

ASSOCIATED ENVIRONMENTAL FACTORS, KNOWLEDGE AND
PRACTICES REGARDING TO ANTHRAX INFECTION IN HUMAN
IN SALAVAN DISTRICT, SALAVAN PROVINCE, LAO PDR:
CASE-CONTROL STUDY

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A Thesis Submitted in Partial Fulfillment of the Requirements
for the Degree of Master of Public Health Program in Public Health

College of Public Health Sciences

Chulalongkorn University

Academic Year 2011

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ปัจจัยเกี่ยวข้องกับด้านสิ่งแวดล้อม องค์กรความรู้ และการปฏิบัติตัวที่สัมพันธ์กับการติดเชื้อ
แอนแทรกในคน ณ อำเภอสาละวัน จังหวัดสาละวัน ประเทศสาธารณรัฐประชาชนลาว
: การศึกษาแบบย้อนหลังจากผลไปหาเหตุ

นางสาวเพ็ชดาหวัน เรืองวิไล

วิทยานิพนธ์นี้เป็นส่วนหนึ่งของการศึกษาตามหลักสูตรปริญญาสาธาณสุขศาสตรมหาบัณฑิต
สาขาวิชาสาธาณสุขศาสตร์
วิทยาลัยวิทยาศาสตร์สาธาณสุข จุฬาลงกรณ์มหาวิทยาลัย
ปีการศึกษา 2554
ลิขสิทธิ์ของจุฬาลงกรณ์มหาวิทยาลัย

Thesis Title ASSOCIATED ENVIRONMENTAL FACTORS, KNOWLEDGE
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 IN HUMAN IN SALAVAN DISTRICT, SALAVAN
 PROVINCE, LAO PDR: CASE-CONTROL STUDY

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แอนแทรกเป็นโรคที่มีรายงานและพบได้ในทุกทวีปทั่วโลกยกเว้นทวีปแอนตาร์กติกา ในหลายประเทศพบการระบาดของโรคนี้นี้เพิ่มมากขึ้น ในประเทศสาธารณรัฐประชาธิปไตยประชาชนลาว มีรายงานการเกิดโรคแอนแทรกในคนอย่างต่อเนื่อง โดยเฉพาะในจังหวัดสาละวัน การศึกษาค้นคว้าครั้งนี้มีวัตถุประสงค์เพื่อศึกษาและระบุปัจจัยเสี่ยงที่เกี่ยวข้องกับการติดเชื้อแอนแทรกในคน ณ หมู่บ้านใน อำเภอสาละวัน จังหวัดสาละวัน สาธารณรัฐประชาธิปไตยประชาชนลาว โดยใช้แบบสอบถามถึงโครงสร้างและแบบสำรวจในการสังเกตปัจจัยสิ่งแวดล้อม ในระหว่างเดือนกุมภาพันธ์ถึงมีนาคม 2555 การศึกษาแบบย้อนหลังจากผลไปหาเหตุนี้ใช้กลุ่มประชากรทั้งสิ้นจำนวน 414 คน แบ่งเป็นกลุ่มที่เคยเกิดโรคในช่วงปี 2552 – 2554 จำนวน 138 คน โดยใช้ข้อมูลในการคัดเลือกจากศูนย์ห้องปฏิบัติการและระบาดวิทยาแห่งชาติ (National Center of Laboratory and Epidemiology, NCLE) และกลุ่มควบคุมจำนวน 276 คน คิดเป็นสัดส่วน 1:2 โดยการสุ่มเลือกจากทุกกลุ่มเพศและวัยจาก 17 หมู่บ้านที่เคยมีการระบาดของโรคนี้นี้ในเขตอำเภอสาละวัน จังหวัดสาละวัน ผลการศึกษาโดยใช้สถิติการวิเคราะห์พหุตัวแปร พบว่า ปัจจัยด้านความเชื่อทางศาสนา การประกอบอาชีพ การจัดการซากสัตว์ (วัว ควาย) ที่ตายแล้ว และ คอกสัตว์เลี้ยง มีความสัมพันธ์เชิงบวกกับการติดเชื้อแอนแทรกในคนอย่างมีนัยสำคัญ ($p < 0.05$) นอกจากนี้งานวิจัยนี้เสนอให้มีการศึกษาปัจจัยสิ่งแวดล้อมอื่นๆ ที่อาจจะเป็นสาเหตุในการเกิดโรคแอนแทรกในอนาคต เช่น อุณหภูมิ อากาศ ความชื้น ค่าความเป็นกรดด่างในดิน และฝุ่นจากดิน และ เน้นให้มีความร่วมมือหน่วยงานสุขภาพมนุษย์ และ หน่วยงานสุขภาพสัตว์ ตลอดจนสร้างความตระหนักให้กับชุมชนที่มี การระบาดของโรคนี้อีกต่อไป

สาขาวิชา : สาธารณสุขศาสตร์.....ลายมือชื่อนิติศ:

ปีการศึกษา : 2554.....ลายมือชื่อ อ.ที่ปรึกษาวิทยานิพนธ์หลัก:

##5478807953 : MAJOR PUBLIC HEALTH

KEYWORDS : KNOWLEDGE/PRCTICE/ ENVIRONMENT/HUMAN ANTRAX /CASE-CONTROL STUDY

PHETDAVANH LEUANGVILAY: ASSOCIATED ENVIRONMENTAL FACTORS, KNOWLEDGE AND PRACTICE REGARDING TO ANTHRAX INFECTION IN HUMAN IN SALAVAN DISTRICT, SALAVAN PROVINCE, LAO PDR:CASE-CONTROLSTUDY.ADVISOR: WATTASIT SIRIWONG,Ph.D.66pp.

Anthrax is a reportable disease and become a world concern as anthrax is found in all continents except Antarctica; many countries in the world are endemic with more frequent outbreaks. In Lao PDR, sporadic cases reported time to time and the most affected province is Salavan province. This study aims to identify risk factors associated with human anthrax in villagers in Salavan district, Salavan province, Lao PDR. The semi-structured questionnaire and observation form of environmental setting was used for data collection, which was carried out in the months of February and March 2012. The 1:2 ratio case-control study design was used, 414 people were included in this study, 138 of them are reported cases from 2009 to 2011 were included in this study, the line list was provided by the National Center for Laboratory and Epidemiology (NCLE) and 276 controls were selected randomly in all ages and sex in 17 affected villages of Salavan district, Salavan province. The result of multivariable analysis showed that four variables namely religion, occupation, practice of leaving carcass and state of corral associated positively with human anthrax infection with statistical significance ($p < 0.05$). Other environmental factors for instance temperature, weather, humidity, pH of soil and dusty soil should be considered in future research. Collaboration between human health and animal health sectors should be strengthened. Community awareness should consider in these affected areas.

Field of Study: Public Health..... Student's Signature:.....

Academic Year: 2011..... Advisor's Signature:.....

ACKNOWLEDGEMENTS

This thesis would not have been possible without help and support from many people. I would like to express my sincere gratitude and deep appreciation to my thesis advisor, Dr Wattasit Siriwong for his advice. I greatly express my sincere thanks to Dr Robert Sedgwick Chapman for his encouragement and guidance. I also would like to express my thanks to Asst.Prof. Dr. Ratana Somrongthong and Prof. Sirikul Isaranuruk for their value comments to improve my thesis.

I would like to express my thanks to the local authorities for their kind support and good collaboration including kind assistance from officials in different levels such as Salavan Provincial Health Office (PHO), Salavan District Health Office (DHO), health care staff in Health Care Center of Sapone and Ban Beng as well as the village heads and village health volunteers (VHV) of 17 villages included in this study. I also express thank to the National Center for Laboratory and Epidemiology in Vientiane for their contribution on providing the important information of human anthrax cases.

This study was supported by College of Public Health Sciences, Chulalongkorn University and funded by International Training and Research in Environmental and Occupational Health (ITREOH, NIH Fogarty Grant: 1 D43 TW007849)

I would like to extend my thanks to my friends and family, who have direct and indirect contribution to this study not only their assistance but also their comments, support and encouragements.

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LIST OF ABBREVIATIONS

AOR	Adjusted Odds Ratio
CDC	Centers for Diseases Control
CI	Confidential Interval
DHO	District Health Office
FET	Field Epidemiology Training
FAO	Food and Agriculture Organization
HC	Health Care Center
IEC	Information Education Communication
NAHC	National Animal Health Center
NCLE	National Center for Laboratory and Epidemiology
OIE	World Organization for Animal Health
OR	Odds ratio
PHO	Provincial Health Office
VHV	Village Health Volunteer
WHO	World Health Organization

CHAPTER I

INTRODUCTION

1.1. Background and Rational

1.1.1. Global Situation

Anthrax is found all over the world in all continents except Antarctica. There are endemic areas with more frequent outbreaks, other areas are subjected to sporadic outbreaks in response to unusual weather patterns which can cause spores that were dormant in the soil to come to the surface where they are ingested by ruminants, germinate and cause illness. (World Organization for Animal Health [OIE],2007: online)

There are sporadic human cases of anthrax globally for instance USA, Zambia, Bangladesh, India, China and some countries in Africa and Europe and become endemic public health issue.

In 2001, there was mail bioterrorism of anthrax in USA, 22 cases including 5 deaths were detected, 11 of them were confirmed as inhalation anthrax, and others 11 cases (7 confirmed and 4 suspected cases) were coetaneous anthrax. 12 cases are mail handlers who had direct contact with contaminate mails. 55% of all cases were male. The cases were identified in 7 states along east coast of the United State namely Connecticut, Florida, Maryland, New Jersey, New York City, Pennsylvania and Virginia. Age range of the cases is between 7 months to 94 years, in average is 46 years. (Daniel. et al., 2002 : Cole, 2004) . from this event, Anthrax became well-known and also became global public health concern.

In Bangladesh northwest, there are more than 500 human cases infected of anthrax, reported from 12 out of 164 districts throughout the country from August-September 2010. Main risks were identified, for example eating and handling infected animal products. Farmers are recommended on carcass disposal is to bury their infected cattle carcasses in deep underground, but some of farmers are unlikely to perform this advice. The chief technical officer of the Food and Agriculture Organization said that “some of farmers just dispose their cattle carcasses in the river

and lake which is very risky” (Gregg, 2010). From this event shows that one of risk factors of anthrax infection in human is their own practices.

In 2001, there was an outbreak occurred at three villages in Kolar district (Karnataka, south India) between June and August 2001 when 25 sheep and cows died. Villagers get sick after eating those carcass meats. Another outbreak took place at Bandhughutu (Midnapore, West Bengal) in May 2000. Here, too, tribal people feasted on roasted meat of dead animals. 43 people were affected, with three deaths and also in July 1999, too, an outbreak was reported from Karnataka. Eight human cases detected at Jenukuruba in Mysore district, after some people ate meat of an infected deer. Five people died in this incident (Sharma, 2001). In this event, consuming infected meat is the risk of anthrax infection.

1.1.2. Situation in Laos

Anthrax is one of 17 reportable diseases and symptoms of human health in Lao PDR, under the national surveillance system; there is weekly report from provincial health department to the National Centre for Laboratory and Epidemiology (NCLE). In Laos, there are many outbreaks of suspected anthrax occurred from 1984 to 2010, human cases were reported from four provinces namely Vientiane capital, Savannakhet, Salavan and Champasak, the last two provinces are the most affected provinces that human cases are reported quite often and become endemic areas (EWARN, 2010).

Table 1: The years that suspected anthrax in humans occurred in four provinces of Lao PDR (NCLE record, 2011)

Provinces	Years that suspected anthrax in humans occurred
Vientiane capital	1984, 1997, 2009
Savannakhet	2009
Salavan	2001, 2002, 2003, 2006, 2007, 2009, 2010 and 2011
Champasak	2001, 2004, 2008, 2009, 2010 and 2011

Animal health situation

Anthrax is one of the World Organization for Animal Health (OIE) notifiable disease. In 2007, there was an important event happened, it is collaboration between human health and animal health sectors. Both sectors agreed to work collaboratively together including strengthening reporting system, and MOU was signed in 2007. Under this agreement, there are 5 diseases that need to be reported to each other if diseases detected, they are avian influenza (H5N1), anthrax, leptospirosis, rabies and trichinosis (Memorandum of Understanding on collaboration between human and animal health sectors, 2007).

Anthrax vaccination in Lao PDR 1980 – 1996, vaccine distributed to most provinces in the country estimated 70% covered and vaccination stopped in 1996 when there was no ongoing outbreak detected (Chanthalom and Chanthalay, 2010). However, sporadic cases are predicted in Lao PDR.

Table 2: Positive results of anthracis by detected animal specimens (NAHC,2010)

Date	Sample from cattle	Result
1984	Blood	Anthraxis Positive
2008	skin, bone, blood, top of hair	<i>Anthraxis</i> Positive
April 14, 2009	skin, blood, meat	<i>Anthraxis</i> Positive
7 June 2009	Stool and top of hear	<i>Anthraxis</i> Positive
20 July 2009	dry meat, bone, dry skin	<i>Anthraxis</i> Positive

1.1.3. Situation in Salavan Province

Salavan province is located in southern part of Lao PDR, the north of Salavan is next to Savannakhet province, north-east is sharing border with Kuangchi province of Vietnam, the east is next to Sekong province and the west side is Ubonrachathani province, Thailand and have Mekong river in between. This province is affected by infectious diseases including dengue, diarrhea and anthrax. There are 8 districts namely Ta-Oi, Samouai, Lamam, Laongarm, Vapi, Lakhonepheng, Toumlan and

Salavan and consist of 358,761 habitants. As Lao PDR is agriculture country, most of people in this province are farmers, there is no big cattle farm there but people have cattle feeding in the yard area and people live closely with their animals.

