Factors Influencing the Inadequacy of Rabies Post-Exposure Vaccination among Individuals in Yasothon Province, Thailand

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Abstract
This study aims to identify the factors influencing incomplete post-exposure rabies vaccination among residents of Yasothon Province, Thailand. A prospective cohort design was employed, surveying 183 individuals who received rabies vaccination services between January 1, 2023, and December 30, 2023. Factors such as occupation, distance from home to the hospital, attitudes toward rabies, accessibility to vaccination, and prior vaccination experience were found to significantly impact the completion of the vaccination regimen. Agricultural workers, individuals residing farther from health facilities, those with misconceptions about rabies, and those with limited access to vaccination services were less likely to complete the necessary vaccinations. These findings emphasize the need for targeted public health initiatives to increase vaccination rates, particularly in rural and agricultural communities, in order to strengthen rabies control efforts in Thailand.

Keywords: Factors, Inadequate Rabies Vaccination, Yasothon Province

1. Introduction

Rabies is a zoonotic disease and a public health issue worldwide, including in Thailand. The virus is transmitted through wounds caused by bites, scratches, licks, or contact with the saliva of infected mammals. The most commonly involved animals are dogs, cats, and cows. Currently, there is no cure for rabies, but it can be prevented with a vaccine [1]. Despite being preventable through post-exposure vaccination in humans and animal vaccination, rabies results in over 59,000 deaths globally each year. More than 95% of these deaths are due to infections from dog bites, scratches, or licks, which allow the virus to enter wounds, multiply, and cause disease in humans and other mammals. The World Health Organization [2], the World Organisation for Animal Health (OIE) [3], and the Food and Agriculture Organization of the United Nations (FAO) have called for Southeast Asian countries to cooperate in eliminating rabies by 2030 (Zero by 30). They have developed guidelines for creating rabies-free areas and for countries to declare themselves rabies-free [3]. From January 1 to September 18, 2022, Thailand reported one rabies-related death and one additional case in which the patient, who had been bitten and scratched by dogs, did not seek medical attention or receive post-exposure rabies vaccination. The first death occurred in February in Chonburi Province, where an individual was scratched by an adopted dog and did not receive vaccination. The second case was in Songkhla Province, where an individual was bitten on the left hand by a stray dog, causing bleeding. Despite cleaning the wound and receiving recommendations from their father and a health volunteer, the individual did not seek vaccination. The dog was not tested for rabies after its death. The risk factors for rabies include being bitten or scratched by an animal and not receiving post-exposure rabies vaccination, with dogs being the primary source of transmission [4]. A study on factors influencing individuals in Surin Province who were bitten by dogs or cats and did not receive rabies vaccination found that significant factors included lack of follow-up from government officials (OR = 3.93, 95% CI = 1.30-12.63), lack of community support (OR = 2.68, 95% CI = 1.10-6.70), lack of family encouragement (OR = 2.10, 95% CI = 1.16-3.83), and lack of information from media sources (OR = 1.85, 95% CI = 1.01-3.39).

These factors contributed to low awareness about the disease and its prevention and incorrect attitudes toward vaccination, especially after being bitten by a pet dog. Factors affecting incomplete post-exposure rabies vaccination in Buriram Province showed that 47.7% of those who completed the vaccination were male, compared to 55.4% of those who did not complete it, with average ages of 37.6 and 39.3 years, respectively. All patients received the rabies vaccine, but only 95 (37.4%) received rabies immunoglobulin, with no vaccine allergies reported [5]. Factors associated with post-exposure rabies vaccination included not washing the wound with soap after an animal bite (p-value = 0.007) and receiving rabies immunoglobulin (p-value < 0.001).

