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Research article

One Health perspectives on sustainable rabies prevention in Thailand: a qualitative interview study

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Abstract

Rabies is a challenging human and animal health concern that requires a multisectoral and interdisciplinary strategy for prevention and control. The aim of this study was to investigate One Health perspectives on long-term rabies prevention in disease-free subdistricts of Chiang Mai, Thailand. A qualitative study using semi-structured interviews was carried out in three rabies-free communities with diverse demographics, and the results were analyzed using thematic analysis. The findings were gathered from 36 interviews with equal proportions of urban, suburban, and rural populations. Although none of the participants mentioned the term "One Health", the majority of them comprehended that rather than a one-dimensional approach, a multi-dimensional approach to rabies prevention would be effective. The main theme from the interview analysis was multisectoral collaboration. The role of the local government in collaboration, the involvement of the medical and veterinary branches, and intersectoral action with community engagement were all sub-themes. Community leaders and village health volunteers collaborated with local authorities to connect community members. The use of wired broadcasting as a method of public communication was critical to increasing rabies knowledge and awareness. Human and animal health agencies provided support for rabies vaccine and medical equipment, as well as staff skills and practice training. Community participation in rabies activities contributed to preventing, detecting, and responding to the disease. The One Health concept must be developed and implemented in practice at all levels of all key sectors, particularly among the general population in rabies-endemic areas throughout the country.

Keywords: Community engagement, Local government, Multisectoral collaboration, Public communication, Rabies-free community

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INTRODUCTION

Rabies is one of the most lethal zoonotic diseases, posing a constant challenge to public health and veterinary medicine, with tens of thousands of human fatalities occurring each year, primarily in Asian and African countries (World Health Organization, 2013; Hampson et al., 2015; Sreenivasan et al., 2019). The disease burden focuses on human rabies cases and deaths caused by dogs. Although rabies is fatal, it is completely avoidable (World Health Organization, 2013) and conditionally treatable (Yamada et al., 2016; Banyard et al., 2019; Hemachudha et al., 2021). A traditional veterinary preventive approach in endemic areas is annual mass parenteral vaccination of domestic dogs combined with dog population management (Tenzin et al., 2015; Taylor et al., 2017), whereas a public health approach addresses pre- and post-exposure prophylaxis to eliminate human rabies cases (Hampson et al., 2019; Quiambao et al., 2020).

Since rabies is such a complicated human and animal health issue, there is no one-dimensional approach to rabies prevention that is effective and sustainable (World Health Organization et al., 2016). As a result, the paradigm shift in healthcare facilitated by the One Health approach, which promotes human, animal, and environmental health through multisectoral and interdisciplinary collaboration, is driving a wider and deeper revolution (Mackenzie et al., 2014; Zinsstag et al., 2015). To enable better prevention, detection, and response to this disease, it is critical to include a diverse range of health experts at the local, national, and international levels (Belay et al., 2017; Kelly et al., 2020). All relevant sectors are aware of their respective roles and responsibilities in the collaboration to ensure that the procedures run efficiently (World Health Organization et al., 2019). Moreover, the general public's One Health approach is equally crucial as a critical partner in achieving the elimination of canine and human rabies without negative socioeconomic consequences (Häsler et al., 2014).

In Thailand, the importance and necessity of One Health were first discussed across relevant ministries and sectors more than a decade ago, following an outbreak of avian influenza (Ministry of Public Health, 2013b; Ministry of Public Health, 2016; Sommanustweechai et al., 2016). The One Health concept was adopted for rabies control later (Ministry of Public Health, 2014; Hinjoy et al., 2016). The active implementation of this concept proved effective, as the number of reported human deaths in this rabies-endemic country remained stable at around five cases per year between 2011 and 2015 (Ministry of Public Health, 2017). However, just when Thailand was declared to be containing the rapid spread of the disease, there was a more than two-fold surge in human rabies deaths per year across the country from 2016 to 2017 (Ministry of Agriculture and Cooperatives, 2017; Ministry of Public Health, 2017). The regulatory authorities and the general population were becoming increasingly concerned about rabies outbreak control. Some provinces were outstanding in terms of protecting their communities from this disease because they had no evidence-based reports of either animal or human rabies deaths within a few years of the initial declaration of temporary rabies endemic areas (Ministry of Agriculture and Cooperatives, 2017).

