

# FACTORS RELATED TO USING RODENTS AS TRADITIONAL CURING PRODUCTS

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## ABSTRACT:

**Background:** Rodents are one of the important reservoirs for zoonotic diseases that have been increasing public health concerns, especially in Southeast Asian countries including the Lao PDR.

**Methods:** A cross-sectional study was conducted to determine human-rodent exposure in Bolikhamxay Province, Lao PDR, among the majority Lao-Tai, and Hmong ethnic groups, aged between 18 – 50 years, during March through May 2013. The current study focused on use of rodents as traditional curing sickness products.

**Results:** Among 584 respondents, sixteen (16, or 2.7%) respondents (6 females and 10 males) who reported using any part(s) of rodents as traditional curing products. Mean age was 33.6 years old and half of the respondents (8, 50.0%) were > 36 years old. Final multiple logistic regression results showed that two independent variables (has a car, and sanitation as flush toilet) were statistically significant with reported use of rodents or any parts of rodents for medicinal purposes. The respondents who reported having a car (OR=3.534, 95% CI 1.289 – 9.688, p 0.014) and having sanitation as flush toilet (OR=4.167, 95% CI 1.262 – 13.752, p 0.019) were positive statistically significant with reported use of rodents or any parts of rodents as medicine. These findings may imply that among persons who have better living status (e.g. having car or flush toilet) preferred to have rodents [e.g. porcupines (3, 0.5%), rat/mouse (6, 1.0%), and squirrels (8, 1.4%)] as traditional curing products.

**Conclusions:** Further studies should be planned to extend and assess these findings, especially in specific target population who have been exposed with wildlife or focused tribe in this study in order to obtain in-depth information on the usage of the rodents. It would also be useful to characterize their risk of rodent-borne illnesses, and the health benefits of using rodents to treat these illnesses

**Keywords:** Emerging Pandemic Threat Program (EPT), PREVENT Project, Rodent, Curing products, Traditional medicine, Zoo therapy, Hmong, Lao-Tai, Bolikhamxay, Lao PDR

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## INTRODUCTION

Animals and their products have been reported as used by ancient people for primary sources of food and medicine (as for treating illnesses) [1]. Likewise, wildlife has been extensively used in traditional medicines in countries worldwide [2-5]. A literature review showed that about 13% of the medicines used by Traditional Chinese Medicine (TCM) are derived from animals. However, the animal-based products and remedies have not been systematically studied [5], and there is an especial lack of information on users and percentage of the usage, as well as disease risks from the usages, especially from Southeast

Asian countries and Lao PDR where people have been consuming wildlife products and using them as traditional medicines [6].

Zoonoses associated with wildlife have been increasing public health concerns worldwide [7]. Zoonotic pathogens have been reported responsible for approximately three-fourths of human emerging infections [8]. Routes of transmission of the zoonoses from wildlife, especially rodents, consist of direct and indirect contact [8], e.g. inhalation [9], skin puncture [10], and consumption [11]. Rodents are a species of animals that have been hunted, prepared for food (butchered and cut), consumed [12], and used as medicines [13]. However, there are still few studies that document the use of rodents as medicines that might be direct risky for rodent-borne infection.

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This study was conducted in Bolikhamxay province of Lao PDR. It was conducted among adult respondents (18-50 year-old) who are of different ethnic groups, during March - May 2013. The results of this study provide information the use of rodents for medicinal reasons among different ethnic groups, gender, and socio-demographic, environmental, behavioral, and cultural contexts and is evidence-based information in support of further studies in this country and other areas that have similar contexts.

## MATERIALS AND METHODS

### Study area and study sites

The Khamkeuth district of Bolikhamxay province, located in the central part of Lao PDR, was selected as our study area with the approval by the Department of Hygiene and Prevention, Ministry of Health (MOH), the National Emerging Infectious Diseases Coordination Office (NEIDCO), the Department of Livestock and Fisheries, and the Wildlife Division of the Ministry of Agriculture and Forestry (MAF) of the Lao PDR. This area also serves as host to several dams and a national protected area that is home to both wildlife and human communities that live by hunting. It was also important to select a site where the environment is changing due to development or other human activities (e.g., logging, construction of hydro power plants, and presence of other extractive industries) that can transform the human-animal interface in ways that can result in new exposures to diseases [6].

### Study design, respondents, and household selection

This cross-sectional study was conducted during March - May 2013. The following criteria were considered in selecting the study respondents –

1) Ethnicity: Two major ethnic groups: Hmong and Lao-Tai, in Khamkeuth district.