In Salavan province, there are many events of cattle death occurred in last two decades. With limitation on lab capacity and reporting and surveillance system, there was no record of cattle deaths from 1993-2008, until 2009 there is laboratory confirmation of *Bacillus Anthracis* positive of animal specimens. The same outbreak in human in above mentioned.

Table 3: Shows the animal deaths in Salavan province from 1993-2009, reported by director of provincial agriculture department. (Chanthalom, Chanthalay, 2009)

ID	Year Occur cattle death	Diagnostic	District affect	Record
1	1993,1995, 1996, 1998	No	Kongxedon ,	No
2	1999	No	Taooy	No
3	2004	No	Kongxedon	No
4	2008	Suspected Anthrax	Saravan	No
5	2009	Anthrax	Saravan	Yes

In 2009, there was a big anthrax outbreak occurred in Salavan province. Investigation was done and there were 138 human cases detected including 10 deaths from a total population of 3885 in seven villages during February 22 to September 28, 2009. Most of the cases had experienced of handling and/or eating death carcasses. There were report of skin lesion and abdominal symptoms after consuming carcass. There was no vaccination against anthrax for cattle in that area. (National Center for Laboratory and Epidemiology [NCLE], 2009)

Last outbreak in Salavan occurred in April-May 2011, 18 cases including one death were reported from four villages, the most affected village is Nalath village where there are 14 cases out of 537 villagers, attack rate was 2.60%. The risk factors found is similar to earlier mentioned outbreak, that was behavior of villagers about Butchering sick and death cattle instead of dispose those animal properly by burying in deep underground. (NCLE, 2011)

People in Salavan have experienced with similar situation for years, but still, similar event occur again and again, risk factor found is their behavior. Health education is always conducted right after the outbreak detected to teach them what is anthrax, what are the risk and how can they prevent themselves. However, knowledge of villagers about anthrax is seem to be lack or unknown, this study would help providing information on this aspect which could help on further consideration about developing message for some specific groups and areas. Moreover, environmental setting is often leave behind even it is also important aspect, therefore environmental factors would be identified in this study as well.

1.2. Research Questions

- Which socio-demographic factors associated with anthrax infection in human in Salavan district, Salavan province?
- Do their past practices associated with anthrax infection in human in these Salavan district, Salavan province?
- What are the environmental factors associated with anthrax infection in human in Salavan district, Salavan province?

1.3. Hypothesis

- There is association between past practices and human anthrax infection among villagers in these seven villages
- There is association between environmental factors and human anthrax infection.
- There is association between socio-demographic factors and human anthrax infection.

1.4. Objective

1.4.1. General Objective

To assess environmental factors, knowledge and practice towards anthrax infection in human and in villagers of in Salavan district, Salavan province, Lao PDR.

1.4.2. Specific Objective

- To identify association between past practice and human anthrax infection in Salavan district, Salavan province
- To identify association between socio-demographic factors and anthrax infection in human in Salavan district, Salavan province.
- To identify environmental factors influencing anthrax infection in human in Salavan district, Salavan province
- To assess knowledge, practice of villagers towards anthrax infection in human in Salavan district, Salavan province.

1.5. Conceptual Framework

Independent variables

Dependent variable

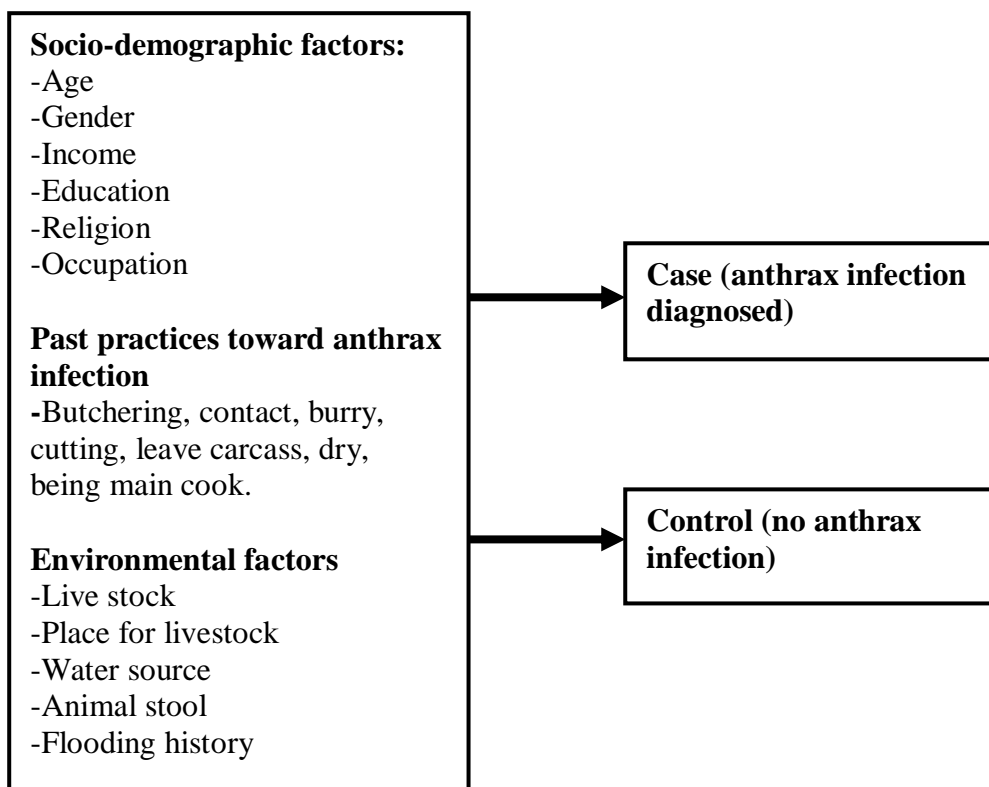


Figure 1 : Conceptual Framework

1.6. Operational Definitions

- *Environmental factors* means characteristics in a household's surrounding for instance number of animals, animal stall nearby their houses, water sources, animal stool surrounds the house as well as history of flooding in that area.
- *Socio-demographic factors* refers to age, gender, income, ethic, education, religion, occupation of the participants.
- *Practices* refer to practices of participants regards to anthrax infection for instance slaughtering and eating meat, disposal of carcass, vaccination of their cattle.
- *Past practices* refer to practices of participants before the outbreak in their villages occurred.
- *Knowledge* refers to knowledge about anthrax in difference aspects for instance causes symptoms, mode of transmission and how to prevent the diseases.
- *Cases* are all reported cases from the anthrax outbreak in 2009-2011 in Salavan district, Salavan province, who were diagnosed as anthrax infection by clinician by using clinical based diagnosis.
- *Controls* are non-case in affected villages (never experience anthrax like skin lesion in their lifetime), in all ages and sex.

CHAPTER II

REVIEW OF LITERATURE

2.1. Review of Related Literature

2.1.1. Overview of anthrax

Anthrax is a zoonotic disease caused by spore-forming bacteria *Bacillus anthracis*. The name of the bacteria is from the Greek word for coal, because of the ulcers with dark centers that develop on the skin of affected people. The disease is common in domestic and wild animals for example cattle, sheep, goats, camels, antelopes, and other herbivores and as a rare condition in humans. The incubation period in humans is approximately 1-6 days and the disease may be present as three distinct clinical syndromes: cutaneous, inhalational, and gastrointestinal diseases (Heymann, 2004) as following:

- Cutaneous or skin anthrax is the most common form. Incubation period is 1-12 days. It is usually contracted when a person with a break in their skin, such as a cut or abrasion, comes into direct contact with anthrax spores. The resulting itchy bump rapidly develops into a black sore. Some people can then develop headaches, muscle aches, fever and vomiting. Cutaneous anthrax must be treated quickly. Appropriate medical evaluation and treatment are essential.
- Gastrointestinal anthrax is caught from eating meat from an infected animal. Incubation period is 1-7 days. It causes initial symptoms similar to food poisoning but these can worsen to produce severe abdominal pain, vomiting of blood and severe diarrhoea. Appropriate medical evaluation and treatment are essential.
- The most severe form of human anthrax is called inhalation or pulmonary anthrax. Incubation period is 1-7 days. Though the rarest, it is the form of human anthrax causing the most current concern. This form of the disease is caused when a person is directly exposed to a large number of anthrax spores suspended in the air, and breathes them in. The first symptoms are similar to those of a

common cold, but this can rapidly progress to severe breathing difficulties and shock. Appropriate medical evaluation and treatment are essential. (CDC, 2001)

2.1.2. Mode of transmission to human

There are three main ways of anthrax transmission such as direct contact to infected animal products, consuming infected meat and breathing in anthrax contaminated air. Clinical forms mentioned above are developed according to such ways of transmission. The following picture shows the mode of transmission of anthrax from animal to human.

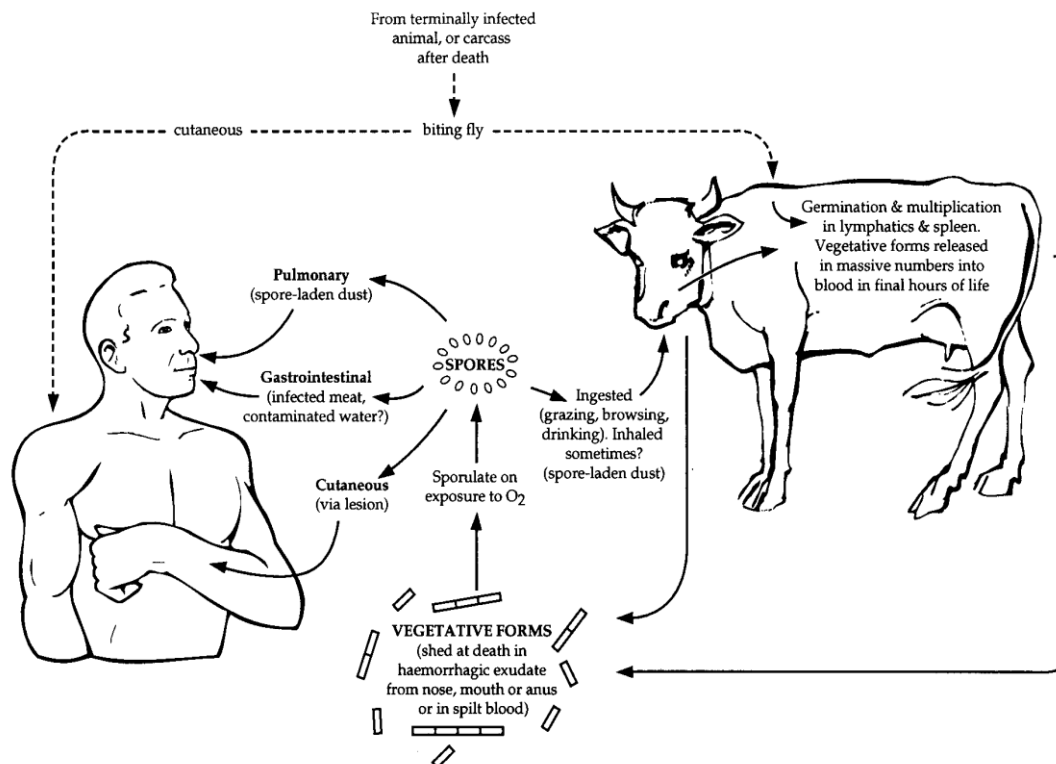


Figure 2: Cycle of infection in anthrax

The spore is central to the cycle, although vegetative forms may also play a role in establishing infection when, for example, humans or carnivores eat meat from an animal that died of anthrax or when biting flies transmit the disease. The infectivity of vegetative forms is difficult to establish since it is close to impossible to prepare truly spore-free vegetative cell suspension in the laboratory (Peter Turnbull, Anthrax in humans and animals 4th edition, (Geniva: WHO press, 2008). Page 10.)

So far, report of person to person transmission is very rare (Quinn and Turnbull, 1998).

2.1.3. Related researches.

There are many studies about anthrax have been done so far. However, most of them are studying among animals as anthrax is zoonotic disease and some of them are biological researches and there are some studies among human related to this issue.

A previous study on ecology and epidemiology of anthrax in cattle and humans in Zambia 2009 shows that there are some factors shown as challenges of anthrax control for instance socio-political, economical factors, environmental and cultural factors (Siamudaala et al, 2009)

A report of Community-based Public health system Behavior of Tanzania shows that slaughtering sick animals for human consumption in Tanzania is one challenge of community public health education program(Kambarage et al., 2005 cited in Expert Consultation on Community-Based Veterinary Public Health System, 2005)

In 2007, there was a 1:1 unmatched case control study done in Zimbabwe. This study was conducted after an outbreak of anthrax occurred during January to February 2007, to identify risk factors for contracting anthrax in Kuwirirana ward, Gokwe North, Zimbabwe. 37 cases and 37 controls were involved in the study. A case was any person who developed disease by itchy of the affected area, followed by painful lesion which became popular and then eschar during period of outbreak which is 12 January-20 February 2007. The controls were people who did not develop any symptoms mentioned above. There are several risk factors identified in this study for example, eating contaminated meat (OR=7.7), belonging to a household with cattle deaths(OR=9.7), assisting with skinning infected carcasses (OR=5.4), preparation food, cutting meat (slaughter)(OR=4.8), preparation for drying meat (OR=5), having cuts or wounds during skinning (OR=19.5) were all significantly associated with anthrax with 95% CI excluded 1 (Gombe et al, 2010).