In Yasothon Province, from January 1 to December 31, 2017, there were 39 rabies exposures reported across 29 locations in 17 subdistricts of 6 districts: 27 exposures in 19 locations in 8 subdistricts of Mueang Yasothon District (including Nai Mueang, Tat Thong Sing, Doet, Du Thung, Nam Kham Yai, Khuang Kham, and Na Samai); 6 exposures in 5 locations in 3 subdistricts of Loeng Nok Tha District (including Sawa, Sri Kaew, and Kut Chiang Mue); 2 exposures in 2 locations in 2 subdistricts of Kut Chum District (including Huai Kaeng and Kut Chum); 2 exposures in 2 locations in 2 subdistricts of Sai Mun District (including Sai Mun and Dong Mafai); 1 exposure in Khok Na Ko Subdistrict of Pa Tio District; and 1 exposure in Nam Kham Subdistrict of Thai Charoen District. Rabid dogs included 25 males and 15 females, with 3 vaccinated and 36 unvaccinated dogs. Among these, 15 dogs had owners, and 20 were stray. Additionally, there were 4 unvaccinated female cows [6]. If bitten or scratched by a pet or stray animal, even if there is no bleeding, it is advised to consult a doctor promptly. In 2018, following the ninth rabies death, a senior woman in Yasothon Province was scratched by a dog and did not receive vaccination. The Department of Disease Control and the Ministry of Public Health emphasized the need for continuous monitoring of the rabies situation. Vaccination campaigns for pets, including dogs, cats, and cows, have been ongoing, but rabies deaths persist [4]. Based on this data, the researcher aims to study the factors affecting incomplete post-exposure rabies vaccination in Yasothon Province residents to identify factors influencing service utilization and to improve the effectiveness of hospital and subdistrict health promotion services in the future.

2. Methods

2.1 Study Area

Muaeng Yasothorn district was selected as the study area. Yasothon is a district located in the northeast of Thailand, between latitudes 15°42′N and 15°58′N, and longitudes 104°00′E and 104°22′E. It covers an area of approximately 578.20 square kilometers and is divided into 18 sub-districts as illustrates in Figure 1. Yasothon is situated in the west of the province, 531 kilometers from Bangkok. It is bordered by the following neighboring districts:

- North: Selaphum District (Roi Et Province), Sai Mun District, and Kut Chum District
- East: Pa Tio District
- South: Kham Khuen Kaeo District and Phanom Phrai District (Roi Et Province)
- West: Selaphum District (Roi Et Province)

The total population of Mueang Yasothon District is approximately 84,000.

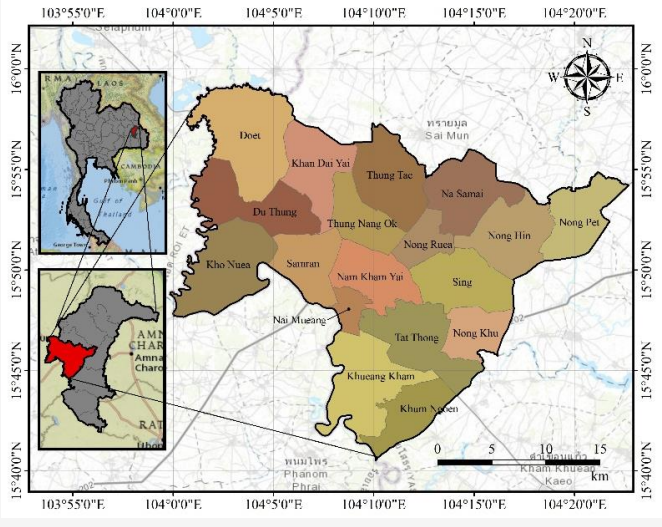

Figure 1: Muaeng Yasothorn district, Yasothorn province, Thailand

2.2 Research Objectives

General Objective: To study the factors affecting incomplete post-exposure rabies vaccination in the population of Yasothon Province.

Specific Objectives:

- To determine the prevalence of incomplete post-exposure rabies vaccination in the population of Yasothon Province.
- To identify the factors associated with incomplete post-exposure rabies vaccination in Yasothon Province.
- To explore the factors influencing incomplete post-exposure rabies vaccination in the population of Yasothon Province.

2.3 Research Design

2.3.1 Population and sample

Population: The population consists of residents of Yasothon Province who received rabies vaccination services at Yasothon Hospital between January 1, 2023, and December 30, 2023.

Sample: The sample consists of residents of Yasothon Province who received rabies vaccination services at Yasothon Hospital between January 1, 2023, and December 30, 2023. The sample size, calculated using the G*Power program version 3.1.9.4, is 183 individuals.