2) Age and Gender: Adult (18-50 year-old) females and males.

A two-stage cluster sampling procedure was used. In the first stage, villages were selected randomly using probability proportional to size (PPS) sampling. In the second stage, independent samples of males and females in households in each village were selected using systematic sampling with different random starts for the two genders, and with a specified interval between selected households. Each team used a predetermined walking route that covered the entire village so that all households in the villages had an equal chance of being included in the survey. This route was determined prior to the start of field work using

village maps provided by local health offices. Starting with the first household of each sample and walking in the predetermined route, the survey team screened for eligible respondents in households. In households with more than one eligible adult, one adult was selected by using a Kish grid table [13], which essentially gave an equal probability of selection to each eligible respondent in the village.

This current paper focused on only one outcome variable: respondents reported using rodents or any parts of rodents as traditional curing products.

### Data collection tools and pre-test procedures

The study used a questionnaire consisting of 13 sections that elicited information on socio-demographic and other descriptive characteristics, and evidence of contact with rodents and other animals (including poultry and domestic animals). However, this report has focused specifically on use of rodents or any parts of rodents as traditional curing products. After the original questionnaire was translated from English into Lao and into Hmong, a pre-test was conducted to gauge the validity and precision of the translation, as well as understanding of the questions. The pre-test was conducted among 40 individuals (21 Hmong and 19 Lao-Tai). As a result of the pre-tests, questionnaires in English, Lao, and Hmong were refined before they were used in actual data collection. Interviews were conducted by trained field researchers and supervised by FHI 360 technical researchers.

There were 22 independent variables used for our analysis. These variables were selected based on unpublished formative research in Khon Kaen province of Thailand by PREVENT during 2011 [6] and literature which addressed factors related to rodent consumption and hunting [14], such as socio-demographic factors (e.g., age, gender, occupation, and economic status) [15-18], behavioral factors (e.g., cultivation-related tasks) and environmental factors (e.g., household types) [19]. This research indicated that potential factors such as age, gender, economic status, and cultural context might be associated with rodent exposure. Of these, nineteen were dichotomous and three were continuous. For each dichotomous variable, the comparison group was described first, followed by the reference group. The numbers and percentages of participants in the comparison group were also given. Of these, 18 were dichotomous and three were continuous. The independent variables were grouped into four types: socio-demographic, environmental, behavioral, and cultural. Details are shown below.

### Statistical analysis

Data were analyzed separately for the three

**Table 1** Step 2, first multiple logistic regression model for reporting use of rodents or any parts of rodents as medicine

Variables	Coefficient	Odds Ratio	95% C.I. for ORs		P-values
			Lower	Upper	
Ethnic group					0.423
Ethnic group - Lao-Tai	0.420	1.522	0.129	17.925	0.738
Ethnic group - Hmong	1.605	4.979	0.392	63.295	0.216
Religion as spirit	-0.182	0.834	0.112	6.201	0.859
Educational attainment level	0.656	1.927	0.689	5.387	0.211
Has a car	1.080	2.945	1.048	8.273	0.040
Sanitation as flush toilet	1.026	2.790	0.813	9.575	0.103
Dwelling as wooden floor	-0.062	0.940	0.169	5.215	0.943
Constant	-5.370	0.005			0.000

outcome variables and included all 584 subjects. During analysis, descriptive statistics were calculated for dependent and independent variables. Then data were analyzed in three steps. Step 1 consisted of bivariate analysis in which associations between the dependent variable and each of the independent variables (all 22 variables), considered separately, were ascertained [20]. Chi-square or Fisher's exact tests were used for categorical independent variables, and logistic regression was used for continuous independent variables.

In Step 2, a multiple logistic regression model, which included eligible independent variables for which  $p \leq 0.15$  in the bivariate analysis, was constructed for each dependent variable. In Step 3, a second logistic regression model, which included eligible independent variables for which  $p \leq 0.15$  in the Step 2 model, was constructed for each dependent variable. P-values  $\leq 0.05$  were considered statistically significant. Data analysis was conducted with licensed SPSS software (version 22; IBM: Armonk, NY).

#### Ethical considerations

This study was conducted after obtaining ethical approval from the FHI 360 Institutional Review Board (IRB) (PHSC Proposal #10356), the Lao PDR National Ethics Committee for Health Research (NECHR) within the National Institute of Public Health (NIOPH) under the Ministry of Health, and the College of Public Health Sciences (Approval No. 57/NECHR), Chulalongkorn University (Protocol No: 005.1/56, COA No. 080/2013).

