RESEARCH ARTICLE

Development and Preliminary Evaluation of a Dengue Hemorrhagic Fever Problem-Solving Model through the District Health Board (DHB) in Namon District, Kalasin Province

Supoth Sabangban[1*]

[1] Namon District Public Health Office, Namon District, Kalasin Province, Thailand

*Corresponding author

☐ **Received:** 15 April 2026 ✓ **Revised:** 20 April 2026 ☑ **Accepted:** 30 April 2026

Citation: Sabangban S. Development and preliminary evaluation of a dengue hemorrhagic fever problem-solving model through the District Health Board (DHB) in Namon District, Kalasin Province. Thai Health Sciences Frontiers. 2026;1(1):30–43.

Abstract

This research and development study aimed to examine the situation, develop a model, and evaluate the outcomes of solving dengue hemorrhagic fever (DHF) problems through the District Health Board (DHB) using a participatory larvivorous gourami fish innovation. The study was conducted from January 2025 to April 2026. The sample comprised 381 residents and 204 dengue-prevention network partners (n = 585), calculated using the finite-population proportion formula and selected by proportional stratified random sampling by subdistrict. Research instruments were group-process and community-forum guides, the R506 surveillance report, an Aedes larval index survey form (HI/CI), a larvae-consumption record form for surface-feeding predatory fish, and an innovation satisfaction questionnaire. Data were analyzed using descriptive statistics, independent t-test, and chi-square test at a significance level of 0.05.

Preliminary data (2010–2018) showed that dengue in Namon District followed an alternate-year pattern. In 2015 there were 80 cases (204.21 per 100,000 population), mostly students aged 10–14 years, and container indices (CI) in 2013–2015 were 17.16, 12.58 and 13.66. The model comprised six UCCARE-based measures driven through the DHB and the district Emergency Operations Center (EOC). Gourami fish consumed 18.45 larvae per fish per day (5,535.00 larvae per 30 fish over 10 days). In the 2016–2018 pilot phase, cases were 21, 36 and 5 (2018 incidence 12.76 per 100,000) and satisfaction scores rose from 31.96 to 42.06 ($t = -28.23$, $p < 0.001$). From January 2025 to April 2026, 16 cases were reported (40.82 per 100,000) with no deaths; House Index (HI) decreased from 8.21 to 3.08, CI from 7.94 to 2.91, and satisfaction rose from 33.48±5.12 to 41.37±6.84 ($t = -22.34$, $p < 0.001$). The DHB-driven model strengthened collaboration among network partners and communities and may be scaled up to neighboring districts after confirmation in a controlled study.

Keywords: Dengue hemorrhagic fever, District Health Board, community participation

Introduction

Dengue hemorrhagic fever is an Aedes-borne communicable disease that has increased faster than other communicable diseases. The World Health Organization reported that the number of reported cases rose from 505,430 in 2000 to 14,434,584 in 2024, with 11,201 deaths.[1] In Thailand, clear outbreaks have been reported since 1958, beginning in Bangkok and then spreading to all regions. In 1987, the highest number of cases ever recorded was reported (174,285 cases, 1,007 deaths), and in 2018 there were 85,849 cases, an incidence of 129.96 per 100,000 population.[2] In 2025 (as of 19 August 2025), 38,687 cumulative cases (59.60 per 100,000 population) and 37 deaths were reported, which was below the 5-year median, but the country was still in the epidemic season requiring surveillance.[3]

In Namon District, Kalasin Province, dengue showed an increasing trend in 2013–2015, with incidence rates of 156.81, 180.56 and 204.21 per 100,000 population, respectively (based on a 2015 mid-year population of approximately 39,175). In 2015 there were 80 cases (44 female, 36 male); the 10–14-year age group was most affected (23 cases), students were the most affected occupation (58 cases), and cases peaked in November (13 cases). Namon Subdistrict had the highest incidence (659.90 per 100,000 population). Identified risk factors were the rainy season, larval indices above the standard, travel to epidemic areas, and failure to protect oneself from mosquito bites.[4] At the same time, communities lacked temephos (Abate) sand and guppies, so Uthaiwan Subdistrict Health Promoting Hospital in Lak Liam Subdistrict developed a gourami larvivorous fish innovation using local resources and found it highly effective in controlling Aedes larvae.[5] After district-wide scale-up, there were 21, 36 and 5 cases in 2016–2018, respectively. However, this work had not yet been systematically elevated to the DHB agenda, and its sustainability in subsequent years still needed to be monitored.