There is a case control study conducted in Saskatchewan, Canada in 2007, to investigate an anthrax outbreak in cattle that occurred during summer 2006. Cases were defined as farm with one or more animals confirmed with anthrax and control farms were farms that had no evidence of anthrax or suspicious deaths of anthrax in 2006 while there were many anthrax outbreaks occurred. 117 case farms and 259 control farms were included in the study. Questionnaire was used for data collection which consists of the environmental conditions of farms site and how do they manage the premise, history of animal deaths, density of herds, grass length, pasture condition, history of flooding etc. the researcher found that premises where there is occurrence of flooding is more likely have anthrax infection compare to those who don't. The higher density of animals on pasture is one risk factor of anthrax infection with OR=3 with 95% CI is 1.6-5.7. (Epp, Waldner and Argue, 2010)

There was a retrospective cohort study was conducted in Kazakhstan in order to identify risk factors for human anthrax among contacts of anthrax infected livestock in Kazakhstan. There were 53 cases and 255 non ill persons (contacts) from 7 outbreaks of human anthrax involved in the study, the researchers take data from those seven outbreaks that occurred during 1 January 1997-31 December 1998 and included all ages of cases and contacts. From this study they found that slaughtering animals (RR=8.3; 95%CI 4.8-14.4), butchering (RR=7.7; 95%CI 4.4-13.4), having cuts on hands (RR=4.2; 95% CI 1.9-9.0) are main risk factors of anthrax infection in human with P value less than 0.001 for each variable (Woods et al, 2004).

A retrospective case-control study done in North Dakota, USA, in 2006, after anthrax outbreak in animal during July 1 to October 12, 2005. The researchers sent out mail to 419 premises and there are 137 responses (33%). In this figure, 52 premises with cases and 85 respondents were premises with no reported cases. Therefore, giving 1:1.6 ratio for case and control. These cases was defined as premise with one or more animal deaths with specimens are positive for anthracis which confirmed by laboratory and the control are premises where there was no reported of animal deaths. Key findings of this study were the premises that vaccinated their animals more than one time a year is more likely to be protected compare with premises where they animal vaccination provided only once a year (OR=0.12 95% CI

0.05-0.30, $p < 0.0001$) Using antibiotics along with vaccination were almost eight times more likely to be anthrax-positive premises as compare with those that did not use antibiotics combinaton (OR=7.69, 95% CI 2.5-25, $p < 0.0001$). Moreover, weather condition is also taken into account, both instinct wet and dry conditions are more likely to be anthrax positive with $p < 0.03$ (Mafany et al, 2008)

Cross sectional survey was done in Tanzania to assess knowledge about cause, clinical features and diagnosis of some zoonotic diseases including Anthrax, found that the medical practitioners have lack knowledge about zoonotic diseases. There is no different between practitioners in different background. However, practitioners in rural area have lack knowledge compare to their urban colleagues. (John, 2008)

An earlier retrospective study was done among 369 villagers in KaengLai village, Bacheing district, Champassak province in the month of June 2008. The study was conducted after occurrence of an outbreak of suspected Anthrax in May-June 2008. After the investigation, 43 villagers experienced with skin lesion and/or rash called anthrax eschars, some of them reported an onset of abdominal pain with diarrhea after consuming cow meat product but no one present respiratory symptom. Identified risk factors of infection in humans with anthrax are experiencing a prior wound infection, contacting with cow hair, handling cow product (meat, bone) prior consumption, this shows that butchering and preparation of meat from dead cattle are the risk factors. Moreover, cases can be found in both male and female and from all ethnic groups. (Khamphongphan and Denny, 2008).

In 2009, there was an anthrax risk assessment done by FET (the Field Epidemiology Training) trainees, the assessment conducted in two provinces, Champasak and Salavan and found that animals in these two provinces are not vaccinated. In 1980, around 70 % coverage of Anthrax vaccination throughout the country, until 1996, vaccination program was stop when anthrax outbreak was not detected. Sometime vaccine is imported from Vietnam and Thailand just for specific event but it not routine program. (Chanthalom and Chanthlay, 2009)

There was a study done by FET (the Field Epidemiology Training) trainees in 2010. The assessment of knowledge about anthrax among staff of human health and animal health sectors in Salavan province. The result from this study shows that they

had lack understanding about anthrax in human, less than 30% of clinician know symptoms of anthrax and more than 70 % of them think that anthrax is only occur in animals. (Singhalath and Vilasone, 2010).

CHAPTER III

METHODS

3.1. Research Design

The case-control study design was used to identify environmental factors, knowledge and practices toward anthrax infection in humans among villagers in Salavan district, Salavan Province.

3.1.1. Study Area

The study is conducted in seventeen villages of Salavan district, Salavan Province, namely Nabak, Kadab, BengOudom, DongKohNeua, SaenVangnoiy, Nakhok, Nakoisao, Nalad, Sapone, Maisamphan, NaxayKokphao, DanYai, Nadonekhuang, NaphengYai, Thameuangkao, Thameuangxe, Khiengkong where the anthrax outbreak and anthrax human cases reported in 2009-2011. The study area covered 17 villages out of nineteen villages since two villages of them are far and there was only one case in each of these two villages, however, history of these two cases were taken. They both went to other villages where there was outbreak and they developed symptoms after consuming meat from carcass in other villages and there were no unusual cattle dead in these two villages (Ban Bouang and NongBua).

Salavan province is located in southern part of Lao PDR, the north of Salavan is next to Savannakhet province, north-east is sharing border with Kuangchi province, Vietnam, the east is next to Sekong province and the west side is Ubonrachathani province, Thailand and have Mekong river in between. This province is affected by infectious diseases including dengue, diarrhea and anthrax. There are 8 districts namely Ta-Oi, Samouai, Lamam, Laongarm, Vapi, Lakhonepheng, Toumlan and Salavan and consist of 358,761 habitants. As Lao PDR is agriculture country, most of people in this province are farmers, there is no big cattle farm there but people will have cattle feeding in the yard area, people live closely with their animals.



Figure 3 : Salavan Map

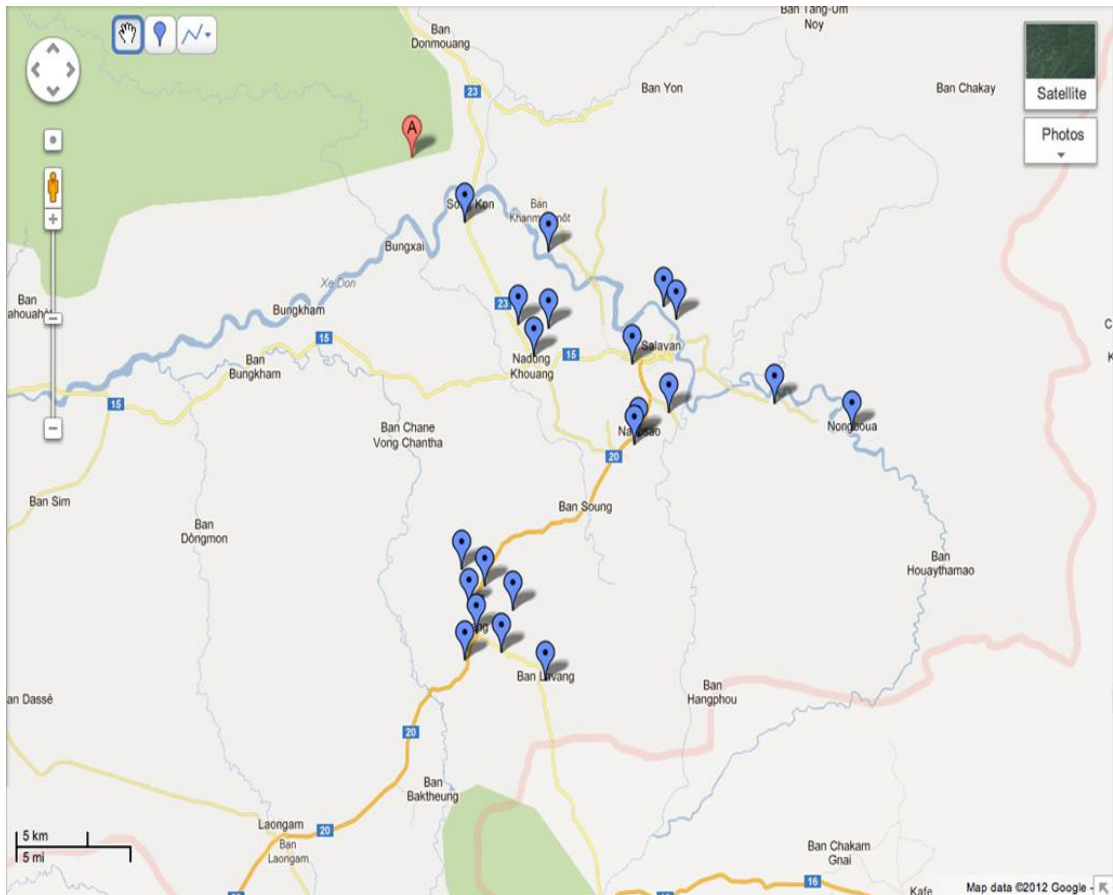


Figure 4: Villages of Salavan, the study site.

3.1.2. Study Period

This study is conducted in the months of February-March, 2012.

3.1.3. Study population and sample size

Cases

All reported cases from suspected anthrax outbreak in 2009-2011 and have been residing in those 17 affected villages, Salavan district, Salavan province before the outbreak in each specific village occurred

Control

Those who are non cases from suspected anthrax outbreak during 2009-2011, have been residing in those 17 affected villages for at least three years and have never experienced anthrax like skin lesion.

Exclusion criteria applied in this study is as follows:

Cases and Control

- Those who moved out from those affected villages
- Those who have mental health problem.
- Those who refuse to participate in the study.

Note: if there is mother of children under 12 who participated, being randomly selected, that mother will be excluded as she will be interviewed about her child. This condition will be applied for controls.

There are 138 cases that meet inclusion criteria mentioned above and all are invited to participate in the study. Two controls per one case were selected, so 276 controls are included, therefore 414 people are included in the study.

3.1.4. Sampling Technique

All cases are invited to involve in this study by using purposive sampling technique, an individual case is defined as a reported case from an anthrax outbreak in 2009-2011 in Salavan district, Salavan province. The line list of cases is provided by the National Centre for Laboratory and Epidemiology (NCLE) of Lao PDR. In the line list received from the National Center for Laboratory and Epidemiology, there were 171 cases in 19 villages should be included, and only 138 or around 80.23 % of reported cases were included in this study.

Controls were sampled randomly from those seventeen affected villages mentioned above. In this stage, initial survey was done in nine villages where there were reported cases more than five and called to eight villages where there were cases less than five. 138 cases were verified in this stage, therefore 276 controls would be included to this study, and number of households in each village was collected. Number of controls in each village was sampled randomly, there were 263 households were selected randomly by village head of each village. Then, each individual control was selected randomly from chosen the households respectively.

3.1.5. Research Instruments Measurement Tools

The data were collected by using a semi-structured interview questionnaire as well as developed checklist of environment observation which is done by the researcher based on references from others related researches done in the past. Printed photos of anthrax skin lesion was used for showing to controls in order to verify that they had never experienced this lesion in their life time. There are questions related to socio-demographic status, knowledge about anthrax in different aspects for example, mode of transmission, symptoms and prevention. Both cases and control group were asked by using same questionnaire. Each questionnaire needed approximately 30-45 minutes including observation form.

Pretesting of 50 questionnaires were conducted in Houai Leusi village, Bachieng district, Champasak province where there were report of human cases of anthrax in 2011 and is not included in this study. The whole interview process was monitored closely to ensure understanding of questions. For questions knowledge part, reliability test was done and Cronbach's alpha coefficient was 0.77 which is acceptable. The questionnaire was translated into Lao language and also the interview was conducted in Lao language. The form was edited on wording to make the questions more clear and understandable.

3.1.6. Data Collection

Data collection started from the month of February to March 2012. Firstly, researcher asked permission from the Ministry of Public Health, and then official letter is sent to local government authority for instance the Provincial Public Health Office (PHO), District Public Health Office (DHO), Health Care Center and the village heads of those villages in order to request for their approval and collaboration in each level. There are 3 assistants involved in data collection and there was a short training for these three assistants.

The validated and pre-tested questionnaire is administered to the participants. Data collection is done by face to face interview, the interview is conducted in Lao language, some interviewees those who speak only ethnic or local language, the interview is carried out with interpretational assistance from village head and village

health volunteer. Observation form is used as a check list for each individual person, to observe environmental setting of their house as well as their water sources.

3.1.7. Data analysis

For data analysis, Statistical Package of Social Science (SPSS) Software Version 17.0 is used. Followings were the statistics in use:

Descriptive statistics: The socio-demographic characteristics and general information is presented by frequency, percentage, mean and standard deviation.

Inferential statistics: the relationship between the independent variables and the dependent variable is analyzed by using binary logistic regression. Then all variables of interest were evaluated in a final multivariable model, all variables that p value less than 0.15 were taken into account for this model and then reported as an odds ratio (OR) with 95% confidence intervals (CI) and p-value less than 0.05 will be set for statistical significant level.

The answer of participants were weighed, 1 score for right answer and 0 for wrong answer. Then the knowledge scores were computed in percentage in each aspect of knowledge for instance general knowledge about anthrax consists of four questions, knowledge about mode of transmission way consists of six questions, knowledge about symptoms consists of eleven questions and knowledge about prevention consists of eight questions. Knowledge level of each aspect was classified into three levels as following.