Conducting social science research to identify and enhance community knowledge and responses and exploring public preferences for participatory interventions were suggested as parts of effective disease prevention and control in the debate about reflections on the socio-political, ethical and legal aspects of emerging and re-emerging infectious diseases using a One Health implementation (Degeling et al., 2015). Therefore, exploring public perspectives and preferences is required as the first of a series of actions for community empowerment in disease control activities.

Learning from the One Health approach adopted by rabies-free communities was a step forward because the evidence could be assessed and used to reverse engineer a model that could then be applied in endemic areas. The success of rabies prevention in an area surrounded by endemic areas could be attributed in part to strict control measures implemented by local authorities in conjunction with public awareness and actions. The purpose of this study was to examine the viewpoints of One Health on sustainable rabies prevention among the general population in disease-free communities of Thailand. Moreover, semi-structured in-depth interviews using a phenomenological approach would elicit their perceptions and experiences with the situation.

MATERIALS AND METHODS

Study design

Following ethical considerations by the Chiang Mai University Research Ethics Committee (approval number 61/004), a qualitative phenomenological study using semi-structured in-depth interviews and observations was carried out between August and September 2018. Questions about the main factors contributing to sustainable rabies-free communities were designed without using the term "One Health" in order to avoid prejudice. The interviews were preceded by personal information such as gender, age, occupation, education and religion.

Study areas

Chiang Mai was selected by purposive sampling since it was one of two provinces in northern Thailand without evidence-based reports of animal rabies deaths. Moreover, Chiang Mai also represented an area of demographic diversity. The study was conducted in three subdistricts: Mae Hia (urban) in Muang Chiang Mai district, San Klang (suburban) in San Kamphaeng district and Sob Tia (rural) in Chom Thong district, all of which won the Thailand Rabies Awards in 2010 and 2011 (Ministry of Public Health, 2013a). The study areas in Chiang Mai are depicted in Figure 1.

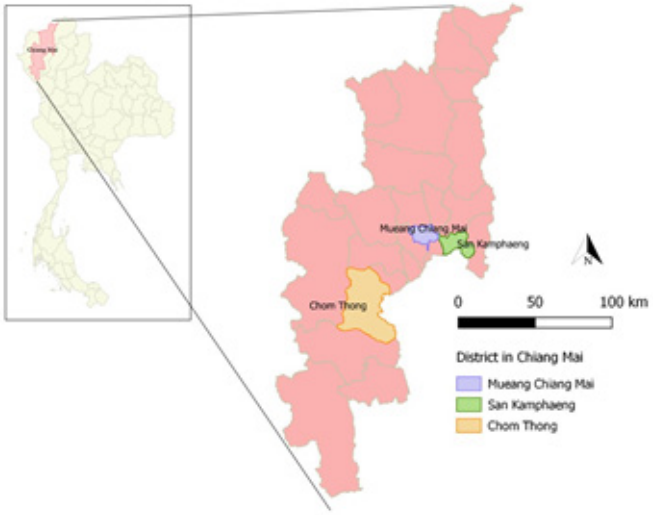

Figure 1 Location of the three study sites in Chiang Mai.

Participants

To explore public perspectives, key informants for this study were permanent residents between the ages of 18 and 79 who were recruited through convenience sampling during home visits. The participants could provide their written consent on a voluntary basis. There were no vulnerable groups among the participants. The number of participants was determined by data saturation.

Study tool and procedure

A qualitative interview guide was developed following literature reviews and utilizing prior subject-area work experience. Before a full-scale interview, a pilot study was carried out to ensure the clarity of the open-ended questions. For example, who was actively involved in sustainable rabies prevention in the community, how and why? Face-to-face interviews were conducted by an interviewer in the local native (Lanna) language or formal Thai depending on participant preferences for communication. Each interview lasted between 25 and 35 minutes and was documented with audio recording and field notes. The interviews in the Lanna language were transcribed by research assistants, translated into English by the investigator, and edited by a native English speaker before analysis. Methodological and data triangulation were used as credibility indicators for the trustworthiness of the study.

