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Solving area-based problems through intellectual empowerment: a model for developing village health volunteers' and public health officials' competencies in producing academic work

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This action research aimed to analyse the situation, create, develop, and evaluate the model. Furthermore, reporting the lessons learned from the outcomes. The sample group, chosen through purposive sampling, consisted of 10 village health volunteers and 10 public health officers, all attending sub-district health promotion hospitals. The research tools were a questionnaire on academic performance productivity and records of the participants' academic work. These obtained an IOC value between 0.67 and – 1.00, while the Cronbach's alpha confidence coefficients were 0.84 and 0.86, respectively. The study followed the steps of action research. The data were analysed using descriptive statistics, Wilcoxon signed-rank test statistics, content analysis, and thematic analysis. The results were as follows: 1. Before using the model, the VHVs had the highest capacity in terms of character traits conducive to academic work performance ($\bar{x}$ = 3.24, SD = 0.43), while the public health officials had the highest score regarding attitude towards developing routine work in research ($\bar{x}$ = 3.70, SD = 0.69). VHVs showed increased competency scores (Z = -2.803, p = 0.005; effect size r = 0.63), and public health officials improved in R2R competency (Z = -2.497, p = 0.013; effect size r = 0.56). The qualitative data consisted of (a) problems in producing academic works, (b) the need for academic knowledge, (c) academic potential, (d) obstacles to producing academic works, (e) needs for academic work production, and (f) competencies necessary for academic work production. 2. The model consisted of 5 Ps, namely (a) policy formulation from supervisors, (b) preparation, (c) practice, (d) publication of academic works, and (e) positive reinforcement. 3. After the development of the model, both VHVs and public health officials showed higher competencies to produce academic works than before using the model, with statistical significance at the 0.01 and 0.05 levels, respectively. 4. For the VHVs and public health officials, the key success factors for producing academic works were (a) setting a clear policy, (b) preparation, (c) practical implementation, (d) having a mentor to support academic work production, and (e) using positive reinforcement. Conclusion, the ability of village health volunteers (VHVs) and public health officials to generate academic work is crucial for addressing health issues in a specific area. To enhance their competencies, a model should be employed that involves developing strategic and action plans and organizing workshops. These workshops will encourage the creation of academic work aimed at solving local health problems based on academic principles. These findings suggest that the model effectively strengthens the academic capacity of frontline health workers. The intervention holds potential for scaling within public health policy frameworks to foster evidence-based practices and community-driven health solutions across diverse settings.

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The changing population structure and other changes in the world dynamics affect both positive and negative aspects of health, notably the emergence of new diseases, such as COVID-19, resulting in many patients and deaths. The World Health Organization (WHO) declared the outbreak of COVID-19 to be a Public Health Emergency of International Concern (PHEIC)[1]. Between 2020 and 2023, public health systems had to change their operation model in accordance with the situation. As of 2023, Thailand has over 1,040,000 VHVs nationwide, with each volunteer typically responsible for 20 households (Primary Health Care Division, 2019). that the VHV program significantly improves health knowledge, healthcare-seeking behaviors, and overall community health outcomes.Furthermore, the World Health Organization acknowledged Thailand's effective community-level response to the COVID-19 pandemic, in which VHVs played a crucial role[1,2].

Public health systems, including dimensions of health promotion, disease prevention, treatment, and rehabilitation, are important mechanisms for health management to prevent diseases from occurring or, otherwise, to be ready to overcome them. Following the scientific process, the social dimension for Thailand may involve a method of conduct that is different from that in Western countries. Indeed, by paying attention to the social dimension, especially people's participation in health care as village health volunteers (VHVs), Thailand's health system is clearly distinct.

The Ministry of Public Health started the Village Health Volunteer Project in 1977, before adopting the Alma Ata declaration in 1978 (B.E. 2521), allowing the country to operate public health with the principles of primary health care (PHC) regarding community participation[3,4].

Public health personnel play an important role in health promotion and disease control, driving the policy concerning information, public health knowledge dissemination, health promotion, surveillance, prevention of disease, and so on. VHVs are people who work voluntarily and devote their physical and mental energy, as well as their time, to their work, resulting in public trust[5]. Because, the strength of Thai public health system lies in VHV network and community based upon activities in response to disasters and health issues[4]. VHV is a key factor to link between people living in community and health personnel to drive public health work at community level. As a result, the initiative not only enables healthy and safe communities, but also diminishes vulnerabilities and strengthens resilience.