The District Health Board (DHB) was established under the Regulation of the Office of the Prime Minister on Area-Based Quality of Life Development B.E. 2561 (2018) to integrate the work of the public, private and civil sectors in solving health problems in line with the local context.[6] It uses the UCCARE components of the District Health System (DHS) as its operational framework,[7] comprising six components: Unity district health team, Customer focus, Community participation, Appreciation, Resource sharing and human development, and Essential care. Previous studies found that the participation of network partners and communities is a key mechanism for dengue prevention and control,[8-10] and the effectiveness of various larvivorous fish has been studied;[11] however, no study has developed a dengue problem-solving model that integrates the gourami larvivorous fish innovation into the DHB mechanism. This is the knowledge gap addressed by the present study.

Therefore, the researcher developed a dengue problem-solving model through the Namon DHB, building on the preliminary data and the gourami larvivorous fish innovation, from January 2025 to April 2026. The findings are expected to guide the DHB and related agencies in community-based dengue control and in scaling up to neighboring districts.

Research Objectives

1. To examine the situation and risk factors of dengue hemorrhagic fever in Namon District, Kalasin Province.
2. To develop a dengue problem-solving model through the District Health Board (DHB) using a participatory gourami larvivorous fish innovation.
3. To evaluate the effects of the developed model on the disease situation, Aedes larval indices, and satisfaction with the innovation.

Methods

This participatory research and development (R&D) study used the UCCARE framework together with the district Emergency Operations Center (EOC). It was conducted in Namon District, Kalasin Province, from January 2025 to April 2026 (16 months) in two cycles: Cycle 1 (R: Research) analyzed the situation, defined measures and network-partner roles, and implemented them; Cycle 2 (D: Develop) drew lessons learned, revised the measures, and continued implementation, as detailed below.

Population

Residents and dengue-prevention network partners in the 5 subdistricts and 67 villages of Namon District, comprising 36,550 residents and 431 network partners (local administrators, community leaders, public health officers, village health volunteers [VHVs] and volunteers).

Sample

The sample size was calculated using the formula for estimating a proportion in a finite population,[12] with a 95% confidence level (Z = 1.96), an acceptable error of 0.05 and a maximum proportion of 0.5, yielding 381 residents and 204 network partners (585 in total). Pre- and post-implementation assessments were collected from independently drawn samples (different sets of participants), with a 100% response rate. The sample was allocated proportionally by subdistrict: Namon 201, Yot Kaeng 126, Song Plueai 112, Lak Liam 82 and Nong Bua 64. Simple random sampling was performed by lottery from household lists (one representative per household) and network-partner lists; if a selected participant could not be found, the next name on the list was used.

Inclusion Criteria

1) Aged 20 years or older and residing in Namon District for at least 1 year; 2) a household representative or a network partner involved in dengue prevention and control; 3) able to communicate in Thai and willing to participate.

Exclusion Criteria

1) Illness preventing the provision of information; 2) moving out of the area during the study; 3) withdrawal from the study.

Research Instruments

The instruments consisted of 1) activity tools: group interview guides, group processes and community forums for situation analysis, defining measures and network-partner roles, lessons learned and revision of measures; and 2) data collection tools: (2.1) the R506 report form; (2.2) the Department of Disease Control Aedes larval index survey form (HI/CI); (2.3) a record form for the larvae-consumption experiment of surface-feeding predatory fish; and (2.4) a satisfaction questionnaire on the gourami larvivorous fish innovation, adapted from the Department of Health innovation satisfaction form,[13] with 5 domains and 10 items (total score 50). Scores were interpreted using Bloom's criteria[14] at 5 levels: Level 1 (10.00–17.99), Level 2 (18.00–25.99), Level 3 (26.00–33.99), Level 4 (34.00–41.99) and Level 5 (42.00–50.00). Content validity was reviewed by 3 experts (IOC = 0.67–1.00), and reliability was 0.89 (Cronbach's alpha).

Data Collection

Data collection comprised 8 steps: 1) collecting and analyzing the situation, risk factors and preliminary data for 2010–2018 (Jan–Mar 2025); 2) a DHB meeting to define measures and activities using the gourami larvivorous fish innovation (Apr 2025); 3) defining network-partner roles (May 2025); 4) implementing the measures and roles (Jun–Dec 2025); 5) drawing lessons on problems, obstacles and solutions (Jan 2026); 6) revising the measures and network-partner roles (Feb 2026); 7) implementing the revised measures (Mar–Apr 2026); and 8) summarizing lessons learned and analyzing data (Apr 2026). The efficacy experiment tested 13 species of surface-feeding predatory fish, 30 fish per species, selecting the healthiest and largest individuals. Fish were kept in 160-liter jars filled with 120 liters of water and covered with fine mesh, starved for 2 days, and then given batches of 100 Aedes larvae over a 10-day life cycle; the number of larvae eaten between 06:00 and 18:00 was recorded daily. Data were collected by trained public health officers and VHVs. HI/CI surveys of sampled households and satisfaction assessments were conducted before (Jan–Mar 2025) and after implementation (Apr 2026).