Data analysis

Data collection and thematic analysis were applied simultaneously. Coded data were extracted after each interview was transcribed completely. The coded data from all interviews were sorted under the different codes and organized into themes and sub-themes. Reviewing and defining themes and sub-themes were emphasized around a core framework.

RESULTS

Participants

A total of 36 participants were successfully interviewed in equal numbers within urban, suburban and rural communities. The proportion of male and female participants was equal. The mean age of the participants was 58.8 years (a range of 25-79 years of age). The largest proportion of participants worked as independent contractors (36%), had completed primary education (53%), and were Buddhists (97%). Socio-demographic profiles of the study population are presented in Table 1.

Table 1 Demographic characteristics of 36 interviewees

Demographic variables	Value
Gender (n)	
Male	18
Female	18
Age (years)	
Mean ± SD	58.8 ± 13.8
Range (Maximum-Minimum)	54 (79-25)
Occupation (n)	
Unemployed (housewife, retired or jobless)	12
Employed (government or private sector)	11
Independent (own business or farmer)	13
Education (n)	
Primary	19
Secondary	7
Tertiary	10
Religion (n)	
Buddhism	35
Others	1

Content theme and sub-themes

The findings from these interviews indicated that, while none of the participants referred to the terminology and definitions of One Health, almost all of them perceived that a multi-dimensional approach to rabies prevention would be more effective than a one-dimensional approach. The importance of multisectoral collaboration emerged as the main theme from the interview analysis.

Content theme: Multisectoral collaboration

Multisectoral collaboration was defined as a collaborative approach involving various sectors and stakeholders with the same goal of addressing a specific issue. The main theme was subdivided into three sub-themes: 1) the role of the municipal government in collaboration, 2) the involvement of the medical and veterinary sectors, and 3) intersectoral action with community engagement.

Sub-themes: 1) The role of the municipal government in collaboration

Most participants (33 out of 36) mentioned that the municipal government played a key role in sustainable rabies prevention in their communities due to its responsibility for implementing control measures. Since rabies control activities have been decentralized from the national government to the provincial and local levels for decades, national control measures allow municipal governments to run rabies campaigns. However, the local authorities did not operate in isolation. They collaborated with the medical and veterinary sectors to educate and train municipal staff, community leaders and village health volunteers involved in rabies meetings, workshops and campaigns in their subdistricts.

Interviewee ST2: "*The municipal government arranged for both public health and animal health staff to provide information about rabies and train village health volunteers to act as peer support for protection against the disease in the village.*" (male, age 63, secondary education, rural farmer)

It was stated that community leaders and village health volunteers who served as connectors between the local authorities and the community worked on all rabies activities with the municipal government. Community leaders were tasked with disseminating rabies information and announcing activities via village wired broadcasting. In general, broadcasts were made almost every day on other topics, such as public health issues or religious activities. However, rabies information was disseminated at least twice a year: there was a series of announcements immediately before and during the hot season, and there were also broadcasts on World Rabies Day. The goal of these broadcasts was not only to raise public awareness, but also to mobilize community members to participate in meetings and campaigns. Furthermore, village health volunteers were assigned to assist municipal staff with the vaccination of pets on the campaign sites, to provide a mobile vaccination service at villagers' houses for a wider reach, and to explain the responsibilities of pet ownership to the households they visited.