Village Health Volunteers (VHVs) represent a vital component of the healthcare system, particularly in rural areas where access to healthcare services may be limited. These volunteers, trained by the Ministry of Public Health (MOPH), work closely with local health authorities to provide essential healthcare services, health education, and health promotion activities. VHVs engage in various community-based initiatives, including conducting home visits, organizing health education sessions, and facilitating public health programs such as immunization campaigns. Research, such as the study by Peltzer and Pengpid highlights the significant impact of the VHV program on health behaviors and outcomes in Thailand, demonstrating improvements in health knowledge, healthcare-seeking behavior, and overall health outcomes among community members. Additionally, the VHV program aligns with the principles of primary healthcare and community empowerment advocated by the World Health Organization (WHO), as recognized in their report on primary healthcare workforce innovations. Overall, Village Health Volunteers in Thailand play a crucial role in addressing healthcare disparities, promoting health equity, and improving the well-being of rural populations.

Currently, the Ministry of Public Health has a total of 1,040,000 VHVs[6], who cover all areas of the country. One VHV is generally responsible for taking care of a population of 20 households[7]. All VHVs must undergo training from local public health officials and acquire health knowledge, which they must understand before transferring it. They encourage people in their area to take care of their own health to prevent communicable diseases, non-communicable diseases, and epidemics within their area of responsibility. Therefore, VHVs are crucial in filling the gap in access to public health and promoting knowledge and understanding of self-care in health. During the global spread of COVID-19, the World Health Organization (WHO) praised Thailand for reducing the number of infected people to the point at which there was continuously no infection in the country and stated that Thailand has a health care system at the family level that allows close and thorough care of people[8]. According to the study by Nawsuwan, Singweratham, and Thepaksorn[9], the components and indicators of success in the implementation of COVID-19 control in the community by village health volunteers (VHVs) consisted of five internal factors, namely (1) self-protective behaviours, (2) self-care, (3) correct hand washing, (4) motivation for work, and (5) perceived severity of disease, as well as four external factors, specifically (1) proactive disease control, (2) communication, planning, and following up, (3) information querying, recording, and reporting, and (4) support for equipment and medical supplies.

Previous studies show that VHVs have the potential to take part in solving the health problems or promoting the health of people in their own communities under supervision, controlling and guiding as friends of government personnel. The collaboration with Health Network Association VHV worked with, Health Network Association and various agencies to play as institutional link of myriad networks. Furthermore, the role of VHVs was changed from service providers into health managers and professionals; similarly, their role was leveraged to the health security policy so that people would access health security thoroughly. The VHVs receive support and resources from the private sector in the form of material and financial donations, as well as life insurance and some advantages, privileges and benefits. Intellectual empowerment is the process of enhancing individuals' knowledge, critical thinking, and decision-making skills. It enables them to understand information, solve problems, and participate actively in personal or community development. This empowerment fosters confidence, autonomy, and the ability to make informed choices in various aspects of life and work. It is therefore a process of empowerment that gives individuals the power to perform various behaviours to achieve their

goals. The empowerment process consists of four steps[10], namely step 1: discovering the reality; step 2: critical reflection; step 3: taking charge, and step 4: holding on. It is a continuing process. To succeed in each step, individuals require systematic thinking and a high level of competence. When an individual effectively passes through the four stages of empowerment, they will be able to achieve the desired goals. The use of positive reinforcement methods helps to keep learners motivated and willing to learn as well as achieving academic outcomes[11,12,4].

Village Health Volunteers (VHVs) in Thailand shoulder significant responsibilities in promoting public health and providing essential healthcare services, particularly in rural areas where access to formal healthcare is limited. Trained by the Ministry of Public Health (MOPH), VHVs engage in various tasks such as conducting health education sessions, facilitating community health events, and promoting preventive healthcare measures. They also play a crucial role in identifying health risks within the community, conducting home visits to assess health needs, and referring individuals to appropriate healthcare facilities when necessary. Previous studies underscores the positive impact of VHVs in Thailand, showing improvements in health knowledge and healthcare utilization among community members. Recognized by the World Health Organization (WHO) for their contribution to primary healthcare, VHVs exemplify the importance of community involvement in addressing healthcare disparities and promoting health equity[9,2].

Developing VHVs' competency in solving community health problems in a given area through reliable scientific processes such as continuous quality improvement (CQI), Routine to Research (R2R), innovation research development, and research is therefore essential for empowering their intellectual abilities and developing their potential[13] to solve public health problems and promote healthy lifestyles among the people in their area. They work closely with public health officials as role models and consultants as well as collaborating in producing academic works. According to the study by Semrum, Chankong, and Ratioran[14], the competency components for the development of public health officials regarding R2R are knowledge, ability, skills, supportive characteristics for development, motivation, attitude, self-esteem, and the ability to use research results to improve work from R2R.

