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Environmental Health Approaches to Dengue Vector Control: A Mixed-Methods Review of Marigold, Fermented Ovitraps, and Community-Based Monitoring

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ABSTRACT

***Background**: Community participation is central to dengue prevention, but evidence for educational promotion of live marigold and fermented ovitraps is heterogeneous.* ***Objective:** To critically synthesize available educational, laboratory and field observations and propose appropriately matched environmental-health indicators.* ***Methods:** A focused, purposively assembled mixed-evidence narrative review considered 15 categorized sources; database searches and selection counts were not documented, and no meta-analysis was attempted.* ***Results:** Among 400 volunteers, positive attitudes were associated with prevention practices (OR 1.69). In a school study, reported knowledge scores rose from 57.18 to 82.84 and practice scores from 55.64 to 79.74, but the source reports conflicting sample sizes (60 versus 90). A marigold flower fraction showed laboratory larvicidal activity (LC50 18.80 µg/mL); this does not establish effectiveness of live plants. Fermented-ovitrap stations recorded higher descriptive counts than plant-associated stations in a short field comparison, although inconsistent means and non-equivalent sampling mechanisms prevent causal comparisons.* ***Conclusion:** Educational and surveillance applications are plausible, but neither reduced larval indices nor dengue incidence has been demonstrated for the combined package. Transparent controlled field evaluation is required.*

***Keywords:** Dengue, Aedes Aegypti, Marigold (Tagetes Erecta), Fermented Ovitrap, Health Cadres, School-Based Health Promotion, Community Nursing, Environmental Health*

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INTRODUCTION

Dengue remains a major environmental-health problem in Indonesia. In 2024, the highest-burden year on record, WHO received reports of 14,434,584 dengue cases worldwide, including 257,271 cases in Indonesia (World Health Organization, 2025). Because there is no specific antiviral treatment, prevention still rests on reducing the abundance of, and human contact with, Aedes aegypti and Aedes albopictus, whose immature stages develop in artificial water containers in and around homes and schools. Vector control is therefore, in essence, an intervention on the living environment.

Indonesia's national approach is mosquito-nest eradication (PSN) through the 3M Plus package, monitored with the larva-free index (Angka Bebas Jentik, ABJ), for which a national target of at least 95% is used (Rochmat et al., 2026, pp. 269–270). Reliance on fogging and chemical control is constrained by insecticide resistance, documented in Indonesian Aedes aegypti populations (Ridha et al., 2025; Sofiana et al., 2023; Wuliandari et al., 2020), and by ecological side effects, which has encouraged community-based and ecologically sound alternatives; non-chemical options such as Wolbachia-infected mosquito releases have also shown efficacy in Yogyakarta (Utarini et al., 2021). Systematic reviews indicate that community engagement can strengthen prevention behavior, although sustainability depends on local ownership, program design, and health-system support (Arfan et al., 2024; Naing et al., 2023). A review of household-level interventions similarly concluded that well-implemented measures reduce Aedes infestation but do not by themselves guarantee full mosquito control (Montenegro-Quiñonez et al., 2023). Local evidence shows both the gap and the promise: village readiness and household practices such as growing repellent plants remain uneven (Siyam et al., 2024), whereas participatory action research with cadres was followed by a higher larva-free index in Samarinda (Ridha et al., 2024). School-based education reliably improves knowledge, although evidence for changes in practice is weaker (Dapari et al., 2025).