Interviewee SK1: "*The local government let the village headmen provide rabies information and publicize campaigns through wired broadcasting.*" (female, age 57, primary education, suburban housewife)

Interviewee MH6: "*Rabies campaigns were organized by the municipal government every year. Village chiefs communicated with residents to engage them, and village health volunteers assisted in vaccinating dogs and cats at the campaign sites or at the owners' houses.*" (male, age 70, primary education, urban entrepreneur)

Interviewee SK6: "*Vaccination coverage data were recorded by village health volunteers and reported to community leaders, who in turn reported it to the municipal, provincial, and national governments.*" (male, age 54, tertiary education, suburban government officer)

Sub-themes: 2) The involvement of the medical and veterinary sectors

Nearly half of the participants (17 out of 36) stated that the agencies in charge of public health and animal health made a vital contribution to rabies prevention and control. The involvement of the medical and veterinary sectors enabled these communities to benefit from collaboration between professionals trained in various disciplines and skills. To work closely with local communities, the public health and animal health authorities had to affiliate with the municipal government, which was the central coordinating body. The level of coordination between the human and animal health agencies and the municipal government varied from year to year depending on budget and policy frameworks. Despite these variations, the collaboration between human and animal health agencies, as well as local authorities, consistently produced satisfactory results in terms of rabies prevention and control. Moreover, the public recognized the involvement of the medical and veterinary sectors.

The participants mentioned that public health agencies or local hospitals sponsored the provision of some medical equipment for giving injections, educated staff about good rabies prevention practices, and promoted community awareness at rabies meetings. Furthermore, animal health agencies or local livestock offices provided additional rabies vaccine to local authorities, improved staff pet vaccination and handling skills, and conducted animal vaccination and sterilization on rabies campaign days.

Interviewee MH10: "*Both public health and animal health sectors collaborated with the government to support rabies campaigns and provide extra rabies vaccine and medical equipment.*" (male, age 69, tertiary education, urban retiree)

Interviewee SK11: "*Human health authorities worked to raise public awareness at rabies meetings while veterinary authorities promoted and offered vaccination and neutering services for dogs and cats in rabies campaigns.*" (female, age 47, primary education, suburban entrepreneur)

Interviewee ST1: "*Hospital staff taught village health volunteers how to educate people about the prevention of rabies, avian flu and dengue. Livestock officers demonstrated how to vaccinate an animal to volunteers [as part of the mobile vaccination service].*" (male, age 62, primary education, rural farmer)

Sub-themes: 3) Intersectoral action with community engagement

One-third of the participants (12 out of 36) stated that the intentional interaction between communities and government agencies in both human and animal health sectors was a crucial factor for a variety of social outcomes in long-term rabies prevention. Active community members who participated in rabies meetings and campaigns were committed to creating and being part of a disease-free community. Other members who were not interested in rabies activities could listen to rabies information on wired broadcasting to become more aware of their surroundings. Therefore, some community members possessed rabies knowledge and practices that enabled disease prevention, detection, and response in their communities.

Interviewee MH8: "*I agree with community engagement. I am willing to work with the authorities to eliminate rabies in Thailand. I think that all dog*

and cat owners should be educated in basic lessons from meetings before and during the raising of their pets, and that they should join in campaigns every year." (male, age 67, tertiary education, urban entrepreneur)

Interviewee SK10: "*As owners, we have to register for free vaccination in rabies campaigns. The early bird registration period has begun at the houses of village health volunteers. Most owners join at the campaign site on the campaign date, but some owners use the mobile vaccination service the day after the campaign.*" (female, age 54, primary education, suburban entrepreneur)

Interviewee ST10: "*When I did not have my own dogs, I just listened to rabies announcements from a village headman via wired broadcasting. But now that I have a new puppy, it is necessary to participate in rabies activities from now on.*" (female, age 70, primary education, rural housewife)

DISCUSSION

The key findings of this study identified that multisectoral collaboration was the main theme of the One Health strategies for rabies control in the long run. While there was limited public communication about what the term "One Health" meant, the concept of One Health was shaped by rabies meetings and campaigns. Residents realized that a one-dimensional approach to rabies prevention was ineffective. Therefore, the One Health approach, which consisted of the role of the local government in partnership, the participation of the medical and veterinary sectors, and intersectoral activity with community engagement, was mentioned as the way to address this zoonotic disease at the local level.