2.3.2 Research instruments

The tools used for data collection include questionnaires designed to assess factors affecting incomplete post-exposure rabies vaccination among the public. These questionnaires were developed based on literature reviews and relevant research. The questionnaire is divided into five components as follows:

1) Personal Factors: Includes gender, age, marital status, education, occupation, income, healthcare coverage, distance from home to the hospital, mode of transportation to the hospital, type of animal exposure, history of animal vaccination, and level of exposure

2) Enabling Factors:
   Knowledge:
   - Comprising 10 questions in a binary choice format (Yes/No). Correct answers score 1point, incorrect answers score 0 points. The level of knowledge is assessed according to Bloom (1975):
     - High knowledge: 8-10 points or 80% and above
     - Moderate knowledge: 6-7 points or 60-79.99%
     - Low knowledge: 0-5 points or 0-59.99%

   Attitudes towards Rabies:
   - Comprising 10 questions in a 5-level rating scale (Strongly Agree, Agree, Neutral, Disagree, Strongly Disagree). Strongly Agree scores 5 points and Strongly Disagree scores 1 point. Interpretation of scores:
     - 10-23 points: Attitude needs improvement
     - 24-37 points: Moderate attitude
     - 38-50 points: Good attitude

   Health Belief Model:
   - Covers four aspects: perceived susceptibility, perceived severity, perceived benefits of treatment and prevention, and perceived barriers. Questions are in a 5-level rating scale format. Interpretation is divided into levels by calculating the width of the class interval using Best's rule (1977):
     - 5-11 points: Health beliefs need improvement
     - 12-18 points: Moderate health beliefs
     - 19-25 points: Good health beliefs

3) Facilitating Factors: Convenience in receiving the vaccine, comprising 10 questions in a 5-level rating scale. Interpretation of scores:
   - 10-23 points: Convenience factors need improvement
   - 24-37 points: Moderate convenience factors
   - 38-50 points: Good convenience factors

4) Supporting Factors: Information and recommendations received from friends, relatives, and healthcare professionals, comprising 10 questions in a 5-level rating scale. Interpretation of scores:
   - 10-23 points: Information and recommendations need improvement
   - 24-37 points: Moderate level of information and recommendations
   - 38-50 points: Good level of information and recommendations

5) Incomplete Rabies Vaccination: Questions are in a binary choice format (Complete/Incomplete).

3. Results

3.1 General Information

The sample group that completed the rabies vaccination was 55.3% female, with an average age of 43.54 years (SD = 12.26). Regarding marital status, 79.7% were unmarried. Education levels varied, with 53.7% having attained at least a high school education.

The majority, 84.6%, were farmers. The median family monthly income was 5,000 baht (P25 = 2,300 baht; P75 = 10,000 baht). Self-paid medical care was utilized by 64.2%. The median distance from home to the hospital was 11 km (P25 = 10 km; P75 = 12 km). Vehicles were used for hospital visits by 65.0%. Dogs were the primary animals involved in incidents, accounting for 68.3%. The rabies vaccination status of the animals was unknown in 74.0% of cases. Contact with potentially rabid animals included wounds in 73.2%.

For the group that did not complete the rabies vaccination, 58.3% were female, with an average age of 45.73 years (SD = 13.50). Unmarried individuals constituted 91.7%, and 65.0% had less than a high school education. Farmers made up 66.7% of this group. The median family monthly income was 5,100 baht (P25 = 3,900 baht; P75 = 7,500 baht). Self-paid medical care was used by 66.7%. The median distance from home to the hospital was 9 km (P25 = 9 km; P75 = 11 km). Vehicles were used for hospital visits by 65.0%. Dogs were involved in 78.3% of incidents. The rabies vaccination status of the animals was unknown in 63.3% of cases. Contact with potentially rabid animals included wounds in 76.7%. Detailed information is provided in Table 1.