Village Health Volunteers (VHVs) in Thailand contribute to academic work through various means, including data collection, program evaluation, knowledge sharing, capacity building, and participatory action research (PAR). As active members of their communities, VHVs offer firsthand insights into local health issues and community dynamics, aiding researchers in data collection and providing valuable perspectives for studies. Additionally, VHVs collaborate with researchers to document their experiences, successes, and challenges in delivering healthcare services, which contribute to program evaluations and case studies. Participation in workshops, seminars, and conferences enables VHVs to share their knowledge and experiences with researchers and policymakers, informing research agendas and study designs[9,2]. Furthermore, VHVs engage in capacity-building activities, such as training programs, to enhance their research skills and understanding of research ethics. In participatory action research projects, VHVs play a central role in problem identification, intervention design, and evaluation, ensuring that research findings are relevant and beneficial to their communities. Overall, VHVs' active involvement in academic work enriches the research process and enhances the understanding of community health issues in Thailand[2].

As mentioned above, this research aimed to study the potential of a new development model for VHVs and public health officials regarding the production of academic work to solve health problems effectively in their area. Therefore, the success of developing VHVs' potential for producing academic works to solve health problems in a given area depends on the factors contributing to sustainability in intellectual empowerment.

Research objectives

1. To study the situation of VHVs' and public health officials' competencies for producing academic works to solve area-based health problems.
2. To create a model for developing village health volunteers' and public health officials' competencies for producing academic works to solve area-based health problems.
3. To evaluate the model for developing competencies for producing academic works to solve area-based health problems.
4. To report the lessons learned from the outcomes of the developed model's implementation.

Research methodology

This research was based on the action research methodology[15,16], which consists of four steps: planning (P), action (A), observation (O), and reflection (R), The research project met the requirements of Human Research Ethics from Phatthalung Provincial Public Health Office (reference: PPHOREC/2565, dated 19 November 2021). All procedures performed in this study were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards. The researcher protected the rights of the sample group by explaining the details, covering the following information: (1) the name of and information about the researchers, (2) the objectives and benefits obtained from the research, and (3) the questionnaire collection process. The names of the respondents were not specified in the questionnaire, and they were assured of (4) confidentiality, (5) presentation of the research results as a whole, and (6) their right to accept or decline research participation or to withdraw from the research at any time without affecting the work of the respondents. All data will be destroyed within 6 months after the results of the research have been published. All methods were performed in accordance with the relevant guidelines and regulations.

Study area
Sribanphot District Public Health Office, Phatthalung Province, Thailand.

Population and sample
Population

1. 466 Volunteers who worked at Tambon health-promoting hospitals and Sribanphot hospitals under the Phatthalung Provincial Public Health Office.
2. 42 Public health officials who worked at subdistrict health-promoting hospitals and Sribanphot hospitals under the Phatthalung Provincial Public Health Office.

Sample
This study is conducted in a small homogenous sample. The participants were recruited from one specific geographical area. Although the current study is based on a small sample of participants the results may not be generalized and extended to wider population, because, there are difference in ethnics group or people from different social contexts, culture, values, beliefs, and lifestyles. however, the volume of the data alongside the process of data handling and analysis, which is committed with an idiographic method, consumes a vast amount of time. This may result in the loss of potentially subtle inflection of meaning and that is the reason why the use of a smaller size is appropriate to be emerging. Purposive sampling was used to recruit a sampling to participate in this study. Purposive sampling was implemented by collaborating with district health administrators to identify VHVs and public health officials who met predefined criteria. Selection focused on individuals demonstrating motivation, availability, and baseline competencies in computer use. Researchers verified eligibility through direct interviews and consultation with local supervisors before enrollment.

1. The VHVs were working at sub-district health-promoting hospitals and Sribanphot hospitals under the Phatthalung Provincial Public Health Office. Ten people were selected through purposive sampling. The inclusion criteria were (a) completion of Grade 6 or higher, (b) computer skills, and (c) determination to produce academic work.
2. The public health officers were working at sub-district health-promoting hospitals under the Phatthalung Provincial Public Health Office. Ten people were selected through purposive sampling. The inclusion criteria were (a) computer skills and (b) determination to produce academic work successfully.

A total of 20 participants were selected: 10 VHVs and 10 public health officials. Recruitment was based on consultations with district health supervisors and assessments of each candidate's readiness and motivation.

Conceptual framework
The researchers applied Gibson's[10] concept of empowerment, which is a social process of recognizing, promoting, and enhancing people's ability to meet their own needs. They are able to manage problems on their own with the available resources to create a feeling that they can control their lives. The factors that influence a person's empowerment process consist of internal factors and external factors, including (1) beliefs, which will result in a person's confidence that they can provide quality care to the best of their abilities, (2) values, which relate to providing care for patients, (3) experience, which enables the development of guidelines for managing the situation and providing effective patient care, and (4) determination, which motivates individuals to acquire the power to perform behaviours to achieve the goals set by a process. Empowerment consists of four steps. Step 1 is knowing oneself and discovering reality and involves a person receiving criticism of their action from others. This might make one feel hesitant and insecure in one's own actions; however, one will realize the problem oneself. Step 2 is critical reflection. At this stage, the person will feel empowered and confident in their knowledge and ability to make decisions. Step 3 involves taking charge. At this stage, the person will decide on the appropriate and best practice. The final step is holding on, which occurs when the chosen method is implemented and the goal is achieved. A person feels confident, empowered, and capable and will retain that behaviour and solution for future use.