As One Health zoonotic disease prioritization workshops in several continents indicated that rabies was at the top of the priority zoonotic disease list, this lethal disease was a major concern for multisectoral collaboration (Rist et al., 2014; Munyua et al., 2016; Pieracci et al., 2016; Steele et al., 2018; Yasobant et al., 2019; Wang et al., 2021). Previous studies on the One Health strategy for rabies prevention and control were conducted in many countries, such as India (Abbas et al., 2011), Sri Lanka (Häsler et al., 2014), Canada (Rock et al., 2017), Australia (Degeling et al., 2018), and Ghana (Adomako et al., 2018). Although the fundamental goal of the findings from all these studies remained consistent, notably to use the One Health concept for rabies control, the specifics of the findings differed from the current study.

To begin with, the municipal government was referred to by the majority of interviewees in the present study as the authority in charge of implementing rabies activities and coordinating collaboration across all relevant sectors and communities. Local governments in other endemic countries, such as India and Tanzania, had played similar roles (Abbas et al., 2011; Mpolya et al., 2017). Since the local governments need to prepare their networks, which include official staff, community leaders and village health volunteers, for rabies meetings and campaigns, they plan and arrange for medical and veterinary professionals to train them in their knowledge and skills. These networks are crucial for public awareness, attitudes and practices. For instance, community leaders educate residents about rabies via wired broadcasting, while village health volunteers enable community members to participate in rabies campaigns.

In terms of public preferences for communication, wired broadcasting was the most common mode of public communication that was effective in conveying rabies knowledge throughout communities in Thailand (Kiratitana-olan et al., 2021). As a result, community leaders or village chiefs were entrusted with sharing accurate information and announcing rabies activities through wired broadcasting. However, since earlier rabies studies were carried out in diverse social circumstances, the findings of public preferences varied. A study in China showed that combining a cell phone short message service with rabies information sessions enhanced knowledge (Wu et al., 2016). Communication in Northern Australia and Papua New Guinea should be verbal in the native language and via traditional routes such as elders and councils (Brookes et al., 2017). In contrast, the internet was the most preferred method of delivering rabies information to respondents in the United States (Palamar et al., 2017).

With regard to village health volunteers, they are community health workers who volunteer and act as a link between the community and health care providers (Lehmann et al., 2007; World Health Organization, 2007). They are directly supervised by a subdistrict level primary health care officer (World Health Organization, 2007). They improve communication, support health behavior change, and encourage community participation in campaigns not only on rabies, but also on other public health issues affecting communities (Lehmann et al., 2007; World Health Organization, 2007; Woldie et al., 2018; Jiaviriyaboonya, 2021). The village health volunteer system in Thailand has been in operation for decades and the activities of community-based health volunteers continue to be retained and sustained (World Health Organization, 2007).

Turning to the involvement of the medical and veterinary branches, this partnership working for the control of zoonotic diseases, including rabies, was recognized by the participants in the present study. The One Health idea on rabies affirms that human and animal health are intimately connected. Therefore, close collaboration between the medical and veterinary professions is required, as well as support from other disciplines (Abbas et al., 2011; Lushasi et al., 2020). A previous study underlined the importance of collaboration between medical and veterinary sectors in improving vaccination coverage, increasing sterilization rates, and reducing dog bite incidents with community support (Gautam et al., 2020)

A few studies on public perspectives of the One Health approach to rabies used quantitative data such as knowledge, attitude and practice surveys to assess their findings. The respondents in Africa, including Uganda and Senegal, agreed that there was a need for collaborative efforts between the medical and veterinary sectors to control rabies (Monje et al., 2020; Ba et al., 2021). Due to a lack of coordination, communication, and collaboration among the parties involved, the number of human rabies cases and deaths has not declined (Acharya et al., 2020). Although in the case of another zoonotic disease, that of Rift Valley fever in Sudan, the respondents stated that human health authorities, rather than veterinary authorities, were primarily responsible for controlling the outbreak (Hassan et al., 2017), it seems clear that the One Health approach has the potential to be a powerful tool for making significant progress in the prevention and control of zoonotic diseases, especially rabies.