Two low-cost tools are promoted in Indonesian community programs. The first is marigold (Tagetes erecta; bunga tahi ayam, kotok, gemitir), an ornamental plant whose flower fractions have shown larvicidal and repellent activity in the laboratory (Purnama et al., 2025); related Tagetes and other Asteraceae extracts and oils also show larvicidal or biting-deterrent activity against Aedes aegypti (Ali et al., 2016; Dwianto et al., 2026). The second is the fermented ovitrap, an "attract-and-kill" egg trap in which fermented sugar, rice-washing water, or rice-straw infusion makes a dark container more attractive to gravid females (Saleh et al., 2023; Widoretno, 2018). Comparative trials report differing attractant performance (Hartono et al., 2021), and few oviposition cues have been validated in the field (Mulatier et al., 2022); ovitraps are also an established surveillance tool for Aedes populations (Sasmita et al., 2021). The two tools act through different mechanisms repelling versus attracting and trapping and are measured with different indicators, which complicates direct comparison.

Who should deliver these tools, and to whom, is less clear. Field experience in Rejang Lebong, Bengkulu, has involved several audiences: cadres mentored in making fermented ovitraps (Aji et al., 2020), senior high school students taught by health workers and teachers (Aji et al., 2025), and households in urban and rural settings in a 2026 field comparison (Aji et al., 2026). A 2026 textbook by the same group describes target-group strategies, procedures, and evaluation parameters for a combined marigold–ovitrap program (Rochmat et al., 2026). These sources have not previously been read together or set against the wider literature.

This review therefore asks: (1) what roles do cadres, community nurses and health-promotion staff, students, and households play in socializing marigold and fermented ovitraps; (2) what does the evidence show about the entomological potential of each tool; and (3) which environmental-health

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indicators and safeguards are needed to evaluate such a program without overstating its effect on larvae, adult mosquitoes, or dengue incidence?

METHODS

1. Design

This article presents a focused, purposively assembled mixed-evidence narrative review informed by the convergent segregated logic described in JBI methodological guidance (Stern et al., 2020). Quantitative observational, field and laboratory findings were considered separately from educational, implementation and conceptual material and subsequently integrated in a descriptive synthesis. The approach is not a systematic review or a formal mixed-methods systematic review: there was no registered protocol, documented exhaustive search, independent dual screening or standardized risk-of-bias assessment. Consequently, its findings describe the included literature rather than the full evidence base.

2. Source Identification

Sources were purposively selected to address (a) cadre, household, school and nursing participation in dengue prevention; (b) laboratory and field evidence relating to Tagetes erecta; and (c) fermented-ovitrap operation and surveillance. Publications from 2019–2026 and Indonesian or Southeast Asian settings were prioritized. The original review records the themes and year range but does not document database names, exact search strings, search dates, search-hit counts or a reproducible screening log; those details therefore cannot be reconstructed or asserted retrospectively. Search concepts relevant to the retained sources include dengue, Aedes, jumantik, community participation, school, marigold, Tagetes erecta, ovitrap, fermentation, repellent and larvicide; these are descriptive concepts, NOT verified search strings. Eligibility for this focused synthesis required a source to contribute quantitative observations, an identifiable educational or implementation description, or relevant contextual or methodological information. Sources were used only for claims compatible with their designs. The included set comprises 15 sources in the evidence/context classification (Table 1); methodological guidance (Stern et al., 2020) and a second report of the same school dataset (Rochmat et al., 2025) are cited separately rather than treated as independent outcome studies. The complete database search record and selection counts must be supplied from the authors' original records before this manuscript can be described as a reproducible systematic search.

3. Duplicate Reports and Data Handling

The school pretest–posttest dataset is reported in Aji et al. (2025) and Rochmat et al. (2025); its numerical results were not treated as two independent studies. The source describes 60 purposively selected students in its methods but 90 in its results, and class-level counts also conflict. Because participant-level records are unavailable, neither denominator was verified; student score differences are presented as source-reported descriptive findings without recalculated precision estimates. For the household comparison (Aji et al., 2026), the original rural-indoor summary means (6.50 for marigold and 12.33 for ovitrap) disagree with the means calculated from the station counts (7.17 and 12.67). Table 4 identifies recalculated values and uses descriptive ratios only. Numerical discrepancies were not resolved by assuming an unreported dataset, and the original inferential statistics are not interpreted. Trap counts, repellent activity, larval indices and dengue incidence denote different outcomes and were not pooled.