Table 1: Number and percentage of the sample group categorized by general information (n=183)

Personal Information	Completed Vaccination Number (%)	Incomplete Vaccination Number (%)
Gender		
Male	55 (44.7)	25 (41.7)
Female	68 (55.3)	35 (58.3)
Age (years)		
≤ 45 years	68 (55.3)	32 (53.3)
> 45 years	55 (44.7)	28 (46.7)
Mean	43.54	45.73
SD	12.26	13.50
Marital Status		
Single	25 (20.3)	5 (8.3)
Others	98 (79.7)	55 (91.7)
Education		
Below High School	57 (46.3)	39 (65.0)
High School and Above	66 (53.7)	21 (35.0)
Occupation		
Agriculture	104 (84.6)	40 (66.7)
Others	19 (15.4)	20 (33.3)
Family Monthly Income		
≤ 5000 Baht	62 (50.4)	30 (50.0)
> 5000 Baht	61 (49.6)	30 (50.0)
Median (P_{25}, P_{75})	5,000 (P_{25}, 10,000)	5,100 (P_{25}=3,900,P_{75}=7,500)
Medical Care Rights		
Self-paid	79 (64.2)	40 (66.7)
Other Rights	44 (35.8)	20 (33.3)
Distance to Hospital		
≤ 10 km	47 (38.2)	44 (73.3)
> 10 km	76 (61.8)	16 (26.7)
Median	11 (P_{25}=10,P_{75}=12)	9 (P_{25}=9,P_{75}=11)
Means of Transport		
None	43 (35.0)	21 (35.0)
Yes	80 (65.0)	39 (65.0)
Animal Involved		
Dog	84 (68.3)	47 (78.3)
Other Animals	39 (31.7)	13 (21.7)
Rabies Vaccine History of Animals		
Vaccinated Annually	32 (26.0)	22 (36.7)
Unknown History	91 (74.0)	38 (63.3)
Contact Level with Suspected Rabid Animals		
No Wound	33 (26.8)	14 (23.3)
With Wound	90 (73.2)	46 (76.7)

Table 2: Knowledge level of Yasothon residents (n=183)

Knowledge Level	Completed (Number, %)	Incomplete (Number, %)
High	80 (65.0)	25 (41.7)
Medium	29 (23.6)	16 (26.7)
Low	14 (11.4)	19 (31.7)

Table 3: Number and percentage of correct knowledge factors of the sample group (n=183)

Questions	No. of people who answer correctly	Percentage (%)
Rabies is also known as hydrophobia	131	71.6
Rabies can be cured completely with vaccination after infection	137	74.9
Rabies can be transmitted through the saliva of infected animals	113	61.7
Certain mammals cannot contract rabies (e.g., pigs, rabbits)	141	77.0
Early rabies symptoms in humans resemble flu symptoms	134	73.2
A single rabies vaccine dose can protect a pet for life	137	74.9
No need for rabies vaccination if licked by a dog without wounds	130	71.0
Immediate medical attention is necessary after a dog bite	144	78.7
Rabies can be fatal	154	84.2
Suspected rabid animals should be observed for 10 days	159	86.9

The knowledge level of Yasothon residents found that the sample group completing rabies vaccination had a high level of knowledge at 65.0%, followed by a medium level at 23.6%. The sample group with incomplete vaccination had a high level of knowledge at 41.7%, followed by a medium level at 26.7%. Details are in Table 2. The top three correct knowledge factors identified were: observing suspected rabid animals for 10 days, as they can spread the virus before showing symptoms (86.9%), rabies can be fatal (84.2%), and seeking medical attention immediately after a dog bite (78.7%). Details are in Table 3.

3.2 Attitude Factors Towards Rabies

The attitude towards rabies among the sample group who completed the rabies vaccination was predominantly positive, with 61.8% displaying a good attitude and 38.2% exhibiting a medium attitude. In contrast, the group that did not complete the vaccination had a medium attitude at 86.7%, with only 13.3% showing a good attitude.

3.3 Rabies Vaccination Administration

Before the study, it was observed that Nai Mueang Subdistrict had the highest number of patients who had been bitten by dogs and did not complete the full course of rabies vaccination, with 130 cases. This was followed by Nam Kham Yai Subdistrict and Tat Thong Subdistrict, each with 53 cases. The areas with the fewest patients who did not complete the rabies vaccination were Thung Nang Ok Subdistrict and Nong Ruea Subdistrict, with 14 cases each, and Nong Ped Subdistrict, with 12 cases, as illustrated in Figure 2.