Data Analysis

Data were processed using RStudio (R version 4.4.1). Descriptive statistics included frequency, percentage, mean ($\bar{x}$) and standard deviation (S.D.). Inferential statistics included the independent t-test to compare satisfaction scores before and after implementation and between network partners and residents, and the chi-square test to compare the proportion of households with Aedes larvae before and after implementation. The significance level was set at .05, and mean differences were reported with 95% CIs. Case trends were analyzed using the 5-year retrospective median and exponential smoothing forecasts.

Research Ethics

This study adhered to the ethics of human research. The researcher explained the objectives and procedures to participants, who gave voluntary written informed consent. Data were kept confidential and presented in aggregate, and participants could withdraw at any time without affecting the services they received.

Results

1. Situation and Risk Factors of Dengue Hemorrhagic Fever in Namon District

1.1 Preliminary data, 2010–2018. Namon District showed an alternate-year epidemic pattern. In 2015, 80 cases were reported, 33.33% above the 5-year median (median = 60 cases in 2010–2014), and exponential smoothing forecasts indicated an upward trend. The incidence was 204.21 per 100,000 population (95% CI 161.93 to 254.16), with no deaths; 44 cases were female and 36 male (1.22:1). The 10–14-year age group was most affected (23 cases), followed by 5–9 years (21) and 15–24 years (16). By occupation, there were 58 students, 11 farmers and 4 dependents, and cases peaked in November (13 cases). CI values in 2013–2015 were 17.16, 12.58 and 13.66, respectively. Containers most often positive for larvae were household drinking and domestic water containers (79.85%), followed by plants (10.13%), tires (5.20%) and waste (4.80%).

1.2 Situation during implementation. From January 2025 to April 2026, 16 cases were reported (14 in 2025 and 2 in January–April 2026), an incidence of 40.82 per 100,000 population (16 months; 95% CI 23.33 to 66.29; equivalent to 30.62 per 100,000 per year), with no deaths. The 14 cases in 2025 were 54.84% below the 5-year median (median = 31 cases in 2020–2024). Of the 16 cases, 9 were male (56.25%) and 7 female (1.29:1). The 5–9-year age group was most affected (5 cases), followed by 10–14 years (4) and 15–24 years (3). By occupation, there were 9 students, 3 dependents and 2 farmers; cases peaked in August (4 cases). The disease was controlled within the first generation in all 12 affected villages, i.e., no new cases occurred in the same village within 28 days of the onset of the first case.

2. Development of the Dengue Problem-Solving Model through the DHB

2.1 Steps and activities of model development. Eight steps were carried out from January 2025 to April 2026, with the District Chief Officer as commander and the District Public Health Office as secretariat, operating jointly with the district Emergency Operations Center (EOC), as shown in Table 1.

Table 1 Steps, activities, tools, duration and academic rationale of model development