Table 4: Classification levels of knowledge of cases and controls

Scores	Descriptions
<60%	Low level
60-80%	Moderate level
81-100%	High level

In the part of practices which consist of eight questions that ask about what did they do if there is cattle died in your household, based on their answers, 1 score for good practice and 0 for risk practice. Total score were computed in percentage and classified as following table.

Table 5: Classification of practice of cases and controls.

Scores	Descriptions
<60%	High risk practice
60-80%	Moderate risk practice
81-100%	Good practice

3.1.8. Ethical Consideration

Before conducting the study, the proposal and research instrument is reviewed by the National Ethics Committee for Health Research (NECHR) of Lao PDR and approved on 29 March 2012, approval number 038/NECHR to ensure that the questionnaire does not consist of any sensitive issue which is ethically incorrect. Before administrating the questionnaires, all the participants are adequately informed about objective, method and benefits of the study, the confidentiality of their information was ensured and data is strictly used only for the study purposes mentioned in consent form. The participants provided informed consent form and have provided their signature of agreement and allow the team to interview them.

CHAPTER IV

RESULTS

This study was conducted to identify risk factors associated with human anthrax in villagers in Salavan district, Salavan province, Lao PDR. Social demographic, knowledge and practice, and environmental factors were taken into account of this study which is case-control study design.

Face to face interview was conducted to collect data, as well as an observation form was administered to collect the finding about environment setting surround the house of each individual participants.

138 participants, who were reported in the national surveillance system in 2009 to 2011, were defined as cases and 276 of non-cases are control group from the calculation ratio of 1:2 ratio. All 414 participants were included in this study, and data was collected during 6-24 March 2012.

The data were computerized and analyzed by using SPSS version 17. The result of this study will be presented as following.

- Socio-demographic characteristics of the cases and controls
- Knowledge about anthrax of both cases and control group.
- Practice before and after the outbreak of the cases and controls
- The multivariable logistic regression model was used for analyzing the risk factors associated with human anthrax cases.

4.1. Socio-demographic characteristics of the cases and controls

The socio-demographics characteristics of all participants in this study are given in the table 6. Majority of cases were female or about 58.7% and approximately 59% of control were male (OR 2.05, 95% CI 1.35 to 3.10). The mean (\pm SD) age of cases was 32.91 (\pm 17.09) and 38.38 (\pm 16.33) years for the controls (OR 0.98, 95% CI 0.96 to 0.99). 54 % of the cases believe in Ghost, 44% are Buddhism and 0.8% is Christian while the majority of the controls are Buddhism (68.1%) and followed by Ghost (31.5%) and Christian (0.4%) respectively. However, this variable was categorized into two levels such as Buddhism and non Buddhism (Ghost + Christian)

as show in the table. Compared to Buddhism participants OR of people who are non Buddhism is 2.61, 95% CI 1.72 to 3.98. Most of cases and controls went to primary school, 47.1% and 52.1% respectively, around 30% of both cases and control did not go to school, and found that not many of them went to high school and higher. Main job of participants are farmers 79% of the cases and 91.3% of the controls. The mean (\pm SD) income of cases is 8.2 (\pm 6.5) million LAK and 7.5(\pm 6.4) million LAK for the controls.

Table 6: Socio-demographic characteristics of Cases and Controls

Characteristics	Number (percentage)		Odds ratio	95% CI		p value
	Case	Control		Lower	Upper	
Age			0.98	0.96	0.99	0.002
Range	3 – 73	1 – 80				
Mean \pm SD	32.91 \pm 17.09	38.38 \pm 16.33				
Sex						
Male	57 (41.3)	163 (59.0)	2.05	1.35	3.10	0.001
Female*	81 (58.7)	113 (41.0)	1	1	1	1
Religion						
Buddhism*	62 (44.9)	188 (68.1)	1	1	1	1
Non Buddhism	76 (55.1)	88 (31.9)	2.61	1.72	3.98	<0.001
Education						0.56
Didn't go to school*	42 (30.4)	83 (30.1)	1	1	1	1
Primary	65 (47.1)	144 (52.1)	0.89	0.55	1.43	0.63
Secondary	22 (16)	31 (11.2)	1.40	0.72	2.71	0.31
High school and higher	9 (6.5)	18 (6.5)	0.98	0.40	2.38	0.97
Occupation						
Farmer*	109 (79)	252 (91.3)	1	1	1	1
Non farmer	29 (21)	24 (8.7)	2.79	1.55	5.01	0.001
Income			1	1	1.03	0.121
Range	0.8M*-30M*	0.7M*-4.2M*				
Mean \pm SD	8.2M* \pm 6.5M*	7.5M* \pm 6.4M*				

*Reference group, are for categorical data not for continuous data.

M = Million LAK (Lao Kip).

Exchange Rate: 1 USD = 8,000LAK

4.2 Current and past practices of the cases and controls.

The practices of both cases and control groups are calculated in percentage as showed in table 8. Based on the result found that the mean practice scores of both cases and controls have been increased from 27.65% to 78.08% in the cases and from 42.26% to 76.15% in the controls if compared to the past (before the outbreak occurred). The past practice level of the cases is very low as most of them (94.2%) are at risk level while the control have 66.67% who were in risk practices level. We found that the past practice is associated positively with human anthrax infection, the group of risk practice with OR 14.13 (95% CI 3.35 to 59.5) and moderate risk practice with OR 2.3 (95% CI 0.442 to 12.04) compared to the group of good practice.

Table 7: Current and past practices of Cases and Controls

Characteristics	Number (percentage)		Odds ratio	95% CI		p value
	Case	control		Lower	Upper	
Current practice score			1.006	0.994	1.017	0.32
Range	12.5-100	0-100				
Mean	78.08±18.30	76.15±19.09				
Past practice score			0.975	0.965	0.984	<0.001
Range	0-90.90	0-100				
Mean	27.65±17	42.26±28.44				
current practice						0.53
81-100%*	68 (49.28)	120 (43.48)	1	1	1	1
60-80%	58 (42.03)	128 (46.38)	0.8	0.52	1.229	0.3
<60%	12 (8.70)	28 (10.14)	0.756	0.361	1.583	0.45
past practice						<0.001
81-100%*	2 (1.45)	40 (14.49)	1	1	1	1
60-80%	6 (4.35)	52 (18.84)	2.3	0.442	12.04	0.32
<60%	130 (94.2)	184 (66.67)	14.13	3.35	59.5	<0.001

*Reference group, are for categorical data not for continuous data.

The following table showed detail of current practices of both groups, the result shown that there is no variable which was associated significantly with human anthrax with p value of less than 0.05

Table 8: Current practices of both cases and controls

Characteristics	Number (percentage)		Odds ratio	95% CI		p value
	Case	control		Lower	Upper	
Butchering						
Yes	8 (5.7%)	26 (9.4%)	0.592	0.26	1.34	0.21
No*	130 (94.2%)	250 (90.6%)	1	1	1	1
Cut and Sale to others						
Yes	8 (5.8%)	24 (8.7%)	0.64	0.28	1.47	0.3
No*	130 (94.2%)	252 (91.3%)	1	1	1	1
Leave carcass in forest or stream						
Yes	25 (18.1%)	33 (12%)	1.62	0.92	2.86	0.09
No*	113 (81.9%)	243 (88%)	1	1	1	1
Dig hole and bury carcass						
Yes	125 (90.6%)	231 (83.7%)	1	1	1	1
No*	13 (9.4%)	45 (16.3%)	0.53	2.77	1.02	0.06
Dry meat						
Yes	15 (10.9%)	33 (12%)	0.89	0.47	1.71	0.74
No*	123 (89.1%)	143 (88%)	1	1	1	1
Keep its skin to make drum						
Yes	6 (4.3%)	12 (4.3%)	1	0.36	2.72	1
No*	132 (95.7%)	264 (96.7%)	1	1	1	1
Contact or handling carcass						
Yes	81 (58.7%)	163 (59.1%)	0.98	0.65	1.49	0.94
No*	57 (41.1%)	113 (40.9%)	1	1	1	1
Main cook of the family						
Yes	85 (61.6%)	195 (70.7%)	0.66	0.43	1.02	0.06
No*	53 (38.4%)	81 (29.3%)	1	1	1	1

*Reference group

The past practices were analyzed and shown in table 9. There are eight variables in this part; six of them were associated positively with human anthrax for instance Butchering carcass, found that people who did have higher risk than people who did not slaughter carcass as OR 8.25 with 95 % CI between 3.87 and 17.59. Cutting meat of dead cattle also associated with anthrax infection as OR of people who did is 6.35 compared to people who did not cut with 95% CI excluded 1 (3.27 to 12.34). People who did leave carcass in forest or stream had higher risk than people who did not as OR 2.17 and 95% CI 1.32 to 3.58. People who dried meat of dead carcass had higher risk than people who did not as OR of 5.37 and 95% CI 2.88 to 10.01. Contacting or handling carcass associated with anthrax infection, people who did had higher risk than people who did not as OR 2 and 95% CI 1.18 to 3.39. Being main cook of the family associated with anthrax infection as OR 0.63 and 95% CI 0.41 to 0.97. Digging hole to bury carcass also associated negatively with anthrax infection, people who did not bury carcass had higher risk than people who did, OR 5.13 and 95% CI 2.63 to 10.01. OR of people who keep skin of cattle for making drum was 0.9 compared to people who did and 95% CI 0.59 to 1.39, however it is not statistically significant as p value >0.05 . Detail of the part of past practices was shown in the following table.

Table 9: Past practices of both cases and controls

Characteristics	Number (percentage)		Odds ratio	95% CI		p value
	Case	control		Lower	Upper	
Butcher						
Yes	130 (94.2%)	183 (66.3%)	8.25	3.87	17.59	<0.001
No*	8 (5.8%)	93 (33.7%)	1	1	1	1
Cut and Sell to others						
Yes	127 (92%)	178 (64.5%)	6.35	3.274	12.34	<0.001
No*	11 (8%)	98 (35.5%)	1	1	1	1
Leave carcass in forest or stream						
Yes	38 (27.5%)	41 (14.9%)	2.17	1.32	3.58	0.002
No*	100 (72.5)	235 (85.1%)	1	1	1	1
Dig hole and bury carcass						
Yes	11 (8%)	85 (30.8%)	0.19	0.10	0.37	<0.001
No*	127 (92%)	191 (69.2%)	1	1	1	1
Dry meat						
Yes	125 (90.6%)	177 (64.1%)	5.37	2.88	10.01	<0.001
No*	13 (9.4%)	99 (35.9%)	1	1	1	1
Keep its skin to make drum						
Yes	47 (34.1%)	100 (36.2%)	0.9	0.59	1.39	0.66
No*	91 (65.9%)	176 (63.8%)	1	1	1	1
Contact or handling carcass						
Yes	116 (84.1%)	200 (27.5%)	2	1.18	3.39	0.01
No*	22 (15.9%)	76 (27.5%)	1	1	1	1
Main cook of the family						
Yes	85 (61.6%)	198 (71.7%)	0.63	0.41	0.97	0.03
No*	53 (38.4%)	78 (28.3%)	1	1	1	1

*Reference group

4.3 Environmental related factors

The result of environmental setting analysis is presented in table 11. The mean number of cow in the group of cases is around 4 cows and around 3 cows per household in the group of controls (OR 1.02, 95% CI 0.98 to 1.07). Number of buffalo in average of both two groups is the same (OR 1, 95% CI 0.91 to 1.10) and there are few goats in both groups, less than one goat per household in average (OR 0.86, 95% CI 0.65 to 1.14) as well as number of pig, less than 2 pigs per household in both group (OR 0.99, 95% CI 0.91 to 1.08). the result showed that 73.19% of cases owned animal deaths during the event occurred, while 66.3% of the controls also experienced animal of the household dead too (OR 1.39, 95% CI 0.88 to 2.18). 6.52% of the cases and 9.68% of the control reported that there was flooding in the area of their houses (OR 0.64, 95% CI 0.29 to 1.41). From the observation found that there are 84.06% of cases' houses and 70.65% of controls' houses had animals on yard or surround their houses (OR 2.19 95% CI 1.3 to 3.70). Animal stool was observed, at the places of cases more than the place of controls, around 71.01 % of cases and 57.97% of controls that animal stool found surrounded their house (OR 1.78, 95% CI 1.15 to 2.75). Around 60.87% of cases and 23.55% of the controls have corral or place for their animals nearby their houses (OR 5.20, 95%CI 3.35 to 8.10). The distance from their house to their corrals or places for animal is around 21.08 meters in average for the cases and 15.80 meters for the controls' household. 95.3% of the cases and 64.6% of the controls have dirty corral, very few cases have clean corral (4.71%) while 35.38% of controls have clean corral, compared to participants who have clean corral, participants who have dirty corral are more likely to get infected with OR 11.50 (95% CI 3.72 to 35.51). All participants drink water from different source from their animals and there is only one person in the group of cases and controls who take a bath at stream nearby village where is the place that animals also used.

Table 10: Environmental related factors.