Measurement
The first set of measurements was a questionnaire on academic performance productivity in academic work, adapted from the study by Semrum, Chankong, and Ratioran[14], which is an analysis of competency components in the routine research of health personnel at subdistrict health-promoting hospitals in Ubon Ratchathani Province. The questionnaire consisted of two parts: (1) general information about VHVs, namely their gender, age, education level, duration of work as a VHV, submission of academic work for the contest in the past 5 years, and academic work presentation history (seven items); and (2) academic work production competencies, consisting of six aspects, specifically the ability to produce academic work (nine items), academic work (five items), appreciation of academic work production (six items), and the ability to apply academic work (nine items).

The second set was a competency questionnaire for the development of R2R among public health officials, which was adapted from the study by Semrum, Chankong, and Ratioran[14], an analysis of competency components in the routine research of health personnel at sub-district health-promoting hospitals in Ubon Ratchathani Province. It consisted of two parts: (1) general information on health officials, namely their gender, age, education level, duration of work, position, submission of academic work for the contest in the past 5 years, and academic work presentation history, totalling seven items, as well as (2) competency for conducting R2R, consisting of eight aspects, specifically knowledge (seven items), ability to develop R2R (nine items),

traits conducive to conducting R2R (seven items), attitude towards developing R2R (four items), motivation to develop R2R (four items), appreciation of R2R conducting (four items), ability to apply research results from R2R (six items), and ability to present academic work (five items).

The questionnaire used a five-level rating scale, on which only one answer could be selected, from the most practical/agreeing (five points) to the least practical/agreeing (one point). The criteria for categorizing performance levels, using the method of Best[17], contain five levels as follows:

Mean 1.00–1.49 The lowest level of performance.
Mean 1.50–2.49 A low level of performance.
Mean 2.50–3.49 A moderate level of performance.
Mean 3.50–4.49 A high level of performance.
Mean 4.50–5.00 The highest level of performance.

The third set was a group discussion questionnaire about problems, obstacles, and needs for academic production to solve area-based health problems as well as the success of developing the competencies of VHVs and public health officials in producing academic work to solve area-based health problems. The fourth part was a record of academic success, such as presentations at the provincial/regional/national level and journal publications. The experimental protocols were approved by the Institutional Review Board (IRB) of the Phatthalung Provincial Public Health Office (reference: PPHOREC/2565, dated 19 November 2021).

Measurement quality

The questionnaire was checked for content validity by three experts (two public health professors and one research expert); the IOC value was between 0.67 and 1.00. The questionnaire was tested with similar sample groups, namely VHVs (30 subjects) and health officials (30 subjects). The reliability of the first and second sets of the questionnaire was tested using Cronbach's alpha coefficient, obtaining values of 0.84 and 0.86, respectively, while the third and fourth sets of the tool (recorded forms) were understandable and consistent with the objective.

Data collection

The researchers collected data following the action research methodology of Kemmis, McTaggart, and Nixon[16], consisting of four steps: planning (P), action (A), observation (O), and reflection (R), as follows:

Planning (P)

1. Conducting a meeting with the head, assistants, and health scholars of the district public health office of Sribanphot Phatthalung Province to plan for working in collaboration.
2. Running a survey regarding the needs of academic production to solve area-based health problems among VHVs and health officials.
3. Implementing a questionnaire regarding competencies in academic performance with the VHV group and one concerning R2R competencies with the health officials (pre-test).
4. Conducting a group discussion about obstacles and the need for academic production to solve area-based health problems among VHVs and health officials.

Action (A)

1. Organizing five workshops on developing the competencies of VHVs through intellectual empowerment to produce academic works to solve area-based health problems in Phatthalung Province. For group discussions, the researcher acted as a modulator which is pivotal in ensuring effective communication and maintaining a productive atmosphere. Acting as a facilitator encourages VHVs turns to promote equitable engagement, and clarifies and summarizes key points to enhance comprehension. Additionally, the modulator foster constructive dialogue, manage time to ensure topics are addressed efficiently, and facilitate conflict resolution if needed. By promoting active listening and keeping discussions focused and relevant, the modulator plays a vital role in guiding the group of VHVs towards achieving its objectives and fostering a collaborative environment conducive to meaningful exchanges and decision-making, as shown in Table 1.