After conducting the study, it was found that Nai Mueang Subdistrict had the highest number of patients who completed the full rabies vaccination regimen, with a total of 97 cases. This indicates a significant effort in public health outreach and vaccination campaigns within the area. The data also revealed that Nam Kham Yai Subdistrict followed with 21 cases, showing a more moderate but still noteworthy level of compliance. Additionally, Tat Thong, Samran, Kho Nuea, and Du Thung subdistricts recorded 11, 9, 8, and 7 cases, respectively, suggesting varying degrees of success in vaccination efforts. These figures, illustrated in Figure 3, demonstrate disparities in health intervention outcomes across different regions. Furthermore, the study highlighted that Nai Mueang Subdistrict not only had the highest absolute number of fully vaccinated individuals but also exhibited the most significant relative increase in vaccination rates, with a remarkable 74.62% rise. This suggests that targeted strategies in this area were particularly effective, possibly due to enhanced awareness campaigns or improved accessibility to vaccination services.

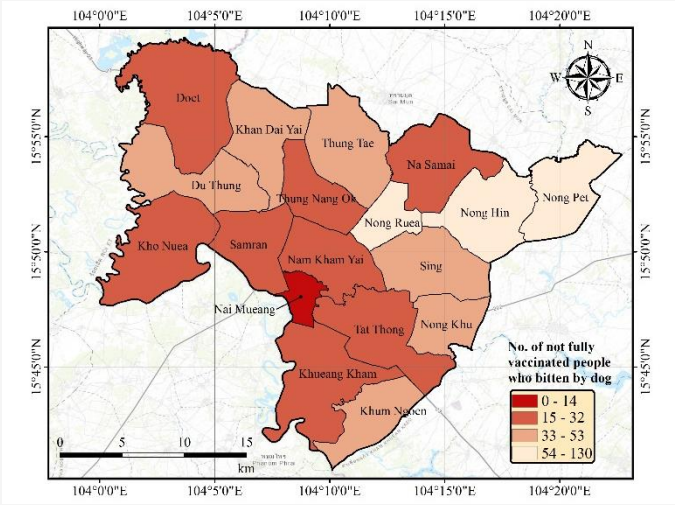

Figure 2: Number of people bitten by dogs who did not receive the complete rabies vaccination series

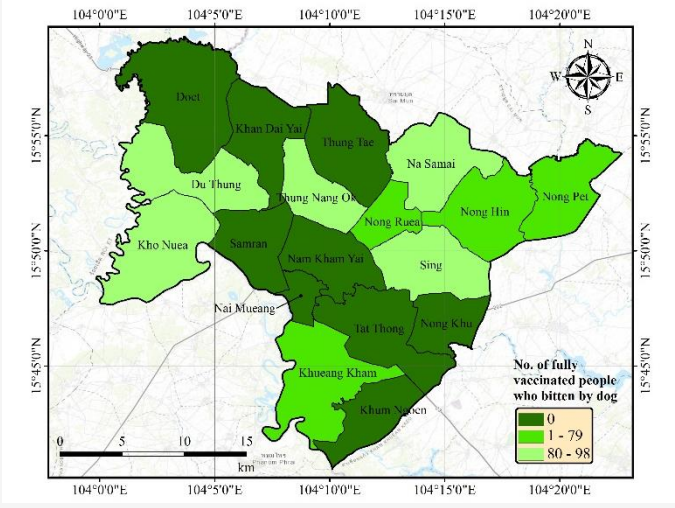

Figure 3: Number of people bitten by dogs who receive the complete rabies vaccination series

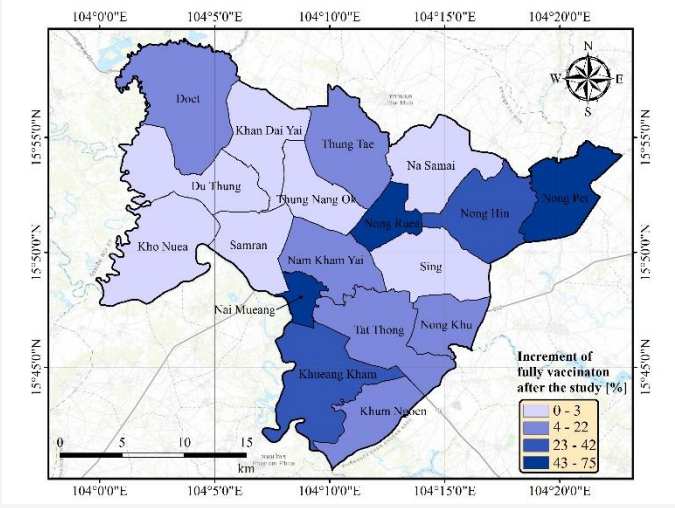

Figure 4: The percentage of people who completed the full vaccination regimen increased following the study