Characteristics	Number (percentage)		Odds ratio	95% CI		p value
	Case	control		Lower	Upper	
Animal						
Cow			1.02	0.98	1.07	0.28
Range	0-30	0-30				
Mean \pm SD	3.48 \pm 5.25	2.95 \pm 4.32				
Buffalo			1.00	0.91	1.10	0.94
Range	0 - 10	0 - 20				
Mean \pm SD	1.12 \pm 2.12	1.11 \pm 2.16				
Goat			0.86	0.65	1.14	0.30
Range	0 - 6	0 - 12				
Mean \pm SD	0.8 \pm 0.662	0.2 \pm 1.14				
Pig			0.99	0.91	1.08	0.75
Range	0 - 13	0 - 15				
Mean \pm SD	1.38 \pm 2.30	1.46 \pm 2.49				
Animal death						
Never *	37 (26.81)	93 (33.70)	1	1	1	1
Used to	101 (73.19)	183 (66.30)	1.39	0.88	2.18	0.16
Flooding						
Never *	129 (93.48)	249 (90.22)	1	1	1	1
Used to	9 (6.52)	27 (9.78)	0.64	0.29	1.41	0.27
Observed animal						
Yes	116 (84.06)	195 (70.65)	2.19	1.30	3.70	0.003
No*	22 (15.94)	81 (29.35)	1	1	1	1
Animal stool						
Yes	98 (71.01)	160 (57.97)	1.78	1.15	2.75	0.01
No*	40 (28.99)	116 (42.03)				
Corral						
No*	54 (39.13)	211 (76.45)	1	1	1	1
Yes	84 (60.87)	65 (23.55)	5.20	3.35	8.10	<0.001
Distance						
Range	0-300	0-100	1.00	0.99	1.01	0.421
Mean (\pm SD)	21.08(\pm 48.34)	15.80(\pm 16.38)				
Corral state						
Clean*	4 (4.7)	23 (35.4)	1	1	1	1
Dirty	81 (95.3)	42 (64.6)	11.08	3.59	34.16	<0.001

*Reference group, are for categorical data not for continuous data

4.4 Multivariable logistic regression analysis

There were 15 variables were included in this analysis as they have p value less than 0.15 such as five socio-demographic factors (age, gender, religion, occupation and income), seven past practices (butchering, cutting, leaving carcass, digging hole and bury carcass, contacting and handling and being the main cook of the family), and three factors related to environmental aspect (animal observed, animal stool surround their houses and state of corral of places for keeping animal). These 15 variables were included in the first model and found that seven of them had p value less than 0.15. Then those seven variables were included in the final model and this time the result shown that four variables namely religion, occupation, leaving carcass and state of corral associated positively with human anthrax, Non Buddhism was more likely to get infected compared to Buddhism (OR 2.91, 95%CI 1.73-4.87). Leaving carcass in the forest became less risk as OR 3.33, 95%CI 1.78-6.23. Having dirty corral was associated with anthrax infection (OR 11.37, 95% CI 6.10-21.18). Occupation also associated with anthrax infection, non farmers were more likely to get infected compared to farmers (OR 2.89, 95% CI 1.35-6.20).

Table 11: Final model of multivariable logistic regression.

Characteristics	Odds ratio	p value	95% CI	
			Lower	Upper
Age	0.99	0.20	0.97	1.00
Religion	2.91	<0.001	1.73	4.87
Occupation	2.89	0.006	1.35	6.20
Leave carcass in the forest	3.33	<0.001	1.78	6.23
Animals observed	1.97	0.93	0.89	4.39
Animal stool	0.57	0.13	0.27	1.19
Corral state		<0.001		
clean corral	0.78	0.69	0.23	2.64
Dirty corral	11.37	<0.001	6.10	21.18

4.5 Knowledge about anthrax

The result of knowledge about anthrax of the cases and controls are showed in table 7. Most of the cases have heard about anthrax or about 81.88 % of them and also 73.91% of controls as well (OR 0.62, 95% CI 0.37 to 1.04). 78.76% of cases who have heard about anthrax from health care staff or health personnel but only 34.80% of the controls who have heard about anthrax from health care staff (OR 6.94, 95% IC 4.06 to 11.86). 26.09% of the cases and 21.01% of the controls have never seen the IEC (Information Education Communication) materials (OR 0.75, 95% CI 0.46 to 1.21). In general, the cases have higher mean score of general knowledge about anthrax compared to the controls, 88.0% and 65.1% respectively and if classified by levels, we found that 76.81% of cases have high levels of knowledge in this aspect while 56.52 % of the controls were in this level but 35.87% of the controls have low knowledge about anthrax and only 10.14% of the cases were in this level. For the knowledge about mode of transmission, the mean score of the cases and the controls are 58.9% and 41.25% respectively, more than half of the controls were in low level (compared to the group low level of knowledge group, OR of high level group is 7.57, 95% CI 3.74 to 15.30 and OR of moderate level group is 3.01, 95% CI 1.89 to 4.80). Knowledge in the aspect of symptoms, mean score of this aspect is 50.54% for the cases and 41.98% for the controls. More than half of both group had low level of knowledge in this aspect, 69.57% of the cases and 67.39% of the control (OR of high and moderate levels are 1.07 (95% CI 0.47 to 2.42) and 0.86 (95% CI 0.53 to 1.39) respectively compared to participant who are in low level group. In the aspect of prevention, mean score of the cases is 61.05 % and 51.9% for the controls. Majority of both group are in moderate knowledge, around 46.38% of the cases and 42.39% of the controls, OR of the moderate knowledge group is 1.58 (95% CI 0.99 to 2.54) and OR of the high knowledge group is 2.29 (95% CI 1.28 to 4.07) compared to the low knowledge group.

Table 12: Knowledge about anthrax of Cases and controls

Characteristics	Number (percentage)		Odds ratio	95% CI		p value
	Case	control		Lower	Upper	
Have heard about anthrax						
Used to*	113 (81.88)	204 (73.91)	1	1	1	1
Never	25 (18.12)	72 (26.09)	0.62	0.37	1.04	0.73
Source of information about anthrax						
Others*	24 (21.24)	133 (65.20)	1	1	1	1
HC staff	89 (78.76)	71 (34.80)	6.94	4.06	11.86	<0.001
Have ever seen IEC material						
Used to*	36 (26.09)	58 (21.01)	1	1	1	1
Never	102 (73.91)	218 (78.99)	0.75	0.46	1.21	0.246
General knowledge						
81-100%	106 (76.81)	156 (56.52)	4.80	2.60	8.85	<0.001
60-80%	18 (13.04)	21 (7.61)	6.06	2.61	14.07	<0.001
<60%*	14 (10.14)	99 (35.87)	1	1	1	1
Knowledge about transmission						
81-100%	29 (21.01)	16 (5.80)	7.57	3.74	15.30	<0.001
60-80%	70 (50.72)	97 (35.14)	3.01	1.89	4.80	<0.001
<60%*	39 (28.26)	163 (59.06)	1	1	1	1
Knowledge about symptoms						
81-100%	10 (7.25)	18 (6.52)	1.07	0.47	2.42	0.859
60-80%	32 (23.19)	72 (26.09)	0.86	0.53	1.39	0.545
<60%*	96 (69.57)	186 (67.39)	1	1	1	1
Knowledge about prevention Cat.						
81-100%	34 (24.64)	43 (15.58)	2.29	1.28	4.07	0.005
60-80%	64 (46.38)	117 (42.39)	1.58	0.990	2.54	0.055
<60%*	40 (28.99)	116 (42.03)	1	1	1	1

*Reference group, are for categorical data not for continuous data.

CHAPTER V

DISCUSSION, SUMMARY AND CONCLUSION

5.1. Discussion

5.1.1. Socio-demographic characteristics

Overall socio-demographics characteristics associated with anthrax infection as showed in table 6. An interesting characteristic is gender; found that male is more likely to get infected than female with OR 2.05 and 95%CI excluded 1. This finding sounds realistic as in Lao culture, male is responsible for Butchering carcass not female and generally, male like eating raw or unwell cooked meat during their Butchering and cutting meat. Religion also play a role for anthrax infection, we can see that participants who believe in ghost is more likely to get anthrax infection with OR 2.61 (95% CI 1.71 to 3.98), in Lao PDR, people who believed in ghost are most LaoTherng, a big ethnic group of Lao, these people have traditional practice called healing ceremony, during this ceremony, many cattle were killed for human consume careless they are sick or healthy cattle. This situation related to the real outbreak events that people get sick after ceremonies or festivals. The finding about the characteristic of sex is consistence with a survey conducted in 2008 by FET student, in Bachieng district, Champasak province. (Khamphongphan and Denny, 2008) that anthrax human cases could find in both male and female but more in male with relation with practice.

This study included children under the age of twelve and interview their parents or guardians as representative, there were 28 children included. A previous case-control study was done in Zimbabwe did excluded children under twelve years old in their study as children might not answer questions properly (Gombe, 2006)

5.1.2. Knowledge about anthrax of cases and controls

In this part, we found that cases have higher knowledge than control, therefore there is negative association between these factors and anthrax infection, the reason is knowledge came after the event occurred, when the outbreak investigation team went to the field, one task of the team is health education and the cases were the most

targeted, that is a reason why cases have higher knowledge because they received information directly from health care staff while some of non cases heard about anthrax from non health staff which might cause misunderstanding about the disease. Another reason was the cases experienced with anthrax themselves therefore they are knowledgeable about anthrax. Compared to a study done by FET trainees in 2010, their finding shown that less than 30% of clinicians know symptoms of human anthrax and 70% of them think that anthrax is only occur in animals (Singhalath and Vilasone, 2010).

Even the finding from this study shown that most of villagers have moderate to high level knowledge about anthrax, but some of them had no idea about anthrax as shown that there were 96 participants (23.2%) of this study got zero score in the part of general knowledge. A hundred people (24.2%) of them got zero score in the part of transmission ways. Around 73 people got zero score in the part of symptoms and prevention. This finding might reflect to the effectiveness of health education done in the past, even they were in same affected area but seems they were not exposed to information although many activities related to community awareness was done before.

5.1.3. Current and past practices of cases and controls

Practice is key important factor of anthrax infection, as show in table 7 that people who have low practice score or risk practice group are more likely to get infected with OR 14.13, 95%CI 3.35 to 59.5 which was very high. The table showed overall practices both current and past practice of the participants. Current practice was not associated with anthrax infection and those current practices came after the event occurred. The result shown that there was improvement on practices of participants, the result showed that their current practice score is higher than before in both groups. From 27.65 (± 17) to 78.08 (± 18.30) in cases. In controls is from 42.26(± 28.44) to 76.15(± 19.09). It found that practice level in both groups is same.

In the part of past practices, there were seven out of eight variables associated with human anthrax namely butchering carcass, cutting and sell to others, leaving carcass in forest or nearby stream, digging hole and bury carcass, dry meat of carcass, contacting and handling carcass, being main cook of the family. This finding is

similar to a study done in 2008 after an anthrax outbreak in Kenglai village, Bachieng district, Champasak province, Lao PDR that practices associate with anthrax infection such as butchering dead cow, contact and handling cow product all were risk factors. (Khamphongphan and Denny, 2008). An other study done in Kazakhstan (restrospective cohort study), this study found that slaughtering animals (RR=8.3; 95%CI 4.8-14.4), butchering (RR=7.7; 95%CI 4.4-13.4) are main risk factors of anthrax infection in human with p value less than 0.001 for each variable (Woods et al, 2004).

Being main cook of the family associated negatively with anthrax infection as OR 0.63 and 95% CI 0.41 to 0.97. Cooking practice is a chance to expose to infected meat as persons had to touch the meat, but the result shown that people who cook would have less risk than people who don't. However, person who cook might have less amount of exposure as they cook little amount of meat. There might have a possible confounder such as having cut on hands which this study did not look at this problem as showed in the mentioned study that having cuts on hands (RR=4.2; 95% CI 1.9-9.0) are main risk factors of anthrax infection in human with P value less than 0.001 for each variable (Woods et al, 2004).

5.1.4 Environmental related factors

In this study, the results shown that environmental factors are associated with anthrax infection as show in table 10. Observed animals presented surround their houses is one associated factor for anthrax infection with OR of 2.19, 95% CI 1.30 to 3.70. This means that there is exposure when people live together with animals, there is possibility to expose or contact with contaminated animals and contaminated surface as we know that human get infected from animals.

Observation of animal stool aim to indentify if there is association between this kind of exposure and the outcome or anthrax infection and found that having animal stool near their houses is more likely to get infected by anthrax with OR of 1.78, 95% CI 1.15 to 2.75. At this point, the household where there is no animals surround their houses, animal stool also presented because some of participants worked on collecting stool cow and buffalo for selling, those animal stool were keep

nearby or under their houses. The situation shown that people were at risk to expose to the disease.

Having corrals or places for keeping animals were taking into account to identify environmental factors as well, the result shown that this is one significant associated factor for anthrax infection as shown in the table of environmental related factors that OR as high as 5.20 and 95% CI 3.35 to 8.10. At this point of view, it is applicable that those who do not have animals they would not have places or corral for keeping animals and corral are often nearby or under their houses, however, distance from house to corral have been observed as well, the analysis shown that there is no association between distance from house to corral with OR of 1 and 95% CI include 1 (0.99 to 1.01). Another possible risk was cleaning of corral, compared to household where there is clean corral; households where there is dirty corral are more likely to get infected with high OR of 11.08 and 95% CI 3.59 to 34.16. This result is consistence with one study was done in Saskatchewan, Canada in 2006 (Tasha, Cheryl and Connie, 2010) that wetter pasture is risk factor in animal anthrax which is feasible that when pasture is wet the area become dirty, which provide good condition for anthrax bacillus to grow well in the environment. However this study in Canada found that animal density is one risk factors for animal anthrax (which is risk factor for human), but this time in Salavan the result showed that number of animals was not associated with human anthrax.

A Case-control study conducted in Zimbabwe on risk factors for contracting anthrax found that belonging to a household with cattle death is one risk factor and significantly associated human anthrax (OR=9.7, 95%CI 2.9-33) (Gombe et al, 2010). Compared to this study, owning dead cattle associated with anthrax infection, OR 1.38 but it's not statistical significant as 95%CI 0.88-2.18. this finding related the situation, in the community if there is cattle dead, people from different household would come and help on butchering therefore there is not much difference between people who owned dead cattle and people who did not.