Observation (O)

During the five workshops, the researchers observed the operation process and found that the problems and obstacles encountered in operation were a lack of continuous information research by public health officials and VHVs, adherence to traditional work processes, and a lack of thinking on innovation development. The researchers then responded by encouraging them to search the database via smartphones, to think outside the box, and to create innovation by using local wisdom.

Reflection (R)

The researchers analysed the contributing factors of and obstacles to the production of academic works and checked whether the workshop met the objectives before offering reflection through a group process and evaluating the results using a questionnaire and the presentation of information. The model was then formulated.

Process of data collection

the researchers contacted the hospital to obtain permission for data collection. Upon receiving authorization, the researcher met with the gatekeepers. The researchers introduced themselves, established rapport, explained the research objectives, emphasized research participant rights, and obtained signed consent forms. Additionally, interview appointments were scheduled, specifying the date, time, and location. Informed consent was obtained

Session	Date	Activities	Grouping format	Time allocation	Session output	VHV involvement
1	29–30 Nov 2021	1. Group discussion on problems and needs in producing academic works 2. Sharing knowledge and experiences in producing academic works 3. Lecture on research topic selection and data searching from reliable databases 4. Writing practice group 5. First learning summary session	Whole group + Small groups	8 h/day (2 days)	Research topic outlines; problem statements	Co-led discussions; shared personal experiences
2	5–6 Jan 2022	1. Group discussion and presentation of research topics with supporting information 2. Lecture on research methodology, sample size, tools, and CQI process 3. Writing practice group 4. Progress presentation 5. Second learning summary session	Lecture + Small groups	8 h/day (2 days)	Drafted methodology sections	Presented draft ideas; helped with peer review
3	3–4 Apr 2022	1. Group discussion and progress presentation 2. Lecture on data collection, recording, and PDCA process (cycle 1) 3. Writing practice group 4. Progress presentation 5. Third learning summary session	Small group + Mentored	8 h/day (2 days)	Data collection tools; peer feedback	Led data planning in small groups
4	18–19 Aug 2022	1. Group discussion and progress presentation 2. Lecture on data analysis, presentation, and PDCA process (cycle 2) 3. Writing practice group 4. Progress presentation 5. Fourth learning summary session	Class-based + Hands-on	8 h/day (2 days)	Initial analysis and results section drafts	Co-developed analysis tables with facilitators
5	19–20 Oct 2022	1. Group discussion and progress presentation 2. Lecture, discussion, and presentation on PDCA process (cycle 3) 3. Writing practice group 4. Oral presentation 5. Fifth learning summary session 6. Reflection on lessons learned and key success factors	Whole group	8 h/day (2 days)	Final project drafts; oral presentations	Presented findings; facilitated summary sessions

Table 1. – Five workshops for developing the competencies of VHVs in Phattalung, Thailand.

from all participants in the study and all procedures were approved by Human Research Ethics from Phatthalung Provincial Public Health Office (reference: PPHOREC/2565, dated 19 November 2021).

Data collection involved questionnaire, in-depth interviews guided by questions, lasting approximately 45 min to 1 h. This is an example of interview guide (1). Could you describe your experiences in producing academic work to solve area-based health problems? What actions did you take? (2). Can you narrate how you in producing academic work to solve area-based health problems.? (3). Can you share about the support you received from public health officials in producing academic work?.

Three qualified experts further refined and validated these interview guidelines: Permission was sought to record interviews, allowing participants to express opinions and answer questions freely. After each interview, the researcher focused on crucial information, summarized points, and took field notes. Field notes and interview recordings were transcribed. Content was interpreted, meanings were deciphered, concepts were grouped, and connections between ideas were established.

Data analysis

The quantitative data were analysed using percentage, mean, standard deviation, minimum, maximum, and Wilcoxon signed-rank test statistics was used because a small sample size. A Shapiro-Wilk test indicated that the test scores were not normally distributed (sig < 0.001).

For the qualitative analysis, we followed content analysis and thematic analysis techniques:

1. Transcripts were read multiple times to gain familiarity.
2. Meaning units were identified, condensed, and coded.
3. Codes were grouped into subthemes and themes by consensus among three coders.
4. NVivo software was used to support organization and retrieval of codes and themes.
5. Member checking was conducted during follow-up sessions to ensure accuracy and confirm the interpretations.

Research results

1. The situation of VHVs and public health officials' competencies in producing academic works to solve area-based health problems.

From Table 2, it was found that, overall, VHVs' competencies in academic work production before the development was at a moderate level ($\bar{x}$ = 2.89, SD = 0.51) (Table 2). The Wilcoxon signed-rank test indicated a significant improvement in VHVs' overall competency in academic work production after participating in the model ($Z = -2.803$, $p = 0.005$). The large effect size ($r = 0.63$) suggests a meaningful change. The 95% confidence interval ([0.29, 0.85]) supports the conclusion that the intervention had a substantial positive impact on VHVs' academic performance capabilities.