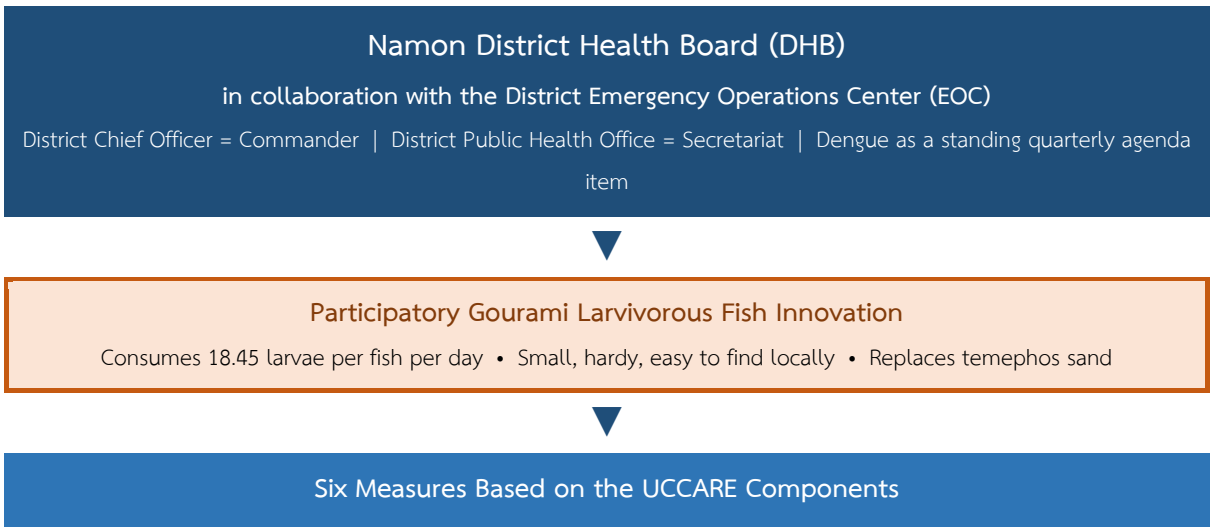
Step	Activity/Content	Tools	Duration	Academic Rationale
1	Collect and analyze the situation, risk factors and preliminary data for 2010–2018	R506 report, HI/CI survey form, group interviews	Jan–Mar 2025 (3 months)	Use epidemiological data to identify risk areas and shared problems[4]
2	DHB meeting to define measures/activities in 6 areas based on UCCARE and activate the EOC during outbreaks	Community forum and group process	Apr 2025 (1 month)	The DHB integrates the public, private and civil sectors to solve health problems[6,7]
3	Define network-partner roles (District Chief Officer, DHO, SHPHs, LAOs, community leaders, VHVs, volunteers)	Community forum and group process	May 2025 (1 month)	Participation of network partners and communities is a key mechanism of disease control[8,9]
4	Implement measures: train VHVs/volunteers, catch gourami fish together, distribute fish, build holding ponds, and campaign to eliminate breeding sites	Gourami fish, fish holding ponds, HI/CI survey form, R506 report	Jun–Dec 2025 (7 months)	Biological control replaces scarce temephos sand; gourami are small, hardy and easy to find locally[5,11]
5	Draw lessons on problems, obstacles and solutions	Group process	Jan 2026 (1 month)	Reflect on practice to improve the next development cycle
6	Revise measures/activities and network-partner roles based on lessons learned	Community forum and group process	Feb 2026 (1 month)	Continuous research and development (R&D) cycle
7	Implement revised measures and collect post-implementation HI/CI and satisfaction data	HI/CI survey form, satisfaction questionnaire	Mar–Apr 2026 (2 months)	Evaluate against the HI/CI <10 criterion and satisfaction levels using Bloom's criteria[14]

Step	Activity/Content	Tools	Duration	Academic Rationale
8	Summarize lessons learned and perform statistical analysis	RStudio	Apr 2026 (1 month)	Summarize the model for district-level scale-up

2.2 The developed model comprised six UCCARE-based measures: 1) Unity district health team: activating the EOC during outbreaks, holding situation-analysis meetings at least monthly, issuing weekly outbreak alerts through the district situational awareness team, and driving the gourami fish innovation policy into communities; 2) Customer focus: promoting gourami fish instead of temephos sand and building gourami holding ponds in communities; 3) Community participation: catching gourami fish together and distributing them for use in communities; 4) Appreciation: campaigns to eliminate larval breeding sites run by community members themselves, supported by health officers, VHVs and local administrative organizations (LAOs); 5) Resource sharing and human development: mobilizing 100% of health officers, volunteers and VHVs during outbreaks and preventing second-generation cases; and 6) Essential care: 24-hour consultation with on-call physicians and timely referral. The DHB also made dengue a standing agenda item at its quarterly meetings and set subdistrict-level HI/CI indicators, as shown in Figure 1.

2.3 Efficacy of surface-feeding predatory fish. Among the 13 species tested, the climbing perch consumed the most larvae, 93.15 larvae per fish per day (Mean±SD = 27,946.20±480.22 larvae/10 days), followed by the gourami, 18.45 per fish per day (Mean±SD = 5,535.00±56.63), and the goby, 18.03 per fish per day (Mean±SD = 5,410.10±109.39), whereas guppies consumed only 5.10 per fish per day (1,528.80 larvae/10 days). The gourami was selected for this model because it is small, hardy, easy to find in communities, and less fishy-smelling than the climbing perch and the goby.