5.1.5 Multivariable analysis

There were 15 variables were included in this analysis as they have p value less than 0.15 such as five socio-demographic factors (age, sex, religion, occupation and income), seven past practices (Butchering, cutting, leaving carcass, digging hole and bury carcass, contacting and handling and being the main cook of the family), and three factors related to environmental aspect (animal observed, animal stool surround their houses and state of corral of places for keeping animal).

The stage of multivariable logistic analysis did not include knowledge part since knowledge came after event occurred, as well as current practices were also excluded based on time line, current practices did not cause any event in the past.

In the final model the result shown that four variables namely religion, occupation, leaving carcass and state of corral associated positively with human anthrax with p value less than 0.05. This happened, when we look only one problem we could find that it associated with the outcome, but in the real world there always have combination with others factors which play role in different way to anthrax infection, in this finding, all four variable became very significant as p value <0.001 except occupation which shown p value of 0.006 but still significant. The final model shown that having dirty corral is very risky as AOR 11.37 and p value <0.001. In this situation, if people have dirty corral they might have more chance to expose to germs since corral could be a suitable reservoir for anthracis which can survive in soil for decades (Peter Turnbull, Anthrax in humans and animals 4th edition, (Geneva: WHO press, 2008). Page 15.)

5.2. Limitation

This study conducted in only specific villages however, it covered wide area, seventeen out of nineteen affected villages. The cases were included the reported cases from 2009 to 2012, people have been changing the practice day by day and could lead to possible confounding that might occurred in timeline, therefore questions about past practice were added, these questions asked about their practice in 2009 or before the outbreak occurred in order to compare their current and recent practices and help the analysis become more accurate, moreover, sample size was big

if compared with other studies done in the past, and also covered almost all affected villages in that province. These points strengthened this study to be more realizable as it could present bigger picture of situation in Salavan province.

Children under 12 were included in this study as well, but did not focus more on risk factors in children as we could see that part of practices which are not common in children to that, therefore the result could not present clear picture among this group.

Environmental conditions are current situation which might be different from the past, however, it is all available information we could get and used instead of environmental conditions in the part. A change in number of animal that people have or raise had been decreased compared to the past (before the outbreak). Observation form is not cover all aspect of environmental factors for instance temperature, weather, humidity, PH of soil, dusty soil because the observation form only consist of other characteristics that can be observed for instance animals surround the house, place where people keep animals-the buffalo corral, water source that people use. Cases of this study are not laboratory confirmed cases; however all of cases were diagnosed by clinicians. Most of villagers in that village work on agricultural field; they leave home early and come back in the evening. Therefore some participants were interviewed in the evening.

5.3. Conclusion and suggestion for further studies

The study of associated Environmental Factors, Knowledge and Practices Regarding to Anthrax Infection in Human in Salavan District, Salavan Province, Lao PDR could be concluded that interviewing of 138 cases and 276 controls was done by face to face interview. Socio-demographic characteristics are associated factors to human anthrax such as religion (non Buddhism) AOR 2.91, 95% CI 1.73-4.87. as well as occupation (non farmer) with AOR 2.89, 95% CI 1.35-6.20. Leaving carcass is a risk factor for anthrax infection, AOR 3.33 95% CI 1.78 to 6.23. Another risk factor is environmental condition; found that having dirty corral presented higher risk with OR 11.28, 95% CI 6.06-21.

The result from this study provided useful information which could help decision makers understand more about characteristics of people in that area as well as environment factors associated with anthrax infection in humans, then decision on control measure should be appropriated with specific group and area. In addition, attention from animal and human health sectors should be increased and work collaboratively for effective outcome.

Community awareness should be considered as we found that even they were in the same affected areas but many of them have never heard about anthrax and confused with some other diseases such as dengue, food mouth disease in cattle; some believe that cause by their blood itself. All misunderstanding should be clarified. Policy makers should pay more attention improving public health particularly in people in affective areas. Any measure should fit in specify group of people.

Further researches should be continued to indentify other environmental factors, identifying anthrax contamination in water and soil should be considered for future research as *B. anthracis* able to live in soil for decades.

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APPENDICES

APPENDIX A

Information sheet

1. Topic

Associated environmental factors, Knowledge and Practices regarding to Anthrax infection in human in Salavan district, Salavan province, Lao PDR.

Case-Control Study

2. Researcher

The study is conducted by *Ms Phetdavanh LEUANGVILAY, MD*

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3. Rational, Background and Objective

3.1. Rational and Background

Anthrax is a zoonotic disease caused by spore-forming bacteria *Bacillus anthracis*, The name of the bacteria is from the Greek word for ‘coal’, because of the ulcers with dark centers that develop on the skin of affected people. The disease is common in domestic and wild animals for example cattle, sheep, goats, camels, antelopes, and other herbivores and as a rare condition in humans

In Laos, there are human anthrax cases reported from southern province of Laos. The most affected province is Salavan, where there were more than 200 suspected cases of human anthrax including 11 deaths reported from 2009-2011

3.2. Objective

To assess environmental factors, knowledge and practice towards anthrax infection in human and in villagers of in Salavan district, Salavan province, Lao PDR. The specific objectives are following:

- a) To identify environmental factors influencing anthrax infection in human in Salavan district, Salavan province.
- b) To identify association between socio-demographic and anthrax infection in human in Salavan district, Salavan province.
- c) To assess knowledge, practice of villagers towards anthrax infection in human among villagers Salavan district, Salavan province.
- d) To identify association between knowledge, practice and anthrax infection in human among villagers Salavan district, Salavan province.

4. Methodology

4.1. Study design

“Case-Control Study” is used to identify environmental factors, knowledge and practice towards anthrax infection in human and in villagers of in Salavan district, Salavan province, Lao PDR.

Case: 173 anthrax diagnosed cases were reported to the National Center for Laboratory and Epidemiology (NCLE).

Control: select randomly by using 2:1 ratio; Thus 346 control will be included. Therefore, 519 participants will be invited to this study.

4.2. Study sites

The study will be conducted in 19 villages of Salavan province namely Kadab, Khiangkhong, Naxaykokphao, Saenwangnoi, DongkohNeua, Maisamphan, BengOudom, Thameuangkao, Thameuangxe, Nadonkuang, Nakok, Sapon, Danyai, Nongbua, Navian, Buang, Nakoisao, Nalad, and Naphengyai.

5. Reason for inviting villagers to participate in the study

All 19 villages mentioned above are the most affected area, where human anthrax cases were reported from year 2009-2011. Therefore the villagers of above villages are the most targeted group.

6. Procedure during data collection

If you are willing to be interviewed, please sign the enclosed informed consent form to participate in this study. You will be asked questions about knowledge and practices related to human anthrax infection among villagers in Salavan district, Salavan province and environmental factors by using observation form. The whole interview will take around 30 minutes.

7. Expected outcome

The results of this study will become an essential data about the people's specialties and environmental factors influencing anthrax infection in human, for the higher management team or policy makers, in order to plan and setup policy to control the infection that would fit with the need of the people and situation in the

area. Furthermore, this also enforces awareness of related government and public sectors, such as human health sectors and animal health sectors. In summary, the results of this study will not have a direct or immediate effect to any individual, but it will benefit all related sectors/people as a whole.

8. Potential risk to participant

This study does not impose any risk to participant's physical or mental. However, participant may feel disturbed or uncomfortable when answering the questions.

9. Precaution taken to reduce negative feeling of participant

Before the interview, the interviewer will explain the purpose of the study to the participant in detail.

10. Confidentiality of data

Every data of this study will be protected by the researcher team. All questionnaire/Observation forms will be kept in safe folder. The researcher ensures that no external party will be able to access it.

11. Right to withdraw from study

Participating in this study is totally on a voluntarily basis. The participant may decline or withdraw from the study at any time, without losing or paying anything. The participants are very welcomed to ask or find out more about this study from the researcher.

12. Contact information of researcher

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Consent Form to Participate in Study

At: Date:
 Sequence number of sample population or participant

I, as name stated and signed at the end of this document, here by express my voluntary and fully consent to participate in the study:

Research Topic: Associated environmental factors, Knowledge and Practices regarding to Anthrax infection in human in Salavan district, Salavan province, Lao PDR. : Case-Control Study

Researcher: Ms Phetdavanh LEUANGVILAY, MD
 MPH (Master of Public Health) student of the College of Public Health Sciences,
 Chulalongkorn University

I, Mr / Ms
 Current address village, district, province.

I have read and fully understand the information sheet about this research. And I have listened to the explanation in detail about purpose, methodology, risk, and benefits that will affect me.

I understand that my personal data will be kept secret, including my name will not be disclosed in any case. I will be given a completed copy of this Consent Form. I have the right to withdraw from this study at any time without losing anything.

Researcher's signature.....

Participant's signature.....

Name

Name.....

Witness's signature.....

Name.....

ເອກກະສານຊີ້ແຈງກາ ສຶກສາ

13. ຊີ້ໂຄງກາ ຄື ຄວ້າ:

ປັດໃຈທີ່ກ່ຽວຂ້ອງດ້ານສິ່ງແວດລ້ອມ ຄວາມຮູ້ ແລະ ການປະຕິບັດຕົວທີ່ສໍາພັນກັບການ ຕິດເຊື້ອພະຍາດໄຂ້ເລືອດດໍາໃນຄົນ ທີ່ເມືອງສາລະວັນ ແຂວງສາລະວັນ, ສປປ ລາວ: ການສຶກສາແບບຍ້ອນຫຼັງຈາກຜົນໄປຫາເຫດ

14. ຜູ້ຮັບຜິດຊອບ:

ການສຶກສາຄັ້ງນີ້ ທ່ານໝໍນາງ ເພັດດາວັນ ເຫຼືອງວິໄລ ັກສຶກສາ ລະດັບປະລິ ຍາໂທ ດ້າ ສາທາ ລະ ະສຸກສາດ, ວິທະຍາໄລສາທາລະນະສຸກສາດ, ມະຫາວິທະຍາໄລຈຸລາລົງ ກອນ ຈະເປັນຜູ້ເຮັດການສຶກສາ ພາຍໃຕ້ການຊີ້ນໍາຂອງອາຈານທີ່ປຶກສາ

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15. ເຫດຜົນ ຄວາມເປັນ ມາ ແລະ ຈຸດປະສົງ:

ເຫດຜົນ ຄວາມເປັນ ມາ:

ພະຍາດໄຂ້ເລືອດດໍາເປັນພະຍາດທີ່ຕິດຕໍ່ຈາກສັດສູ່ຄົນ ເຊິ່ງເກີດຈາກເຊື້ອບັກເຕີຣີ *Bacillus anthracis* (spore form). ພະຍາດດັ່ງກ່າວພົບໄດ້ໃນສັດລ້ຽງ ແລະ ສັດປ່າ ເຊັ່ນ: ງົວ, ຄວາຍ, ແກະ, ແບ້, ອູດ ແລະ ອື່ນ ແຕ່ບໍ່ຄ່ອຍພົບໃນຄົນ. ອາການຂອງ ພະຍາດດັ່ງກ່າວມີ 3 ແບບຄື: ອາການທາງຜິວໜັງ, ອາການທາງລະບົບຫາຍໃຈ ແລະ ອາການທາງລະບົບລະລາຍ.

ໃນປະເທດລາວ ມີການລາຍງານກໍລະນີຂອງພະຍາດໄຂ້ເລືອດດໍາໃນຄົນຢູ່ແຂວງ ທາງພາກໃຕ້ຂອງລາວ, ແຂວງທີ່ມີການລາຍງານກໍລະນີພະຍາດດັ່ງກ່າວຫຼາຍທີ່ສຸດແມ່ນ ແຂວງສາລະວັນ ທີ່ມີເຖິງ 282 ກໍລະນີສົ່ງໃສຂອງພະຍາດໄຂ້ເລືອດດໍາ, ໃນນີ້ລວມມີ 11 ກໍລະນີທີ່ຕາຍຍ້ອນພະຍາດດັ່ງກ່າວນີ້.

ຈຸດປະສົງ

ເພື່ອປະເມີນປັດໃຈທີ່ກ່ຽວຂ້ອງດ້ານສິ່ງແວດລ້ອມ ຄວາມຮູ້ ແລະ ການປະຕິບັດຕົວທີ່ສໍາພັນກັບການຕິດເຊື້ອພະຍາດໄຂ້ເລືອດດໍາໃນຄົນ ທີ່ເມືອງສາລະວັນ ແຂວງສາລະວັນ, ສປປ ລາວ. ເຊິ່ງຈຸດປະສົງສະເພາະມີດັ່ງຕໍ່ໄປນີ້:

1. ເພື່ອຊອກຫາປັດໃຈທີ່ກ່ຽວຂ້ອງດ້ານສິ່ງແວດລ້ອມ ທີ່ມີຜົນຕໍ່ການຕິດເຊື້ອພະຍາດໄຂ້ເລືອດດໍາໃນຄົນ ຢູ່ເມືອງສາລະວັນ, ແຂວງສາລະວັນ.
2. ເພື່ອຊອກຫາສໍາພັນກັນລະຫວ່າງປັດໃຈດ້ານປະຊາກອນສັງຄົມສາດ ແລະ ການຕິດເຊື້ອພະຍາດໄຂ້ເລືອດດໍາໃນຄົນ ຢູ່ເມືອງສາລະວັນ, ແຂວງສາລະວັນ.
3. ເພື່ອປະເມີນລະດັບຄວາມຮູ້ ແລະ ການປະພຶດຕົນຂອງປະຊາຊົນ ກ່ຽວກັບການຕິດເຊື້ອພະຍາດໄຂ້ເລືອດດໍາໃນຄົນ ຢູ່ເມືອງສາລະວັນ, ແຂວງສາລະວັນ.
4. ເພື່ອຊອກຫາສໍາພັນກັນລະຫວ່າງປັດໃຈດ້ານຄວາມຮູ້-ການປະພຶດຕົວ ແລະ ການຕິດເຊື້ອພະຍາດໄຂ້ເລືອດດໍາໃນຄົນ ຢູ່ເມືອງສາລະວັນ, ແຂວງສາລະວັນ.