Following this, Nam Kham Yai, Tat Thong, Samran, and Du Thung subdistricts experienced increases of 39.62%, 20.75%, 17.65%, and 17.07%, respectively, as depicted in Figure 4. These statistics underscore the importance of localized public health strategies in improving vaccination rates and achieving broader health objectives.

4. Discussion

There are five variables that jointly explain the variability in predictive factors for incomplete rabies vaccination after exposure among the population of Yasothon Province: occupation, distance from home to the hospital, attitude towards rabies, convenience of vaccine access, and the number of times rabies vaccination services have been previously used. These factors can be discussed as follows:

4.1 Occupation

Occupation is a significant factor related to incomplete rabies vaccination after exposure among the population of Yasothon Province. Individuals engaged in agricultural occupations are more likely to receive incomplete vaccinations compared to other groups. This finding aligns with several recent studies. For instance [7] found in Nakhon Phanom Province, also in northeastern Thailand, that occupation significantly influenced post-exposure prophylaxis (PEP) adherence. Agricultural workers and laborers were more likely to have incomplete PEP series compared to other occupational groups. Similarly, research by [8] in Surin Province revealed that occupation was a significant predictor of knowledge, attitudes, and practices regarding rabies prevention. Individuals in healthcare-related professions and those with higher education levels were more likely to complete the full course of PEP.

However, not all studies have identified occupation as the primary factor. A comprehensive review by [9] of rabies control measures in Thailand highlighted that while occupation is relevant, other factors such as distance to healthcare facilities, economic status, and education level are also crucial in determining PEP adherence. Additionally, a study by [10] in Ubon Ratchathani Province, which borders Yasothon, found that the severity of the animal bite was the primary factor affecting PEP adherence, followed by the patient's understanding of rabies risk. While occupation was significant, it ranked third in their analysis. These varied findings suggest that, although occupation is an important factor in rabies PEP adherence, its relative importance may differ depending on the specific context of each province or region. The research in Yasothon Province underscores the need for targeted interventions that consider the local occupational structure.

Public health strategies should incorporate occupation-specific education and awareness programs. For example, targeting agricultural workers and laborers with tailored information about rabies risks and the importance of completing PEP could be particularly effective in regions where these occupations are prevalent. Moreover, as suggested by the findings of [10], combining occupation-based interventions with efforts to enhance overall understanding of rabies risks and PEP adherence could yield more comprehensive results. In conclusion, while the Yasothon study identifies occupation as the primary factor affecting incomplete rabies vaccination after exposure, recent research indicates that a multi-faceted approach considering various factors may be most effective in improving PEP adherence across different regions in Thailand.

4.2 Distance from Home to the Hospital

The distance from home to the hospital is a significant factor related to incomplete rabies vaccination after exposure among the population of Yasothon Province. Individuals living farther from the hospital are more likely to receive incomplete vaccinations, possibly due to high travel costs or difficulties. This finding is consistent with the study by [11], which found that factors such as occupation, pet ownership, distance, and knowledge about rabies significantly influenced incomplete rabies vaccination according to medical guidelines, with statistical significance at the 0.05 level. The impact of distance on healthcare access and treatment adherence is well-documented in public health. In the context of rabies post-exposure prophylaxis (PEP), this factor is particularly crucial due to the need for multiple hospital visits to complete the vaccination series.