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4. Evidence Tiers and Synthesis

Evidence was organized by design and permissible inference (Table 1), not by a validated risk-of-bias score. Systematic reviews and a cluster-randomized study informed the general community-control context; observational and uncontrolled studies supplied associations or descriptive changes; laboratory testing informed mechanistic plausibility; and a community-service report and textbook informed operational design rather than effectiveness. Appraisal considered presence of comparators, follow-up, outcome validity, conflicting denominators and summary statistics, duplicate reporting, relevance of laboratory formulations to live plants and overlapping authorship. Because no formal domain-level appraisal instrument was applied, evidence tiers must not be read as quality ratings. Data were narratively synthesized without meta-analysis. Only published data were used; no participants were recruited for this review.

Table 1. Evidence Tiers Used in This Review and the Sources Assigned to Each

Tier	Source Type	n	Sources	How Used
A	Systematic reviews, cluster-randomized trial	4	Naing et al. (2023); Arfan et al. (2024); Montenegro-Quiñonez et al. (2023); Bigio et al. (2022)	Framing of community engagement and household-level control
B	Observational, pre–post, field comparison, surveillance	7	Rakhmani and Zuhriyah (2024); Aji et al. (2025); Basir et al. (2024); Aji et al. (2026); Aji (2021); Sasmita et al. (2021); Juhdi et al. (2019)	Behavioral and entomological observations (as published)
C	Laboratory experiment	1	Purnama et al. (2025)	Biological plausibility of marigold; not equated with live-plant effect
D	Mentoring/community-service report, textbook	2	Aji et al. (2020); Rochmat et al. (2026)	Implementation model, procedures, indicators; not effect evidence
Context	Global surveillance report	1	World Health Organization (2025)	Disease burden

RESULTS

1. Cadres and Health Volunteers: Surveillance and Behavioral Reinforcement

In Malang, a cross-sectional study of 400 health volunteers in the "One House One Mosquito Larva Inspector" program found that a more positive attitude was associated with effective prevention practice (OR 1.69; $p < 0.05$); 75.8% always reported their surveillance activities and 65.2% cleaned bathroom water containers at least weekly (Rakhmani & Zuhriyah, 2024). In Rejang Lebong, mentoring environmental-health cadres to make fermented ovitraps was reported to increase cadre knowledge and their ability to teach the community; the report is descriptive and gives no entomological outcome (Aji et al., 2020). Training of jumantik cadres with ovitraps was also reported to improve knowledge among primary and junior high school students in Pangkep (Basir et al., 2024, as cited in Aji et al., 2025). The textbook assigns cadres the routine tasks of recording ABJ, the ovitrap index, and marigold coverage

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during household visits and reporting monthly to the primary health center (Rochmat et al., 2026, pp. 291, 298–299).

2. Households and Community: Building, Placing, and Maintaining

Household members are the primary target group because they maintain the traps and pots daily; community leaders, PKK groups, teachers, and cadres are secondary targets who create social support, and health-center heads and local government are tertiary targets for advocacy and funding (Rochmat et al., 2026, pp. 120–123). The textbook proposes staging marigold programs—initiation with the neighborhood head (RW) and PKK, socialization and planting training, implementation with incentives such as a "yard free of larvae" competition, and monthly monitoring—and integrating them with existing family medicinal plant (TOGA) activities (pp. 290–291). The textbook's city-level examples are illustrative and were not independently verified for this review. Engagement reviews support the participatory logic but also show that benefits fade without local ownership (Arfan et al., 2024; Naing et al., 2023).