This study included no invasive or medical procedures of any kind. Participation in the study was strictly voluntary. Written informed consent was obtained from all respondents before proceeding to interview/discussion. Participants were assured that their responses were not shared by the researchers and were kept completely confidential and private. They were provided information about whom to contact if they had questions about the study.

Measures were taken to ensure the respect, dignity, and freedom of each participant. During training of fieldworkers, obtaining informed consent, avoiding coercion of any kind, and maintaining confidentiality was emphasized. To the extent possible, the interviews were conducted in a private setting where the interviews could not be heard by others.

#### RESULTS

Five hundred eighty-four (584) respondents participated in this study. Among respondents, 292 (50.0%) were Hmong, while 152 (26.0%) were Lao-Tai and 140 (24.0%) were other ethnic groups who came from 29 villages of Khamkeuth district within Bolikhamxay province.

Sixteen (16, 2.7%) respondents (6 females and 10 males) reported using any parts of rodents as traditional curing products. Among these 16 respondents, the mean age was 33.6 years old and half of the respondents (8, 50.0%) were  $> 36$  years old. All of them were married or cohabiting and the main occupation was farmer (13, 81.3%). Half of the respondents had higher than primary school education, and lived in households with  $> 6$  people. To be specific about the types of rodents, the respondents reported using rodents or any parts of rodents as medicines of the following: porcupines (3, 0.5%), rat/mouse (6, 1.0%), and squirrels (8, 1.4%).

The bivariate analysis results showed that six independent variables (ethnicity, religion as spirit, educational attainment level, has a car, family size, and dwelling has wooden floor) were included in the initial logistic regression model (cut off point,  $p$ -value  $\leq 0.15$ , based on bivariate analysis results). Two independent variables (has a car and sanitation as flush toilet) were eligible for the Step 2 of the analysis (Table 1). Table 2 shows that two independent variables (has a car, and sanitation as flush toilet) were statistically significant with reported use of rodents or any parts of rodents as

**Table 2** Step 3, second multiple logistic regression model for reporting use of rodents or any parts of rodents as medicine

Variables	Coefficient	Odds Ratio	95% C.I. for ORs		P-values
			Lower	Upper	
Has a car	1.262	3.534	1.289	9.688	0.014
Sanitation as flush toilet	1.427	4.167	1.262	13.752	0.019
Constant	-4.215	0.015			<0.001

medicine. The respondents who reported having a car (OR=3.534, 95% CI 1.289 – 9.688, p 0.014) and having sanitation as flush toilet (OR=4.167, 95% CI 1.262 – 13.752, p 0.019) were positive statistically significant with reported use of rodents or any parts of rodents as medicine.

## DISCUSSION AND CONCLUSION

The results showed that socio-demographic (having a car) and environmental (sanitation as flush toilet) factors were associated with use of rodents or any parts of rodents (e.g. porcupines, rat/mouse, and squirrels) as traditional curing products. As having sanitation as flush toilet could take as wealth's indicator [21], therefore, persons who have better living condition preferred to use rodents as traditional products for curing their illnesses

The results also could be comparable with research cited in the PREVENT literature review [22] which documented that although the Lao traditional medicine is primarily herbal-based, it also encompasses a small proportion of bush meat parts. Other research [23, 24] also documents Chinese traditional medicine as using animal parts. Baird [25] found that animal-based components of traditional remedies were often "by-products" collected from dead animals. TRAFFIC, a wildlife trade monitoring network [26] found that the traditional medicine traders are mostly Hmong women, who source raw material from Hmong living in the north of Laos. The same source [26] also cited that flying squirrels were sold by Hmong traders to Chinese for medicinal purposes.

As per nature of this quantitative study that didn't probe on how to use the rodents, information on exact parts or benefit of the usage. Therefore, further studies should be planned to determine the information, especially in specific target population or previous population to follow up in order to obtain the in-depth information on the usage of the rodents. It may assist to learn on their risk toward rodent-borne diseases and on benefit of the usage on curing the illness.

## FINANCIAL DISCLOSURE

The EPT/PREVENT Project allowed the authors to access, analyze and publish this data. The

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This is noted that the authors, Drs. Suwannarong and Lantican, conducted this study while worked for the PREVENT Project/FHI360 and FHI360 team.

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