Figure 1 Model obtained from the development



U – Unity district health team

District-level collaboration

Activate EOC during outbreaks; monthly situation analysis; weekly alerts

C – Customer focus

Responding to service users' needs

Use gourami fish instead of temephos sand; build community fish holding ponds

C – Community participation

Network and community participation

Catch gourami fish together and distribute them in communities

A – Appreciation

Working to create value

Communities eliminate breeding sites themselves, supported by health officers, VHVs and LAOs

R – Resource sharing

Resource sharing and human development

Mobilize 100% of health officers, volunteers and VHVs during outbreaks

E – Essential care

Context-appropriate essential health services

24-hour consultation with on-call physicians and timely referral

▼

Two Research and Development (R&D) Cycles

Situation analysis ⟶ Define measures/partner roles ⟶ Implement ⟶ Lessons learned ⟶ Revise measures ↺

▼

Outcomes (Jan 2025 – Apr 2026)

16 cases, no deaths • Disease controlled within the first generation

HI 8.21 ⟶ 3.08 • CI 7.94 ⟶ 2.91 • Satisfaction 33.48 ⟶ 41.37 ($p<0.001$)

3. Effects of the Developed Model

3.1 Comparison of satisfaction scores before and after implementation. In the pilot phase, the 592 participants were 57.60% female and 42.40% male, aged 20–65 years (mean 47.65 years); most were married (54.90%) and farmers (42.40%). In the DHB phase, participants were 58.12% female, with a mean age of 48.20±10.94 years, and 40.17% were farmers. In the pilot phase, the total satisfaction score increased from 31.96±4.74 (Level 3) to 42.06±7.23 (Level 5), a statistically significant increase ($t = -28.23$, $p<0.001$), and scores increased in all domains shown in Table 2 (3 of 5 domains). The items with the highest t values were that gourami fish controlled larvae better than temephos sand ($t = -23.01$), followed by cost-effective and participatory use of resources ($t = -22.84$) and safety ($t = -21.07$). In the DHB phase, the total score increased from 33.48±5.12 (Level 3) to 41.37±6.84 (Level 4), a statistically significant increase ($t = -22.34$, $p<0.001$), as shown in Table 2.

Table 2 Comparison of satisfaction scores with the gourami larvivorous fish innovation before and after implementation, by phase (Independent t-test)

Variable	Group	Before		After		Level	$\bar{d}$	95%CI	t	p-value
		$\bar{x}$	S.D.	$\bar{x}$	S.D.					
Total score (max 50)	Pilot 2016–2018	31.96	4.74	42.06	7.23	3⟶5	10.10	9.40-10.80	-28.23	<0.001*
Total score (max 50)	DHB 2025–2026	33.48	5.12	41.37	6.84	3⟶4	7.89	7.20-8.58	-22.34	<0.001*
Gourami better than temephos (max 5)	Pilot 2016–2018	3.19	0.78	4.37	0.95	3⟶5	1.18	1.08-1.28	-23.01	<0.001*
Gourami better than temephos (max 5)	DHB 2025–2026	3.31	0.74	4.29	0.91	3⟶5	0.98	0.88-1.08	-20.14	<0.001*
Cost-effective, participatory resource use (max 5)	Pilot 2016–2018	3.11	0.78	4.33	1.02	3⟶5	1.22	1.12-1.32	-22.84	<0.001*
Cost-effective, participatory resource use (max 5)	DHB 2025–2026	3.22	0.77	4.21	0.96	3⟶5	0.99	0.89-1.09	-19.87	<0.001*
Safety (max 5)	Pilot 2016–2018	3.24	0.74	4.33	1.01	3⟶5	1.09	0.99-1.19	-21.07	<0.001*
Safety (max 5)	DHB 2025–2026	3.35	0.72	4.30	0.93	3⟶5	0.95	0.85-1.05	-19.52	<0.001*

*Statistically significant at p-value <.05

3.2 Comparison of satisfaction scores between network partners and residents. In the pilot phase, network partners had a mean total score of 37.03, higher than residents (35.55) (difference 1.48 points, 95% CI 0.47 to 2.49, t = 2.87, p = 0.004). In the DHB phase, total scores of network partners and residents did not differ significantly either before or after implementation (p = 0.101 and 0.063, respectively), as shown in Table 3.