For public health personnel, it was concluded that, overall, the competency for producing academic works of public health officials before the competency development was at a moderate level ($\bar{x}$ = 3.23, SD = 0.50) Among public health officials, a statistically significant improvement in R2R competencies was observed post-intervention ($Z = -2.497$, $p = 0.013$). The effect size of $r = 0.56$ reflects a moderate-to-large practical significance.

Competencies	$\bar{x}$	SD	Level
1.Ability to produce academic works	2.58	0.46	Moderate
2.Attitude towards academic work production	3.00	0.73	Moderate
3.Motivation to produce academic works	2.94	0.81	Moderate
4.Appreciation of academic work production	2.98	0.81	Moderate
5.Ability to apply academic works	2.93	0.90	Moderate
6.Ability to present academic work	2.68	0.49	Moderate
Overall	2.89	0.51	Moderate

Table 2. Mean, standard deviation, and level of competency in producing academic works of volunteers for each aspect and item before developing the competencies.

Competencies	$\bar{x}$	SD	Level
1.Knowledge about R2R	2.86	0.77	Moderate
2.Ability to conduct R2R	2.89	0.53	Moderate
3.Habits conducive to conducting R2R	3.27	0.65	Moderate
4.Attitude towards conducting R2R	3.70	0.69	High
5.Motivation to conduct R2R	3.50	0.69	Moderate
6.Appreciation of conducting R2R	3.57	0.69	High
7.Ability to apply R2R results	3.48	0.66	Moderate
8.Ability to present R2R	3.12	0.38	Moderate
Overall	3.23	0.50	Moderate

Table 3. Mean, standard deviation, and level of competency development for R2R of public health personnel in sub-district health-promoting hospitals.

The 95% confidence interval ([0.18, 0.67]) reinforces the reliability of the results, indicating consistent competency development attributable to the intervention model. (Table 3).

As qualitative data on the situation of academic work production of VHVs and public health officials, the informants reflected on the production of academic works of VHVs and public health officials in relation to six issues: (1) problems in producing academic works; (2) the need for academic knowledge; (3) academic competency; (4) obstacles to producing academic works; (5) needs for producing academic works; and 6) necessary competencies for producing academic works. The details are as follows:

Problems in producing academic works

The informants reflected on the problems encountered in producing academic works. Their jobs focused on practical tasks, and they rarely produced academic works. They were not confident about giving a presentation. The informants made the following statements:

"Knowledge is less … we practice more. We will use relatively little academic work." (Fourth informant).

"VHVs will be in practice. If academic work is in the 100% part, we will only have 10% of the academic work." (Fifth informant).

"VHVs will have more practical expertise. There will be few academic presentations. In addition, we have little knowledge, so that we are not confident to present or write … let us go out and do our work." (Fifth informant).

The need for academic knowledge

The respondents reflected that academic skills and academic knowledge are essential for VHVs and health workers because training to educate people needs accurate knowledge about communicating information with the public. The informants reflected as follows:

"Academic knowledge is very necessary … there should be knowledge enhancement here, that is, what can we communicate to the public with accurate knowledge." (Third informant).

"… if there is training … we will have correct and reliable information provided to people. So that they can use it to take care of themselves properly." (Seventh informant).

Academic work competency

The informants reflected on the competencies and academic roles of VHVs and health workers. They had little academic potential and knowledge and few academic roles. Most information and knowledge was obtained through internet searches. There was some training provided by staff from sub-district and health-promoting hospitals. Sometimes they consulted a health worker about how to take care of patients at home or answer patients' questions. The informants reflected as follows:

"Academic roles … are few. Most of the time, we will have some training from public health officials. But I don't know much yet." (First informant).

"In terms of academic role, we get some training, but it is not enough. We need more knowledge." (Second informant).

"Now I feel that I can do research. I just needed someone to guide me." (Seventh informant).

Obstacles to the production of academic works

The informants reflected on the obstacles to academic production facing VHVs and health workers. These are a lack of support from the authorities and a lack of effective communication, preventing them from working according to their abilities. There are also obstacles concerning the cooperation of the people in the area. They are not able to use academic language and are not confident. The informants provided the following reflections: "Probably the lack of support from the staff … Lack of proper communication with the staff that this person is good at that job. Therefore, it is not possible to present the work according to the ability." (First informant).

"There is no computer skill… we should learn it in simple ways." – (Secound informant)" Cooperation of village people causing obstacles in the production of works or the work of volunteers." (Third informant).

Requirements for producing academic works

The informants reflected the need for academic production of VHVs and public health officials. They want to gain knowledge promotion, speaking skills, computer skills, and ideas about writing academic works as well as mentors for academic works. The informants stated the following:

"Want to get knowledge promotion and the concept of speaking skills." (Second informant).