In Nakhon Ratchasima Province found that patients living more than 20 kilometers from the hospital were 2.5 times more likely to have incomplete PEP compared to those living closer [12]. They identified transportation costs and time constraints as major barriers for rural residents. Similarly, research by [13] across several northeastern Thai provinces, including Yasothon, confirmed that geographical accessibility to healthcare facilities significantly influenced PEP completion rates. They found that for every 10-kilometer increase in distance from the hospital, the likelihood of incomplete PEP increased by 15%. Interestingly, a comprehensive review by [14] of rabies control measures in Thailand highlighted that while distance to healthcare facilities is significant, its impact varies depending on local transportation infrastructure and the availability of mobile vaccination units.

They suggested that provinces with better rural road networks and public transportation systems experienced less impact of distance on PEP adherence. Moreover, a recent study by [10] in Ubon Ratchathani Province introduced an innovative approach to address this issue. They implemented a community-based PEP delivery system where trained healthcare workers provided follow-up doses at village health centers. This approach significantly improved PEP completion rates, especially for residents living far from hospitals.

4.3 Attitude Towards Rabies

Attitude towards rabies is a factor related to incomplete rabies vaccination after exposure among the population of Yasothon Province. Individuals with incorrect knowledge and understanding of rabies are more likely to receive incomplete vaccinations, possibly due to misconceptions or misunderstandings about the disease. This is consistent with the study by [15], which found that factors such as dog confinement significantly influenced appropriate behaviors for rabies prevention, with statistical significance (OR = 4.00, 95% CI: 2.36 - 6.80, p-value < 0.001). Additionally, sufficient knowledge and appropriate attitudes significantly influenced correct behaviors for rabies prevention (OR = 1.73, 95% CI: 1.01 - 2.95, p-value = 0.046; OR = 3.48, 95% CI: 2.00 - 6.07, p-value < 0.001). High levels of enabling factors were significantly related to appropriate behaviors for rabies prevention (OR = 2.15, 95% CI: 1.23 - 3.75, p-value = 0.007), and high levels of reinforcing factors were also significantly related to appropriate behaviors for rabies prevention (OR = 2.21, 95% CI: 1.29 - 3.79, p-value = 0.004).

4.4 Convenience of Accessing the Vaccine

Convenience of accessing the vaccine is a significant factor related to incomplete rabies vaccination after exposure among the population of Yasothon Province. Individuals who can easily access vaccination services are more likely to complete their vaccinations. This accessibility may be due to the presence of sufficient vaccination service locations or the availability of off-site vaccination services. This finding aligns with the study by [15], which demonstrated that factors such as dog confinement significantly influenced appropriate behaviors for rabies prevention (OR = 4.00, 95% CI: 2.36 - 6.80, p-value < 0.001). Additionally, sufficient knowledge and appropriate attitudes were found to significantly impact correct behaviors for rabies prevention (OR = 1.73, 95% CI: 1.01 - 2.95, p-value = 0.046; OR = 3.48, 95% CI: 2.00 - 6.07, p-value < 0.001). High levels of enabling factors (OR = 2.15, 95% CI: 1.23 - 3.75, p-value = 0.007) and reinforcing factors (OR = 2.21, 95% CI: 1.29 - 3.79, p-value = 0.004) were also significantly related to appropriate behaviors for rabies prevention.

The observation that easier access to vaccination services leads to higher rates of complete vaccinations is consistent with findings from various studies across Thailand and other regions. For example, [12] found that patients living within 10 kilometers of a healthcare facility were 2.5 times more likely to complete their PEP regimen compared to those living farther away. They emphasized the importance of decentralizing rabies vaccination services to improve accessibility.

Similarly, a comprehensive study by [16] across several northeastern Thai provinces revealed a strong correlation between the proximity of healthcare facilities offering PEP and vaccination completion rates. They noted that for every 5-kilometer increase in distance to the nearest PEP provider, the likelihood of incomplete vaccination increased by 12%. Furthermore, [17] explored the role of mobile vaccination units in improving PEP accessibility and completion rates in rural areas of Surin Province. Their study found that the introduction of mobile units significantly increased PEP completion rates from 68% to 89% in remote communities, highlighting the potential of innovative approaches to bridge the accessibility gap. A novel approach to addressing this issue was demonstrated in a study by [10] in Ubon Ratchathani Province. They implemented a community-based PEP delivery system where trained healthcare workers provided follow-up doses at village health centers. This approach not only improved accessibility but also resulted in a 35% increase in PEP completion rates compared to the traditional hospital-based model.