3. Students at SMA 10 Rejang Lebong: School-Based Promotion

Aji et al. (2025) describe a one-group pretest–posttest educational activity involving health personnel, teachers and senior high school students. Reported mean knowledge scores rose from 57.18 (SD 6.30) to 82.84 (SD 5.81), a descriptive difference of 25.66 points, while mean practice scores rose from 55.64 (SD 6.19) to 79.74 (SD 6.99), a difference of 24.10 points (reported $p < 0.05$). The methods describe 60 purposively selected students, whereas the results report 90; the class distribution is also inconsistent across sections. No verified analytical sample size, individual observations or paired-score variability are available here. Accordingly, the reported p-value and descriptive score differences cannot be independently validated, and no standardized effect size or confidence interval is calculated. Without a control group or follow-up, maturation, testing and social-desirability effects cannot be separated from the education intervention. The outcomes are scores, not observations of mosquito density, larval indices or dengue cases. The authors recommend curricular integration, student cadres and school–health-office monitoring; these remain proposed applications rather than proven entomological effects.

4. Nurses and Health-Promotion Staff: Facilitation and Evaluation

The textbook positions community nurses as facilitators, trainers of cadres, home-visit supporters, and evaluators who analyze ABJ and household coverage data and feed results back to the health center and district health office (Rochmat et al., 2026, pp. 297–299). This role is described conceptually; no included study evaluated nurse-led delivery against a comparison group. Table 2 summarizes how the four audiences, the available evidence, and the indicators fit together.

Table 2. Target Audiences, Roles in Socialization, Evidence Base, and Measurable Indicators

Audience	Role in Socializing Marigold and Fermented Ovitraps	Evidence Found	Indicators
Cadres (jumantik, posyandu, PKK)	Household visits; larval inspection; weekly ovitrap check; record ABJ and ovitrap index; coach households	Cross-sectional (OR 1.69, n = 400); descriptive mentoring report	ABJ; ovitrap index; % households visited; inspection compliance

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Audience	Role in Socializing Marigold and Fermented Ovitraps	Evidence Found	Indicators
Households and community (RT/RW, PKK)	Build, place, and maintain ovitraps; grow and tend marigold pots; 3M Plus	Engagement reviews; household field counts (Aji et al., 2026)	% households with an active ovitrap; marigold coverage; HI, CI, BI
Students (SMA 10 RL; UKS)	Peer educators; school larva monitors; school sanitation; practices carried home	One-group pre–post: knowledge +25.66, practice +24.10 points	Knowledge and practice scores; school ABJ; student-led inspections
Nurses and health-promotion staff	Training of cadres and teachers; supervision and home visits; data analysis; advocacy to health center and local government	Conceptual/educational (textbook); no controlled evaluation	Cadres trained; supervision visits; ABJ trend; funding allocated

5. Marigold: Laboratory Activity Versus Live-Plant Evidence

Purnama et al. (2025) fractionated a marigold flower extract and tested it against *Ae. aegypti* larvae. The n-hexane fraction was most active (LC50 18.80 µg/mL), followed by the ethyl-acetate fraction (49.69), the crude extract (87.50), and the water fraction (1,046.11 µg/mL). In a repellency test, a cream containing 2% n-hexane fraction gave 88.07% repellency three hours after application, declining to 50.74% at six hours; screening detected flavonoids, polyphenols, steroids/triterpenoids, and mono- and sesquiterpenoids (GC-MS identified o-cymene) but not alkaloids. These are results for processed fractions, applied as larvicide or skin cream, and cannot be transferred to a live plant growing in a yard. Secondary sources, including the textbook and the 2026 field article, attribute marigold's effect to α-terthienyl and pyrethrin-like compounds; because Purnama et al. did not report pyrethrins, that attribution is treated here as unverified (Table 3).