Table 3 Comparison of satisfaction scores between network partners and residents (Independent t-test)

Variable	Network partners (n = 204)		Residents (n = 381)		Level	$\bar{d}$	95%CI	t	p-value
	$\bar{x}$	S.D.	$\bar{x}$	S.D.					
Total score (max 50), pilot phase 2016–2018	37.03	5.86	35.55	6.12	4/4	1.48	0.47-2.49	2.87	0.004*
Total score (max 50), before, DHB phase	33.92	4.97	33.20	5.21	3/3	0.72	-0.14-1.58	1.64	0.101
Total score (max 50), after, DHB phase	42.05	6.12	41.01	7.01	5/4	1.04	-0.06-2.14	1.86	0.063
Efficacy domain (max 15), after, DHB phase	13.12	1.84	12.84	2.01	5/5	0.28	-0.04-0.60	1.70	0.090

*Statistically significant at p-value <.05

3.3 Effects on the disease situation and Aedes larval indices. In the pilot phase, after implementing the measures in 2016–2018, there were 21, 36 and 5 cases, respectively (2018 incidence 12.76 per 100,000 population), with no deaths. HI values in 2016–2018 were 9.82, 6.52 and 2.36, and CI values were 8.67, 8.58 and 2.36, respectively, decreasing continuously and remaining within the standard (HI and CI <10). The proportion of households with Aedes larvae decreased significantly (χ^2 = 26.72, p<0.001; RR = 0.24, 95% CI 0.13 to 0.44). In the DHB phase, HI decreased from 8.21% to 3.08% (χ^2 = 14.45, p<0.001; RR = 0.38, 95% CI 0.22 to 0.64) and CI decreased from 7.94 to 2.91, as shown in Table 4.

Table 4 Comparison of the proportion of households with Aedes larvae (HI) before and after implementation, by phase (Chi-square test)

Household status	Before (%)	After (%)	χ^2	p-value
Pilot phase: larvae found (HI)	9.82	2.36	26.72	<0.001*
Pilot phase: no larvae found	90.18	97.64		
DHB phase: larvae found (HI)	8.21	3.08	**14.45**	**<0.001***
DHB phase: no larvae found	91.79	96.92		