16. ວິທີການສຶກສາ

ການອອກແບບການສຶກສາ

ນໍາໃຊ້ການສຶກສາແບບ “Case control study” ເພື່ອຊອກຫາປັດໃຈທີ່ກ່ຽວຂ້ອງດ້ານສິ່ງແວດລ້ອມ ຄວາມຮູ້ ແລະ ການປະຕິບັດຕົວທີ່ສໍາພັນກັບການຕິດເຊື້ອພະຍາດໄຂ້ເລືອດດໍາໃນຄົນ ທີ່ເມືອງສາລະວັນ ແຂວງສາລະວັນ, ສປປ ລາວ.

ຜູ້ເຂົ້າຮ່ວມການສຶກສາ

173 ກໍລະນີ (Case) ຂອງພະຍາດໄຂ້ເລືອດດໍາ ທີ່ຖືກລາຍງານໃຫ້ສູນວິເຄາະ ແລະ ລະບາດວິທະຍາ ຈາກໜ່ວຍງານລະບາດວິທະຍາ, ພະແນກສາທາແຂວງສາລະວັນ ກຸ່ມປຽບທຽບ(Control) ໃນສັດສ່ວນ 2:1, ດັ່ງນັ້ນກຸ່ມປຽບທຽບທັງໝົດມີ 346 ຄົນ. ດັ່ງນັ້ນຜູ້ເຂົ້າຮ່ວມການສຶກສາທັງໝົດ ມີ 519 ຄົນ

ສະຖານທີ່ການສຶກສາ

ການສຶກສາຈະໄດ້ຈັດຂຶ້ນຢູ່ໃນ 19 ບ້ານ ຂອງເມືອງສາລະວັນ, ແຂວງສາລະວັນ ເຊິ່ງມີລາຍລະອຽດດັ່ງຕໍ່ໄປນີ້:

ບ້ານກະດັບ, ບ້ານຄຽງໂຄ້ງ, ບ້ານາໄຊກົກພ້າວ, ບ້ານແສນວັງນ້ອຍ, ບ້ານດັງໂກະເໜືອ, ບ້ານໃໝ່ສໍາພັນ, ບ້ານແບ່ງອຸດົມ, ບ້ານທ່າເມືອງເກົ່າ, ບ້ານທ່າເມືອງເຊ, ບ້ານນາດອນຂວາງ, ບ້ານນາໂຄກ, ບ້ານຊະໂປນ, ບ້ານດ່ານໃຫຍ່, ບ້ານ ໜອງບົວ, ບ້ານນາວຽນ, ບ້ານບ່ວງ, ບ້ານນາຂ້ອຍສາວ, ບ້ານນາລາດ, ບ້ານນາແພງໃຫຍ່

5. ເຫດຜົນທີ່ຜູ້ເຂົ້າຮ່ວມຖືກເຊີ ເຂົ້າຮ່ວມກາ ສຶກສາຄັ້ງນີ້:

ເຂດ ຫຼື ບ້ານທີ່ອາໄສຢູ່ນີ້ ເປັນເຂດທີ່ເຄີຍມີການລາຍງານ ຂອງກໍລະນີໄຂ້ເລືອດດໍາໃນ ຄົນມາກ່ອນ ໃນໄລຍະປີ 2009 ເຖິງປີ 2011 ສະນັ້ນເຂດດັ່ງກ່າວເປັນເຂດທີ່ໄດ້ຮັບຜົນ ກະທົບໂດຍກົງຈາກພະຍາດດັ່ງກ່າວ.

6. ກາ ປະຕິບັດຕໍ່ຜູ້ເຂົ້າຮ່ວມກາ ສຶກສາ:

ຖ້າທ່ານ ຍິ ດີສະມັກໃຈໃ ກາ ຕອບຄໍາຖາມ, ພວກເຮົາຈະໃຫ້ທ່ານ ລົງລາຍເຊັນ ໃ ບ ຍິ ຍອມເຂົ້າຮ່ວມກາ ສຶກສາ ແລະ ໃຫ້ທ່ານ ຕອບຄໍາຖາມທີ່ປະກອບດ້ວຍຄວາມຮູ້ ແລະ ການປະຕິບັດຕົວທີ່ສໍາພັນກັບການຕິດເຊື້ອພະຍາດໄຂ້ເລືອດດໍາໃນຄົນ ທີ່ເມືອງສາລະວັນ ແຂວງສາລະວັນ ແລະ ການປັດໃຈທີ່ກ່ຽວຂ້ອງດ້ານສິ່ງແວດລ້ອມດ້ານແບບຟອມສັງເກດການ. ກາ ຕອບຄໍາຖາມຈະໃຊ້ເວລາທັງໝົດປະມາ 30 າທີ.

7. ຄາດຄະເ ຜີ ປະຕິ ທີ່ຈະໄດ້ຮັບ:

ຜົນຈາກການສຶກສາຄັ້ງນີ້ຈະສະໜອງຂໍ້ມູນທີ່ເປັນປະໂຫຍດແກ່ຂັ້ນເທິງໃນດ້ານລັກສະນະຈຸດ ພິເສດຂອງປະຊາຊົນ ລວມທັງປັດໃຈດ້ານສິ່ງແວດລ້ອມທີ່ກ່ຽວຂ້ອງກັບການຕິດເຊື້ອພະຍາດ ໄຂ້ເລືອດດໍາໃນຄົນ ເຊິ່ງຈະເອື້ອອໍານວຍຕໍ່ການວາງແຜນ-ມາດຕາການຄວບຄຸມໃນອະນາຄົດ ທີ່ແທດເໝາະກັບກຸ່ມຄົນ ແລະພື້ນທີ່ນັ້ນໆ. ນອກນີ້ຍັງເປັນການສົ່ງເສີມຄວາມເອົາໃຈໃສ່ຈາກ ພາກສ່ວນທີ່ກ່ຽວຂ້ອງເຊັ່ນ ໜ່ວຍງານສາທາລະນະສຸກ ແລະ ກະສິກໍາອີກດ້ວຍ. ຊຶ່ງ ໂດຍລວມລວມແລ້ວ ຜົນການສຶກສາຈະບໍ່ເກີດຜົນປະໂຫຍດໂດຍກົງ ຫຼື ທັນທີແກ່ຕົວທ່ານ ແຕ່ ຈະກາຍເປັນປະໂຫຍດແກ່ສ່ວນລວມໃຫ້ແກ່ພາກສ່ວນທີ່ກ່ຽວຂ້ອງ.

8. ຄວາມສ່ຽງ/ຜີ ກະທົບທີ່ອາດຈະເກີດຂຶ້ນຕໍ່ຜູ້ເຂົ້າຮ່ວມ:

ກາ ສຶກສາຄັ້ງນີ້ຈະບໍ່ມີຄວາມສ່ຽງດ້າ ຮ່າງກາຍ ແລະ ຈິດໃຈແກ່ຜູ້ເຂົ້າຮ່ວມ. ຢ່າງໃດ ກໍ່ຕາມ ມີ ອາດສ້າງຄວາມລໍາຄາ ແລະ ບໍ່ສະດວກສາບາຍໃ ໄລຍະເວລາທີ່ຕອບຄໍາຖາມ ເທົ່ານັ້ນ.

9. ກາ ປ້ອງກາ ແລະ ກາ ລົດຜ່ອ ຜີ ກະທົບທີ່ອາດຈະເກີດຂຶ້ນຕໍ່ຜູ້ເຂົ້າຮ່ວມ:

ກ່ອ ຈະແຈກຍາຍແບບສອບຖາມ, ຜູ້ຄົ ຄວ້າຈະອະທິບາຍຈຸດປະສົງຂອງກາ ສຶກສາຄັ້ງນີ້ໃຫ້ຜູ້ເຂົ້າຮ່ວມຮັບຟັງຢ່າງລະອຽດ.

10. ກາ ເກັບຮັກສາຂໍ້ມູ ເປີ ຄວາມລັບ:

ທຸກຂໍ້ມູ ຂອງກາ ສຶກສາຈະຖືກຄຸ້ມຄອງໂດຍທີມງາ ຄົ ຄວ້າ ແລະ ແບບສອບຖາມ ຈະເກັບໄວ້ໃ ແຟມເອກສາ ເປີ ຢ່າງດີ ໂດຍຮັບປະກັ ບໍ່ໃຫ້ບຸກຄົ ອື່ນທີ່ບໍ່ມີສ່ວ ກ່ຽວຂ້ອງ ສາມາດເຂົ້າເຖິງໄດ້.

11. ສິດໃ ກາ ຖອ ຕົວຈາກກາ ສຶກສາ:

ກາ ເຂົ້າຮ່ວມກາ ສຶກສາຄັ້ງນີ້ແມ່ ປີ ພື້ນຖານຄວາມສະມັກໃຈ. ຜູ້ເຂົ້າຮ່ວມມີສິດທີ່ ຈະປະຕິເສດໃ ກາ ຕອບຄໍາຖາມ ຫລື ຖອ ຕົວຈາກກາ ສຶກສາເມື່ອໃດກໍ່ໄດ້ໂດຍບໍ່ມີຜີ

ກະທົບໃດໆຕໍ່ຜູ້ເຂົ້າຮ່ວມ ແລະ ຜູ້ເຂົ້າຮ່ວມສາມາດສອບຖາມກ່ຽວກັບກາ ສຶກສານີ້ຈາກ ຜູ້ກຳລັງ ຄວ້າໄດ້ທຸກເວລາ.

12. ບ່ອ ຕິດຕໍ່ພົວພັນ ກັບຜູ້ຄົນ ຄວ້າ:

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ໃບຍິນຍອມເຂົ້າຮ່ວມການສຶກສາ

ທີ່.....ວັນທີ.....ເດືອນ.....ປີ.....

ເລກທີປະຊາກອນຕົວຢ່າງ ຫຼື ຜູ້ມີສ່ວນຮ່ວມໃນການວິໄຈ.....

ຂ້າພະເຈົ້າຊຶ່ງໄດ້ລົງນາມທ້າຍໜັງສືນີ້ ຂໍສະແດງຄວາມສະໝັກໃຈ ແລະ ຍິນຍອມເຂົ້າຮ່ວມ
ການສຶກສາວິໄຈ

ຫົວບົດຄົ້ນຄວ້າ: “ປັດໃຈທີ່ກ່ຽວຂ້ອງດ້ານສິ່ງແວດລ້ອມ ຄວາມຮູ້ ແລະ ການປະຕິບັດຕົວທີ່
ສໍາພັນກັບການຕິດເຊື້ອພະຍາດໄຂ້ເລືອດດໍາໃນຄົນ ທີ່ເມືອງສາລະວັນ ແຂວງສາລະວັນ,
ສປປ ລາວ: ການສຶກສາແບບຍ້ອນຫຼັງຈາກຜົນໄປຫາເຫດ”

ຜູ້ຮັບຜິດຊອບ: ທ່ານໝໍ ນາງ ເພັດດາວັນ ເຫຼືອງວິໄລ ັກສຶກສາ ລະດັບປະລິ ຍາໂທ
ດ້າ ສາທາລະ ະສຸກສາດ, ວິທະຍາໄລສາທາລະນະສຸກສາດ, ມະຫາວິທະຍາໄລຈຸລາລົງກອນ.
ຂ້າພະເຈົ້າຊື່.ທ້າວ/ນາງ.....

ບ້າ ຢູ່ປະຈຸບັ ັເມືອງ.....ແຂວງ.....

ຂ້າພະເຈົ້າໄດ້ອ່າ ແລະ ເຂົ້າໃຈທຸກປະໂຫຍກໃ ເອກະສາ ຄໍາຊີ້ແຈງກ່ຽວກັບກາ
ຄື້ ຄວ້າ ແລະ ພາຍຫລັງທີ່ໄດ້ຟັງກາ ອະທິບາຍກ່ຽວກັບຈຸດປະສົງ ແລະວິທີກາ ຄື້ ຄວ້າ
ພ້ອມທັງ ຄວາມສ່ຽງ ແລະຜິ ປະໂຫຍດທີ່ອາດຈະເກີດຂຶ້ນກັບຂ້າພະເຈົ້າໃ ກາ ເຂົ້າຮ່ວມໃ
ກາ ສຶກສາຄັ້ງ ນີ້. ຂ້າພະເຈົ້າເຂົ້າໃຈວ່າທຸກຂໍ້ມູ ຈະຖືກຮັກສາເປັ ຄວາມລັບ ພ້ອມທັງຊື່ຂອງ
ຂ້າພະເຈົ້າຈະບໍ່ຖືກເປີດເຜີຍໃ ທຸກໆກໍລະ ິໃດໆ. ຂ້າພະເຈົ້າຈະໄດ້ຮັບເອກສາ ລາຍເຊັ ໃບ
ຍິ ຍອມເຂົ້າຮ່ວມໂຄງ ກາ ສຶກສາຄັ້ງນີ້ 1ສະບັບ.