"There are no computer skills, so simple computer skills should be added." (Third informant).

Competencies required to produce academic works

The informants reflected on the competencies needed by VHVs and health workers to produce academic works. The necessary competencies are knowledge, determination to work successfully, sacrifice for the community, proficiency in the subject, courage to present work, technology literacy, and patience. The informants reflected as follows:

"Must have knowledge … have expertise in what to do … as if we are skilled at what we have to do." (First informant).

"Must have determination to get the job done … being patience in your work." (Third informant).

"Now I can help my community not just by visiting homes, but by finding solutions based on data." (Tenth informant).

2. The model for developing VHVs' and public health officials' competencies in producing academic works to solve area-based problems through intellectual empowerment consisted of 5 Ps: (a) policy means policy formulation from supervisors at the district health office level or hospital level, (b) preparation involves organizing activities to reduce anxiety at the same time as organizing activities to build/increase confidence in academic production through motivational speaking and encouragement to reach goals, (c) practice refers to specifying topics, recommending sources for searching, giving examples, being a mentor, and increasing communication channels, (d) publishing means publishing works by writing reports, training for presentations, and making presentations or publications, and (e) positive reinforcement includes complimenting, rewarding, making friendly suggestions, and giving encouragement to produce consistent quality work (as shown in Fig. 1).

Discussion

1. The situation among the VHVs highlighted a positive attitude on the performance. This can be explained by the fact that an increase in good work attitude can increase the VHVs' performance since VHVs with good attitudes have good human relationships with other people. Further, they often spend time on social benefits and self-development in a voluntary way[18]. The aspect with the lowest mean score was the ability to produce academic works. For the public health officials, the attitude towards conducting R2R achieved the highest mean score, followed by the appreciation of R2R. The lowest mean score was for knowledge of developing R2R. Conducting R2R promotes workers' tacit knowledge. Nursing research is vital to the nursing profession and improving healthcare delivery and outcomes. Understanding the research process helps nurses approach any job with critical thinking skills. They will be able to find and create new knowledge by themselves by establishing a form or process to create knowledge for effective continuous development/improvement of their work. The ultimate goals are self-improvement, job development, and organizational development. R2R is a tool for developing people by encouraging them to be proud of their work by inventing new knowledge for organizational and community health development[13,19]. The situation of academic work productivity among VHVs and public health officers revealed problems in producing academic works, the need for academic knowledge, academic ability, obstacles to the production of academic works, needs for producing academic works, and required competencies for producing academic works.
2. The model for developing the competencies of VHVs and public health officials in producing academic works to solve area-based problems through intellectual empowerment consisted of 5Ps, namely (a) policy formulation by supervisors at the district health office level or community hospitals, monitoring, reinforcement, and continuous support; (b) preparation by organizing activities to reduce anxiety as well as to increase participants' confidence and reinforce their academic work production; (c) practice, consisting of setting topics, introducing sources for data searching, giving examples, mentoring, and providing various

Fig. 1. A model for promoting academic production for village health volunteers and health officials.

communication channels; (d) publishing or presenting results; and (e) positive reinforcement, including giving compliments, rewards, confidence, friendly suggestions, and encouragement to produce quality academic works consistently. It can be seen that a clear promotion and support policy from executives is an important factor in driving academic work production[20]. In addition, the developed model is consistent with the empowerment process of Gibson's[7] concept, which emphasizes recognition, promotion, enhancement of people's ability, beliefs, values, experience, and determination. It is also consistent with the systematic review by Mahon, Walsh, Holloway, and Lydon[21], which identified the methods to increase knowledge as description, feedback, modelling, role play, and monitoring incentives. The study about the competencies of researchers in ink packaging product development consisted of knowledge, skill, self-concept, traits, and motives[22]. The development of VHVs using a reliable scientific process included continuous quality improvement (CQI), Routine to Research (R2R), innovation research development, and the research process; therefore, it is important for enhancing intellectual empowerment and developing the potential of VHVs to solve area-based health problems and promote the health of people in their own area following academic/scientific principles. Public health officials can be consultants and role models for work. They can collaborate in producing academic works and be academic friends[23]. Peer-training programs can also increase VHVs' confidence, knowledge, and satisfaction and have strengthened their chronic disease management skills in resource-poor communities. The integration of VHVs peer-training program into both health care systems and municipal health systems is a key challenge for sustainability[17,24].

In addition, ongoing skills training, motivation, distribution, and supervision are required[25]. This is consistent with the study by Mohajer and Singh[26], which identified empowerment as a contributing factor to community work undertaken by health workers and volunteers to modify health behaviours.