*Statistically significant at p-value <.05

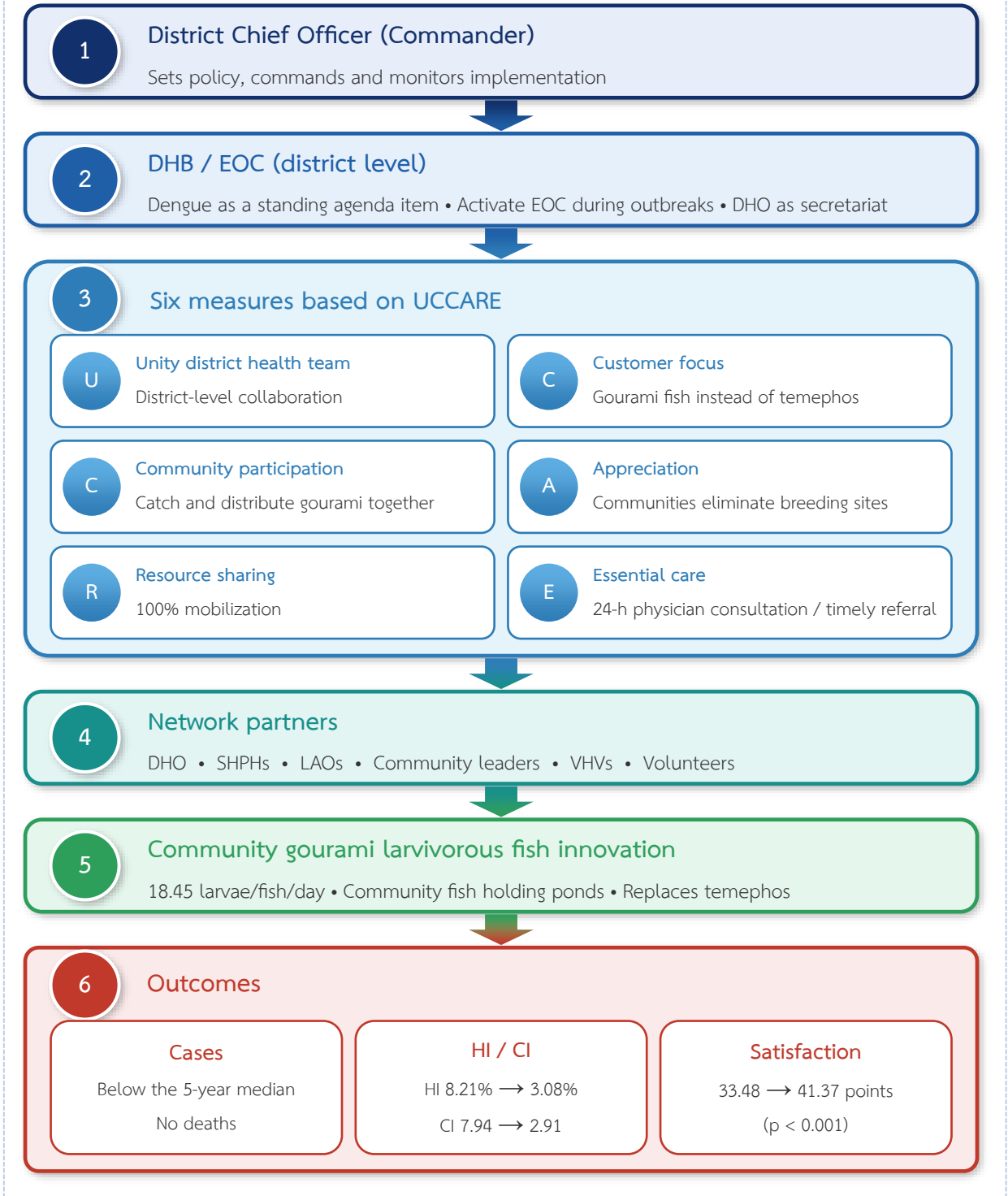


Figure 1 Dengue hemorrhagic fever problem-solving model through the District Health Board (DHB), Namon District, Kalasin Province

Discussion

Dengue in Namon District followed an alternate-year pattern (2010–2015), unlike the report by Chanchainarong Songkhasri,[15] which found two low years followed by two high years. This may relate to differences in topography and rainfall between Namon District and the health

region, as well as population immunity in the area. The age groups most affected were 10–14 and 5–9 years, consistent with that report. A key risk factor was CI above 10 in 2013–2015, with larvae found most often in household drinking and domestic water containers. After the measures were implemented, CI fell continuously below 10, consistent with Aree Phumprawai,[10] who found that work must be driven through communities, with volunteers and VHVs as mechanisms, and requires time to build understanding; where cooperation cannot be obtained, action is taken under the Communicable Diseases Act. The below-median case numbers in 2025–2026 are consistent with the national situation in 2025, which was also below the median,[3] so the results should be interpreted in light of natural epidemic cycles.

The developed model used the UCCARE framework together with the EOC and the DHB, with the District Chief Officer as commander, consistent with Noreenee Tawa and Pawit Chaiwisit[8] and Phakaon Chotking and Prachak Buaphan,[9] who found that network-partner and community participation is a key mechanism of disease control. Because Namon was a strong disease-control district in 2017 and passed the national SRRT standard in 2018, placing dengue on the DHB agenda made command, monitoring and local budget support more systematic.[6] Regarding customer focus, communities lacked temephos sand, feared chemicals and applied incorrect doses, and guppies were found not to eat larvae when larvae were abundant; gourami fish were therefore chosen. Although the climbing perch ate the most larvae, it has a strong fishy odor, whereas the gourami is small, hardy and easy to find. This differs from Kongkaew Ya-oop et al.,[11] who found that Nile tilapia ate the most larvae, followed by guppies and climbing perch. Regarding participation, catching gourami fish together was a group activity that fostered cooperation in rural communities. Regarding resource sharing, Namon is a small district with convenient transportation, strong volunteers and VHVs, and local budget support, enabling 100% mobilization during outbreaks.

After implementation, cases in 2016–2018 (21, 36 and 5) decreased overall but not consistently every year, with no deaths. HI/CI fell below 10, and the disease was controlled within the first generation, with no second-generation cases. Satisfaction increased in all domains, especially efficacy compared with temephos sand, cost-effectiveness and participation, and safety, consistent with Aree Phumprawai,[10] because larval control with locally available gourami fish is low-cost, easy to use and can be done by communities themselves, whereas chemical methods require correct application and dosing by volume and may lead to larval resistance. Limitations of this study include a single-district R&D design without a comparison group; pilot and DHB phase data from different periods; retrospective pilot data following a peak epidemic year, which may involve regression to the mean; pre–post measurements in different seasons; measurement of satisfaction with the innovation before its use; some respondents being implementing network partners; and analysis of summary values not adjusted for seasonality. The observed reductions may also

have been influenced by epidemic cycles, so the results should be interpreted with caution.

Conclusion

The dengue problem-solving model through the Namon DHB comprises six UCCARE-based measures driven jointly with the district EOC using a participatory gourami larvivorous fish innovation. Cases in 2025 were below the retrospective median, Aedes larval indices fell below the standard, and satisfaction increased significantly. However, causality cannot be inferred because there was no comparison group in either the pilot phase or the January 2025–April 2026 implementation phase. Implementation requires time to build understanding and coordinate network partners so that communities can control the disease themselves.