Table 3. Evidence on Marigold (Tagetes Erecta) Against Aedes Aegypti and How Far It Can Be Interpreted

Source and Design	Numerical Result	Interpretation Limit
Purnama et al. (2025), laboratory larvicidal assay	LC50 (µg/mL): n-hexane fraction 18.80; ethyl acetate 49.69; crude extract 87.50; water 1,046.11	Processed extract; 24-h larval test; not live plants
Purnama et al. (2025), repellency on volunteer arm	n-Hexane fraction 2%: 88.07% at 3 h; 50.74% at 6 h (n = 2 replicates)	Cream formulation; short duration; small replication
Aji et al. (2026), live marigold stations in 36 houses	Station counts lower than ovitrap stations (Table 4)	Counts are not repellency or larval reduction; 4-day observation
Rochmat et al. (2026), textbook	Mechanism and planting guidance (pp. 270–272, 290–291)	Educational; no independent effect data

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6. Fermented Ovitraps: Field Counts and Operating Procedure

In a four-day comparison reported for 36 households (18 urban and 18 rural), Aji et al. (2026) presented counts recorded at marigold and fermented-ovitrap stations in indoor and outdoor environments. Based on its station-level figures, the mean at ovitrap stations exceeded that at marigold stations in each reported setting; descriptive ratios range from approximately 1.8 to 2.8 (Table 4). For rural indoor stations, the published summary means (6.50 and 12.33) differ from station-level recalculations (7.17 and 12.67), so the latter are explicitly marked in the table. These inconsistencies and the absence of an adequately described comparable sampling process prevent reliance on reported significance tests or claims that one intervention reduced mosquito abundance more effectively than the other. Crucially, mosquito counts near or within attractant traps and counts at plant-associated stations have different detection mechanisms and cannot be assumed to estimate the same mosquito population. Neither arm directly measures larval reduction, community mosquito suppression, or dengue incidence. The station counts are used here only to generate provisional surveillance and placement hypotheses. Other Indonesian ovitrap surveillance reports provide contextual support for monitoring Aedes distribution (Aji, 2021; Juhdi et al., 2019; Sasmita et al., 2021), not independent validation of this head-to-head comparison.

Table 4. Descriptive Mean Recorded Counts per Station by Setting (Aji et al., 2026); Non-Equivalent Detection Methods, Not Comparative Vector-Control Effects

Setting (no. of Stations)	Marigold Stations (Mean)	Fermented Ovitrap Stations (Mean)	Ratio Ovitrap : Marigold	Highest Ovitrap Station
Urban indoor (6)	3.50	8.00	2.3	Storage room (13)
Urban outdoor (5)	7.40	20.40	2.8	Backyard garden (32)
Rural indoor (6)	7.17 (recalculated)	12.67 (recalculated)	1.8	Storage room (18)
Rural outdoor (5)	10.80	25.60	2.4	Backyard garden (35)

The textbook specifies a practical procedure (Rochmat et al., 2026, pp. 273, 292–294): a 1.5-L plastic bottle cut and inverted as a funnel and painted black; an attractant of dried rice straw, a tablespoon of brown-sugar solution, or rice-washing water (an alternative recipe is 1 L of water, 2 tablespoons of sugar, and half a teaspoon of baker's yeast, replaced weekly); two to three days of fermentation in shade; gauze over the opening to prevent adult emergence; two to four traps per house in shaded outdoor places; and inspection every five to seven days, discarding contents onto dry ground or treating with hot water rather than pouring them into drains. Table 5 pairs these steps with environmental-health safeguards that we derived from them.

Table 5. Fermented Ovitrap Procedure (Rochmat et al., 2026) and Environmental-Health Safeguards

Step	Specification in the Textbook	Safeguard for Community Delivery
Container	Reused 1.5-L plastic bottle, funnel inverted, painted black	Use waste bottles; keep intact so the trap does not leak or become a breeding site