3. The evaluation of the model found that, after the development of the model, the VHVs had higher competencies to produce academic works than before the model development, with statistical significance at the 0.01 and 0.05 levels. This is consistent with the development of research competencies through training, teaching, on-the-job training, and working with experts, assigning important tasks and monitoring, as well as presentation[22]. The concept of empowerment is a social process that recognizes, appreciates, encourages, and enhances individuals' ability to meet their own needs. Problems can be handled manually with the available resources to create a sense of self-control over one's own life[7] and to motivate one's learning[11,12].
4. The lessons learned from the success of the potential development of VHVs and public health officials showed that the key success factors included a clear policy, well-prepared, authentic learning, having mentors, and positive reinforcement. In particular, positive reinforcement could increase the desire to learn and achieve academic outcomes[11,4,27]. This is consistent with the development of competencies in research, training, teaching, on-the-job training and working with experts, assigning important tasks, monitoring, presentation, and giving compliments or rewards[22]. There are also other activities, such as learning in small groups, the volunteer mentor/buddy system, and the integration of knowledge into monthly meetings, which enhance the experience of working together or working in the hospital. They intend to participate in public health implementation and they wish to develop their communities and spend time working in their VHV roles. This result is associated with a previous study which found that a good attitude in the implementation of contagious disease control and prevention along the border lines had a positive effect on VHVs' participation in the management to control and prevent contagious diseases along the border[18,28,4].

It is highlighted that the VHVs in the peer training program demonstrated positive outcomes due to working with their peers and receiving extra help and support. Informal relationships were also very important for VHVs, especially in unfamiliar environments, as they provided a sense of safety and helped the VHVs gain more confidence in delivering services in their communities. What VHV members do is building the network from family and household relations that can create a sense of trusty, loyalty and care among community members[18,24,27]. These findings are consistent with previous studies demonstrating that peer-to-peer support programs promote chronic disease management skills, knowledge, and increased social support for older adults with complex diseases. Furthermore, there should be support for the necessary equipment, learning through electronic media or social media channels, and other forms of learning, such as skill training camps, study visits, and supporting equipment in operation[11,12,29]. Despite these promising results, the study does have several limitations. First, the small sample size ($N=20$) limits the statistical power and may not capture the diversity of VHVs and public health officials in other regions. Second, the study was conducted in a specific geographic and socio-cultural context (Sribanphot District, Phatthalung Province), where health practices, leadership support, and community engagement may differ from other settings in Thailand or beyond. These contextual factors may affect the generalizability of the findings. Moreover, the purposive sampling technique, while suitable for action research, may introduce selection bias, as participants were selected based on willingness and readiness to engage in academic work. As such, the results may reflect a best-case scenario rather than a typical cross-section of VHVs.

Conclusions

The capacity of both village health volunteers (VHVs) and public health officials to produce academic work is often the key to solving health problems in a given target area. This action research aimed to analyse this situation, to create and develop a model and evaluate it, and then to report the lessons learned from the outcomes. The study followed the steps of action research (planning, action, observation, and reflection). The model for developing the potential of village health volunteers and public health officials to produce academic works to solve health problems in a target area consisted of 5 Ps, namely (a) policy formulation from supervisors, (b) preparation, (c) practice, (d) publication of academic works, and (e) positive reinforcement.

The key success factors for producing academic works were (a) setting a clear policy, (b) preparation, (c) practical implementation, (d) having a mentor to support academic work production, and (e) using positive reinforcement.

The model should be used to develop the competencies of VHVs and public health officials by creating strategic plans and action plans and organizing workshops to promote the production of academic work for solving people's area-based health problems in a given target area in accordance with the academic principles.

Implications

Application of research results

The Sub-district (Tambon) Health-Promoting Hospital, District Public Health Office, and Provincial Public Health Office as well as related agencies should use the model to develop the competency of VHVs and health officials by creating clear strategic plans and action plans. Furthermore, they should organize workshops to promote academic work production through intellectual empowerment as well as organizing academic work contests to raise the academic level for VHVs and public health officials, enabling them to apply the scientific process to solve area-based health problems, resulting in people's health self-reliance and reducing unnecessary congestion in health service institutions. In addition, the Ministry of Public Health and provincial health offices should formally incorporate the intellectual empowerment model into their continuing education strategies for VHVs and public health officials. Public health institutions should establish academic mentorship units at the district or provincial level to provide consistent coaching, feedback, and reinforcement to VHVs producing academic work.

Suggestions for further research

1. Exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) of the competency in producing academic works to solve area-based health problems of VHVs and public health officials should be performed.
2. The economic and cost-effectiveness effects of adopting the model in health service institutions should be studied.
3. Longitudinal Studies: Conduct follow-up studies over 12–24 months to examine the sustainability of competencies gained through the model and their practical application in real-world community health challenges.

Data availability

The datasets used and/or analysed during the current study available from the corresponding author on reasonable request.

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Declarations

Competing interests

The authors declare no competing interests.

Additional information

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