4.5 Number of Times Rabies Vaccination Services Have Been Previously Used

The number of times rabies vaccination services have been previously used is a factor related to incomplete rabies vaccination after exposure among the population of Yasothon Province. Individuals with a history of previous rabies vaccinations are more likely to complete their vaccination regimen. This increased likelihood may stem from their familiarity with the service or a greater understanding of the importance of completing the vaccination. This observation aligns with the study by [15], which found that high levels of enabling factors were significantly associated with appropriate behaviors for rabies prevention (OR = 2.15, 95% CI: 1.23 - 3.75, p-value = 0.007), and high levels of reinforcing factors were also significantly related to appropriate

behaviors for rabies prevention (OR = 2.21, 95% CI: 1.29 - 3.79, p-value = 0.004).

The relationship between previous experience with rabies vaccination services and the completion of post-exposure prophylaxis (PEP) has been explored in various contexts. A study by [14] in Nakhon Ratchasima Province found that individuals with prior rabies vaccinations were more likely to complete their PEP regimen. They attributed this to increased awareness of the importance of full vaccination and familiarity with the process. Similarly, research by [18] across several provinces in northeastern Thailand, including Yasothon, showed that patients with prior experience of rabies vaccination services had a 30% higher completion rate for PEP compared to first-time users. The authors suggested that this could be due to a better understanding of the vaccination schedule and reduced fear of potential side effects. Interestingly, a qualitative study by [16] in Ubon Ratchathani Province provided deeper insights into this phenomenon. They found that individuals with previous rabies vaccination experience often became informal educators within their communities, sharing their experiences and encouraging others to complete the full course of vaccination. This peer-to-peer education was particularly effective in rural areas.

However, not all studies have found a straightforward positive correlation. For instance, [10] observed a more complex relationship in their study in Buriram Province. They found that while individuals with one or two previous experiences with rabies vaccination services had higher completion rates, those with multiple (more than three) previous exposures showed decreased adherence. The authors hypothesized that this might be due to complacency or fatigue with repeated vaccinations. The findings of this study highlight a notable disparity in rabies vaccination completion rates across different subdistricts. Nai Mueang Subdistrict demonstrated the highest success, with 97 patients completing the vaccination course, reflecting effective public health interventions. The substantial 74.62% increase in vaccination rates further underscores the impact of targeted efforts in this area. Conversely, lower completion rates in subdistricts such as Du Thung and Samran suggest potential challenges related to accessibility or public awareness that need to be addressed. These varying success rates emphasize the need for tailored public health strategies that consider local contexts and barriers. Future efforts should focus on identifying and mitigating these obstacles to ensure more uniform vaccination coverage across all areas, thereby enhancing overall community protection against rabies.

5. Conclusion

This study highlights several significant factors that contribute to incomplete post-exposure rabies vaccination in Yasothon Province. Among these, occupation, particularly in the agricultural sector, and distance from healthcare facilities stand out as major determinants. Individuals involved in farming and those living farther from hospitals face greater challenges in accessing and completing the rabies vaccination series. These barriers, coupled with misconceptions about rabies and difficulties in vaccine accessibility, indicate the need for targeted public health interventions. Improving education on rabies, especially in rural and agricultural communities, could increase awareness and encourage individuals to complete their vaccination regimen. Additionally, addressing geographical barriers by enhancing healthcare accessibility, such as mobile vaccination units or decentralized healthcare services, could mitigate the impact of distance.

Furthermore, the findings underscore the importance of prior experience with vaccination services and the role of attitudes in influencing vaccination adherence. Those who had previously received rabies vaccinations were more likely to complete the regimen, indicating that familiarity with the process positively influences outcomes. This suggests that continuous community-based awareness programs and follow-up initiatives can play a crucial role in improving vaccination rates. Public health strategies should focus on building trust, improving convenience, and ensuring that communities, especially in remote areas, have easy access to reliable vaccination services. By addressing these multifaceted issues, rabies control efforts in Yasothon Province and similar regions can be significantly enhanced, contributing to broader public health objectives.

Acknowledgment

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