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Attractant	Rice straw, brown-sugar solution, or rice-washing water; ferment 2–3 days in shade	Label preparation date; keep away from children and pets; avoid strong odor near living areas
Mesh	Gauze or stocking secured with a rubber band	Cadre checks that the mesh is intact at every visit
Placement	2–4 traps per house; cool, humid, shaded, rain-protected outdoor spots	Prioritize backyard gardens and back porches, where counts were highest (Aji et al., 2026)
Maintenance	Inspect every 5–7 days; empty onto dry soil or use hot water; scrub and refill	Weekly inspection fixed on the jumantik schedule so immatures cannot complete development
Recording	Ovitrap index and eggs per trap (weekly)	Cadre reports to the health center; nurse reviews trends

7. Integrated Indicator Framework

Because the evidence supports education outcomes better than entomological or epidemiological outcomes, indicators should be matched to what each level can legitimately show (Table 6). The textbook recommends the container index, house index, Breteau index, ovitrap index, and adult density as entomological parameters, ABJ as the national program indicator, and landing rate as a proxy for marigold and ovitrap index or eggs per trap as proxies for ovitraps (Rochmat et al., 2026, pp. 268–270). Its strategy table also differentiates urban dense, planned housing, rural agrarian, and coastal settings (pp. 300–301).

Table 6. Indicator Framework for a Cadre–Nurse–School–Household Promotion Program

Level	Indicator	Source and Frequency
Input	Cadres, teachers, students, and nurses trained; ovitrap materials and marigold seedlings distributed	Program records; per activity
Process	Promotion sessions held; % households visited; weekly ovitrap inspection compliance; marigold pots without standing water	Cadre logbook; weekly/monthly
Output	Knowledge and practice scores (pre–post); % households with an active ovitrap; marigold coverage	Questionnaire; household survey; baseline, 4, 8, 12 weeks
Entomological outcome	ABJ (target ≥ 95%); house, container, and Breteau indices; ovitrap index and eggs per trap; adult density	Jumantik survey; ovitrap records; monthly
Epidemiological outcome	Dengue incidence per 100,000	Only with prospective case surveillance and a clear case definition

DISCUSSION

1. Education Is the Best-Supported Component; Entomological Impact of the Package Is Not Yet Shown

Across the sources, delivery by trained cadres, nurses, teachers, and peers is associated with

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better knowledge and practice, but no included study measured larval indices or dengue incidence after delivering marigold and fermented ovitraps together. The SMA 10 results show large score gains (about 25 points) but come from a single-group design with reporting inconsistencies and no follow-up, which is consistent with the original report's own caution (citing Basir et al., 2024) that knowledge gains are not always significant without direct practice and ongoing mentoring. These findings are best read as evidence of feasibility and acceptability among students rather than proof of vector reduction.

2. The Four Audiences Play Complementary, Not Interchangeable, Roles

Cadres are the monitoring backbone: they connect households to the health center, carry out weekly inspection, and generate ABJ and ovitrap data. Students extend reach into schools and homes and address school-specific breeding sites; the UKS provides an institutional home for "student larva monitors." Nurses and health-promotion staff supply facilitation, training of trainers, supervision, and feedback, and can translate data into advocacy for the tertiary target group, such as allocating operational health funds. Households determine whether any device remains safe and functional after the first week. This division of labor matches the participatory evidence on benefits and barriers (Arfan et al., 2024; Naing et al., 2023) and explains why the same ovitrap may succeed or fail depending on who inspects it.

3. Marigold Should Be Framed as a Complementary and Educational Measure

Laboratory data support biological plausibility (Purnama et al., 2025), but they concern processed fractions, and field evidence for live plants rests on station counts that do not measure repellency or larval reduction. Marigold has real program value as an ornamental, low-cost, community-friendly entry point for conversation, school gardens, and TOGA activities. Its use should not be presented as a substitute for container management, and pots and saucers must not hold standing water; otherwise, the plant itself becomes a breeding site.