Recommendations

1. Recommendations for applying the findings: 1.1 Measures in each area should be implemented intensively and seriously. 1.2 Leadership and community processes influence the solving of dengue problems. 1.3 Network partners and communities are key mechanisms in driving disease prevention and control. 1.4 Communities should have gourami holding ponds; fish caught from nature should be held for 3–5 days before release, and care should be taken that fish do not jump out when containers are full. 1.5 The DHB should keep dengue as a standing agenda item and continuously set subdistrict-level HI/CI indicators.

2. Recommendations for future research: 2.1 Qualitative studies should be conducted alongside evaluation. 2.2 Comparative studies with neighboring districts should be conducted. 2.3 The model and measures should be tested in other areas. 2.4 The relationships between sex, age and education and dengue preventive behaviors should be studied.

Acknowledgments

This research was accomplished with the kind support of the Kalasin Provincial Chief Medical Officer, who permitted data collection in the area. The author thanks all staff of the Namon District Health Coordinating Committee and the Namon communities for responding to the questionnaires, as well as the Namon District Chief Officer, the DHB committee, local administrative organizations and VHVs for supporting the implementation.

References

1. World Health Organization. Dengue and severe dengue [Internet]. Geneva: World Health Organization; 2025 [cited 2026 Apr 30]. Available from: https://www.who.int/news-room/fact-sheets/detail/dengue-and-severe-dengue
2. Bureau of Vector Borne Diseases, Department of Disease Control, Ministry of Public Health. Weekly dengue situation report [Internet]. Bangkok: Ministry of Public Health; 2018 [cited 2018 May 11]. Available from:

https://ddc.moph.go.th/uploads/ckeditor/6f4922f45568161a8cdf4ad2299f6d23/files/Dangue/Situation/2562/DHF%205%20edit.pdf (in Thai)

3. Jujan S, Mahasing C. Situation and trend of dengue in Thailand, 2025 (data as of 19 August 2025). Weekly Epidemiological Surveillance Report [Internet]. 2025 [cited 2026 Apr 30]. Available from: https://he05.tci-thaijo.org/index.php/WESR/article/view/6538 (in Thai)
4. Namon Hospital. Dengue epidemiological situation report. Strategy and Disease Control Unit. Kalasin: Kalasin Provincial Public Health Office; 2015. (in Thai)
5. Thepkhan D, Phanphiphit P. Gourami larvivorous fish innovation for Aedes mosquito control. Uthaiwan Health Promoting Hospital, Lak Liam Subdistrict, Namon District, Kalasin Province; 2015. (in Thai)
6. Office of the Prime Minister. Regulation of the Office of the Prime Minister on area-based quality of life development B.E. 2561. Royal Gazette. 2018 Mar 9;135(Special Issue 54 D). (in Thai)
7. Ministry of Public Health. Percentage of quality District Health Boards (DHB) [Internet]. Nonthaburi: Ministry of Public Health; [cited 2026 Apr 30]. Available from: https://healthkpi.moph.go.th/kpi2/kpi-list/view/?id=770 (in Thai)
8. Tawa N, Chaiwisit P. Development of a participatory model to enhance community capacity for dengue prevention and control in Khreng Subdistrict, Cha-uat District, Nakhon Si Thammarat Province. Faculty of Science and Technology, Nakhon Si Thammarat Rajabhat University; 2018. (in Thai)
9. Chotking P, Buaphan P. Participation in dengue prevention and control of village health volunteers, Samliam Community, Khon Kaen Municipality. J Off Dis Prev Control 7 Khon Kaen. 2017;24(2):29-37. (in Thai)
10. Phumprawai A. Effect of community participation in dengue prevention at the village level. J Health Health Manag. 2019;5(1):43-52. (in Thai)
11. Ya-oop K, Kulhong B, Soonchan P. Effectiveness of fish in feeding on Aedes larvae. J Off Dis Prev Control 6 Khon Kaen. 2015;22(1):49-55. (in Thai)
12. Kongsomboon K. Epidemiological research. Bangkok: Chulalongkorn University; 2014. p. 51-7. (in Thai)
13. Department of Health, Ministry of Public Health. Writing a satisfaction evaluation form [Internet]. Bangkok: Department of Health; [cited 2020 May 11]. Available from: http://person.anamai.moph.go.th/ewt_dl_link.php?nid=1826 (in Thai)
14. Bloom B, Engelhart M, Furst E, Hill W, Krathwohl D. The classification of educational goals. Handbook I: Cognitive domain. 1956. p. 256-62.
15. Songkhasri C. Dengue forecasting model in the area of the Office of Disease Prevention and Control Region 6, Khon Kaen, 2012. J Off Dis Prev Control 6 Khon Kaen. 2012;20(1):65-81. (in Thai)