In relation to intersectoral action with community engagement, the interviewees in the current study believed that community members who actively attended rabies meetings and campaigns contributed to their community's success in remaining disease-free due to their work with the main relevant sectors in zoonotic disease prevention and control. Raising public awareness at meetings and vaccinations during campaigns could bring rabies under control. Moreover, community engagement is one of the most important sociocultural factors for community-based interventions with the potential to prevent the spread of rabies in disease-endemic areas (Widyastuti et al., 2015; Isiko et al. 2017). Public engagement also has an impact on rabies surveillance through reporting of suspected cases in disease-free countries (Brookes et al., 2017).

Although citizen engagement is a crucial element of the One Health strategy for rabies control, it has been disrupted in countries throughout the world. Previous studies indicated that one of the multiple barriers to public awareness was the use of an inappropriate and ineffective form of public communication. In addition, one of the main reasons for owners' non-attendance at rabies campaigns was their unwillingness or inability to travel to campaign sites to acquire a vaccine for their dogs (Castillo-Neyra et al., 2017; Yoak et al., 2021). A recent study identified that a pandemic of the coronavirus disease 2019 (COVID-19) disrupted rabies control activities, including community engagement, and it also pointed out that the impacts of the disruption may take time to manifest (Nadal et al., 2021). To overcome these barriers, exploring public communication preferences, using mobile vaccination services as an efficient method of reaching owned dogs, and embracing oral vaccination of dogs for free-roaming dogs or owned dogs in the COVID-19 period are all ideal solutions.

In Thailand, the national plan for rabies control has been a strategic application of the multisectoral collaboration approach for around a decade (World Health Organization, 2012). As an integrated response is required to prevent rabies from becoming a major zoonotic disease, all relevant sectors at all levels must work collaboratively. The three rabies-free subdistricts in the present study, which had won the Thailand Rabies Awards, strictly followed the One Health approach. Collaboration was evident among local governments, human and animal health authorities, and communities. Their partnership was similar to the WHO's recommendation (World Health Organization, 2022). Furthermore, they have been using wired broadcasting as a public preference for communication and providing rabies vaccination at campaign sites or on mobile vaccination services for years. Due to research conducted last year on the feasibility and effectiveness of oral rabies vaccination of dogs (Chanachai et al., 2021), this may be considered for application across the country in the near future.

The major strength of the current study is the study area. The three rabies-free communities studied are demographically diverse. These communities are also in the north of Thailand, where animal rabies cases were less prevalent (Thanapongtharm et al., 2021). This could reflect the effectiveness of rabies control in terms of long-term sustainability. The main limitation of the study is that it surveyed the perspectives of adults in the communities, with a high average age of the interviewees (59 years old). This could be attributed to

the fact that people in their twenties and thirties spend more time on daily activities outside the home and therefore may have been missed during home visits and interviews. The perspectives of the older generation may differ from those of the younger generation.

CONCLUSION

To summarize, multisectoral and interdisciplinary collaboration is unquestionably critical for the prevention and control of zoonotic diseases, particularly rabies. The One Health approach, which involves all key sectors at all levels, will benefit nations in bringing the disease under control. It is important to emphasize that the perception of the public regarding the application of the One Health concept is absolutely fundamental to long-term success. Therefore, investments in not only rabies control measures, but also public communication and advocacy should be considered. To improve the success rate of disease control, public communication preferences, interventions, and actions should not be disregarded. It is suggested that further research be conducted to apply these study results to the prevention and control of other zoonotic diseases.

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AUTHOR CONTRIBUTIONS

Kritkarnda Kiratitana-olan Conceptualization, Methodology, Investigation, Analysis and interpretation, Writing, Critical review and editing
Warangkhana Chaisowwong Conceptualization, Methodology, Critical review and editing
Kriangkrai Thongkorn Conceptualization, Methodology, Investigation
Khwanchai Kreausukon Conceptualization, Methodology, Supervision.

CONFLICT OF INTEREST

The authors have no conflicts of interest to declare that are relevant to the content of this study.

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