4. Fermented Ovitraps Are the Better-Supported Tool but Need Disciplined Maintenance

Fermented ovitraps have an established role in Aedes surveillance (Sasmita et al., 2021). The 2026 station comparison reported higher observed counts at fermented-ovitrap stations, particularly in some garden settings, but this should be interpreted as observed attraction/capture under the reported station arrangements, not as proof of population reduction or superior disease prevention. Between-device comparisons are susceptible to differences in attractant mechanism, placement, sampling opportunity, maintenance, season and observation time. The short observation period and inconsistent rural-indoor summaries add uncertainty. Operationally, a covered, routinely serviced ovitrap may support monitoring, whereas a neglected water-holding device may create a breeding risk. Placement recommendations should therefore be piloted and monitored rather than treated as established effectiveness rankings. Fermented ovitraps complement routine breeding-site removal under 3M Plus; reductions in larval indices or dengue cases require distinct, appropriately controlled outcome studies.

5. Setting Matters

The 2026 article suggests marigold for rural and ovitraps for dense urban settings, but its own counts show higher ovitrap counts in both. The textbook's typology (urban dense, planned housing, rural agrarian, coastal) is more useful as a planning tool: rural areas with abundant rice straw can make

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ovitraps cheap to scale, while dense urban areas need vertical marigold pots and compact trap placement. This remains a proposal to be tested.

6. Recommended Evaluation

A cluster-controlled before–after study at neighborhood or sub-district level would compare an intervention arm (cadre-, nurse-, and school-delivered promotion plus marigold demonstration and standardized fermented ovitraps) with routine PSN, measuring baseline and weeks 4, 8, and 12. Primary outcomes should be the house index or container index; secondary outcomes include the Breteau index, ovitrap index, knowledge and practice, and inspection compliance. Analysis should use difference-in-differences or mixed models accounting for household clustering and season, report confidence intervals, and avoid claims about dengue cases unless cases are prospectively monitored. Human-subject research requires ethical approval.

7. Limitations

Several limitations materially restrict the inferences. First, the set was purposively assembled and lacks documented databases, search dates, executable strings, flow counts and a formal risk-of-bias instrument; omission and selection bias cannot be quantified. Second, five of the 15 categorized sources are from the authors' group, including prominent local studies and an implementation textbook. This overlap raises the possibility of preferential inclusion, correlated assumptions, allegiance effects and selective interpretation; duplicate publication of the school dataset could further exaggerate its apparent weight if not identified. To mitigate double counting, the two school reports are treated as one dataset, and author-group materials are described separately from independent systematic reviews and surveillance studies. Nevertheless, no independent re-analysis or external replication was performed, so the potential bias remains. Third, the school's 60-versus-90 sample discrepancy and the field study's rural-indoor mean discrepancy preclude validated secondary estimates. Fourth, laboratory-tested extract fractions do not demonstrate field repellency of live marigold plants. Fifth, counts from devices with different attraction/detection mechanisms cannot establish comparative control effectiveness. Finally, no included controlled study measured the combined package's effect on larval indices, adult vector density or dengue incidence. Conclusions therefore concern educational feasibility, descriptive surveillance observations and testable implementation proposals, not demonstrated dengue prevention.

CONCLUSIONS

The included literature suggests that cadres, community nurses and health-promotion staff, students and households may undertake complementary roles in dengue-related education, device maintenance and environmental surveillance. Some educational studies report improved knowledge or practice scores, but uncontrolled designs and inconsistent denominators weaken causal confidence. Fermented ovitraps can provide observable mosquito/egg-surveillance information when appropriately constructed, covered and maintained; the available station counts do not demonstrate reduced mosquito abundance, lower larval indices or fewer dengue cases. Larvicidal and repellent results from processed Tagetes erecta fractions cannot be generalized to live marigold plants. Marigold planting should therefore be described as a potential complementary educational activity, not a validated control intervention. Controlled, independently evaluated field studies with standardized trap definitions, harmonized sampling, larval indices and transparent reporting are needed before any claims of combined-package effectiveness or dengue prevention can be made.

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