ຂ້າພະເຈົ້າມີສິດຖອ ຕົວຈາກໂຄງກາ ສຶກສາຄັ້ງນີ້ໄດ້ທຸກເວລາໂດຍຈະບໍ່ມີຜິ ສະທ້ອ
ໃດ ຕໍ່ກັບຂ້າພະເຈົ້າ.

ລາຍເຊັ ັກຄື້ ຄວ້າ_____ ລາຍເຊັ ຜູ້ໃຫ້ຂໍ້ມູ _____

ຊື່ແຈ້ງ:_____ ຊື່ແຈ້ງ_____

ລາຍເຊັ ພະຍາ _____

ຊື່ແຈ້ງ_____

APPENDIX B

Questionnaire (English Version)

Code of interviewer :

Date of Interview:

No:

Group: Case Control

Socio-demographic

1. Code of interviewee:
2. Age of interviewee: years old.
3. Sex: Male Female
4. Religion
 - Buddhism Ghost Christ
 - Others (Please specify.....)
5. Highest Education level of interviewee
 - Illiterate Primary Secondary
 - High school College and higher
6. What is your occupation?
 - Farmer Raise animal Teacher
 - Vender Housewife
 - Other (specify)
7. What is your year income? (in average estimate)
.....LAK.

Knowledge about human anthrax

8. Have you ever heard about anthrax?
 - Yes No Not sure
 - If “Yes”, where did you hear from?
9. Have ever seen poster or pamphlet about human anthrax to people?
 - Yes No Not sure
 - If “Yes”, where did you see those poster or pamphlet?
.....

10. Understanding about anthrax:

What do you know about anthrax?	Yes	No
10.1 Animal disease (Most found in cattle)		
10.2 can infect to people		
10.3 will recover without any treatment		
10.4 We can eat meat of carcass even it died from this disease		

11. How can people get infected? (check list, mark if the person mentioned)

These are ways that people get infected	Yes	No
11.1 eating infected meat		
11.2 mosquito bite sick animal and then bite people		
11.3 direct contact with skin, hair, meat, bone of infected animal		
11.4 breathing in contaminated air		
11.5 infect from other persons		
11.6 Pets bite (dog or cat bite)		

12. What are symptoms of anthrax? (Checklist)

12 These are main symptoms of anthrax?	Yes	No
12.1 Skin lesion		
12.2 Fever		
12.3 Itchy		
12.4 Bloodily stool		
12.5 Stomachache		
12.6 Diarrhea		
12.7 Bloody vomiting		
12.8 Chest distress		
12.9 Seizure		
12.10 Insomnia		
12.11 Body pain		

Practices (comparison between situation in the past few years and 2012)

13. Do you use mosquito net in your house?

- Yes No

- If "No", Are there other ways to avoid mosquito bite?

- Pesticide (mosquito repellent) Smoke from mesocarp part of coconut
 Others please specify.....

14. What kind of animals do you have?

- Cows.....(Number)
 Buffalo
 Goats.....
 Pigs.....
 Others.....(specify)

15. Have you vaccinated vaccination for preventing anthrax for your cattle?

- Yes No

What about last three year (2009)?

16. What do you do if there are unusual died of animals (cattle)?

What do you do if there is unusual died of animals	Past three years		Currently (2012)	
	Yes	No	Yes	No
16.1 Slaughter for human consume				
16.2 Cut and sale to other households				
16.3 Dispose the carcass in the nearby forest or stream				
16.4 Dig hole to bury the carcass				
16.5 Dry meat for long-term keeping				
16.6 Dry skin for making drum				
16.7 Do you touch handling or contact with carcass?				
16.8 You are the one who cook food in your family				

Observation form

22. Animals surround the house?

- Yes No

23. Yard; is there animal stool on the surface?

- Yes No

24. There is place for keeping animal

- Yes No

- If "Yes", How far from house?.....m

- How is the stock/stall?

- Clean Not very dirty Dirty

25. Where is the water source for drinking?

.....

26. Where is the water source for bathing?

.....

27. Where is the water source for animals?

.....

Thank you for your kind cooperation.

APPENDIX C

Questionnaire (Lao Version)

ແບບຟອມສອບຖາມ

ລະຫັດນັກສຳພາດ:.....

ວັນທີສຳພາດ:.....

ຟອມເລກທີ:.....

ເຮືອນເລກທີ:.....

ກຸ່ມ: Case Control

ດ້ານປະຊາກອນ ແລະ ສັງຄົມ

1. ລະຫັດຜູ້ເຂົ້າຮ່ວມການສຶກສາ.....
2. ອາຍຸ.....ປີ
3. ເພດ: ຍິງ ຊາຍ
4. ສາດສະໜາ
 ພຸດ ຜີ ຄຣິສ ອື່ນໆ (ກະລຸນາລະບຸ
.....)
5. ລະດັບການສຶກສາ
 ບໍ່ໄດ້ເຂົ້າໂຮງຮຽນ ປະຖົມ ມັດທະຍົມຕອນຕົ້ນ
 ມັດທະຍົມຕອນປາຍ ລະດັບວິຊາສະເພາະຂຶ້ນໄປ
6. ອາຊີບ
 ເຮັດໄຮ່-ເຮັດນາ ລ້ຽງສັດ ພະນັກງານລັດ
 ຄ້າຂາຍ ແມ່ເຮືອນ ອື່ນໆ (ກະລຸນາລະບຸ.....)
7. ທ່ານມີລາຍໄດ້ໂດຍສະເລ່ຍຕໍ່ປີປະມານເທົ່າໃດ?ກີບ

ຄວາມຮູ້ກ່ຽວກັບພະຍາດໄຂ້ເລືອດດຳ

8. ທ່ານເຄີຍໄດ້ຍິນກ່ຽວກັບພະຍາດໄຂ້ເລືອດດຳບໍ່?
 ເຄີຍ ບໍ່ເຄີຍ ບໍ່ແນ່ໃຈ

- ຖ້າເຄີຍ, ທ່ານໄດ້ຍິນຈາກໃສ?

9. ທ່ານເຄີຍເຫັນແຜ່ນພັບ ຫຼື ໂປສ໌ເຕີກ່ຽວກັບພະຍາດໄຂ້ເລືອດດຳໃນຄົນບໍ່

- ເຄີຍ
 ບໍ່ເຄີຍ
 ບໍ່ແນ່ໃຈ

-ຖ້າເຄີຍ, ທ່ານເຄີຍເຫັນຢູ່ໃສ?

- ແຜ່ນພັບ:.....
- ໂປສ໌ເຕີ:.....

10. ຄວາມເຂົ້າໃຈກ່ຽວກັບພະຍາດໄຂ້ເລືອດດຳ:

ທ່ານຮູ້ຫຍັງແດ່ກ່ຽວກັບພະຍາດໄຂ້ເລືອດດຳ?	ເຫັນດີ	ບໍ່ເຫັນດີ
10.1 ເປັນພະຍາດຢູ່ໃນສັດ(ສ່ວນຫຼາຍພົບນຳງົວ-ຄວາຍ)		
10.2 ສາມາດຕິດໃສ່ຄົນໄດ້		
10.3 ສາມາດຫາຍເຊົາໄປເອງໄດ້ໂດຍບໍ່ຕ້ອງປິ່ນປົວ		
10.3 ເຮົາກິນຊີ້ນຂອງງົວ-ຄວາຍຕາຍ ເຖິງແມ່ນວ່າພວກມັນຈະຕາຍຈາກພະຍາດໄຂ້ເລືອດດຳ		

11. ຄົນເຮົາຕິດພະຍາດນີ້ໄດ້ແນວໃດ?(ໝາຍຂໍ້ທີ່ຖືກກ່າວເຖິງ)

ເສັ້ນທາງຕິດຕໍ່ໃສ່ຄົນ	ແມ່ນ	ບໍ່ແມ່ນ
11.1 ກິນຊີ້ນທີ່ເປັນພະຍາດ		
11.2 ຍຸງກັດສັດທີ່ເປັນພະຍາດ ແລ້ວມາກັດຄົນ		
11.3 ສຳຜັດໂດຍກົງກັບໜັງ, ຂົນ, ຊີ້ນ ແລະ ກະດູກຂອງສັດທີ່ເປັນພະຍາດ		
11.4 ຫາຍໃຈເອົາອາກາດທີ່ມີພະຍາດນັ້ນລອຍປົນຢູ່ນຳ		
11.5 ຕິດຈາກຄົນອື່ນທີ່ເປັນພະຍາດ		
11.6 ສັດລ້ຽງກັດ(ໝາ-ແມວກັດ)		

12. ອາການຂອງພະຍາດໄຂ້ເລືອດດຳມີຫຍັງແດ່? (ໝາຍຂໍ້ທີ່ຖືກກ່າວເຖິງ)

ອາການຫຼັກຂອງພະຍາດໄຂ້ເລືອດດຳ	ແມ່ນ	ບໍ່ແມ່ນ
12.1 ບາດແຜດຳຕາມຜິວໜັງ		
12.2 ໄຂ້		
12.3 ຄັນ		

12.4 ຖ່າຍເປັນເລືອດ		
12.5 ເຈັບທ້ອງ		
12.6 ຖອກທ້ອງ		
12.7 ຮາກເປັນເລືອດ		
12.8 ແໜ້ນໜ້າເອິກ		
12.9 ຊັກ		
12.10 ນອນບໍ່ຫຼັບ		
12.11 ປວດຕາມຕົນໂຕ		

ດ້ານພຶດຕິກຳ (ປຽບທຽບກັນລະຫວ່າງ 3 ປີທີ່ຜ່ານມາ ແລະ ປະຈຸບັນ)

13. ເຮືອນທ່ານໃຊ້ມຸ້ງບໍ່/ນອນໃນມຸ້ງບໍ່?

- ນອນໃນມຸ້ງ ບໍ່ໄດ້ນອນໃນມຸ້ງ
- ຖ້າບໍ່ໄດ້ນອນໃນມຸ້ງ, ທ່ານເຮັດແນວໃດເພື່ອປ້ອງກັນບໍ່ໃຫ້ຍຸງກັດ?
- ຢາກັນຍຸງ ຈຸດກາບໝາກພ້າວໃຫ້ເປັນຄວັນເພື່ອໄລ່ຍຸງ
- ອື່ນໆ (ກະລຸນາລະບຸ.....)

14. ທ່ານມີສັດປະເພດໃດແດ່ດັ່ງຕໍ່ໄປນີ້? ກະລຸນາໃສ່ຈຳນວນ

- ງົວ.....ໂຕ
- ຄວາຍ.....ໂຕ
- ແບ້.....ໂຕ
- ໝູ.....ໂຕ
- ອື່ນໆ(ກະລຸນາລະບຸ).....

ຖ້າທຽບກັບ 3 ປີກ່ອນ, ທ່ານຄິດວ່າຈຳນວນສັດຂ້າງເທິງທີ່ກ່າວມານັ້ນ ເພີ່ມຂຶ້ນ ຫຼື ຫຼຸດລົງ?

15. ທ່ານໄດ້ສັກວັກແຊງກັນພະຍາດໄຂ້ເລືອດດຳໃຫ້ ງົວ-ຄວາຍທ່ານບໍ່?

- ໄດ້ສັກ ບໍ່ໄດ້ສັກ
- 3 ປີກ່ອນ, ທ່ານໄດ້ສັກວັກແຊງກັນພະຍາດໄຂ້ເລືອດດຳໃຫ້ ງົວ-ຄວາຍທ່ານບໍ່
- ໄດ້ສັກ ບໍ່ໄດ້ສັກ

16. ທ່ານເຮັດແນວໃດແດ່ ຖ້າມີງົວ-ຄວາຍຂອງຄອບຄົວເຫງົາ ຫຼື ຕາຍ?

	3 ປີຜ່ານມາ		ປັດຈຸບັນ (2012)	
	ແມ່ນ	ບໍ່ແມ່ນ	ແມ່ນ	ບໍ່ແມ່ນ
ຂ້າ-ຄົວເພື່ອເປັນອາຫານ				
ຄົວ ແລະ ແບ່ງເປັນພູດໄປຂາຍໃຫ້ຄົນໃນບ້ານ ຫຼື ບ້ານໃກ້ຄຽງ				
ຖິ້ມຊາກສັດທີ່ຕາຍ ຕາມປ່າ-ຫ້ວຍນ້ຳໃກ້ບ້ານ				
ຊຸດຊຸມຝັງຊາກສັດທີ່ຕາຍ				
ເຮັດຊີ້ນແຫ້ງ ເພື່ອເກັບໄວ້ກິນດິນ				
ຕາກໜັງມັນໄວ້ເຮັດກອງ				
ຈັບບາຍ-ສົ່ງຍິນ ຊາກສັດທີ່ຕາຍ				
ທ່ານເປັນຜູ້ແຕ່ງກິນຂອງເຮືອນ				

ອື່ນໆ, ກະລຸນາລະບຸ.....

17. ທ່ານມັກແຕ່ງກິນ-ມັກກິນອາຫານສຸກປະມານໃດ?

- ດິບ ບໍ່ສຸກດີປານໃດ (ສຳລາ)
- ສຸກດີ

18. ທ່ານມັກກິນຫຍັງເປັນພິເສດ (ຊີ້ນງົວ-ຄວາຍ)?

.....

19. ວິທີປ້ອງກັນພະຍາດໄຂ້ເລືອດດຳມີຄືແນວໃດແດ່?

ວິທີປ້ອງກັນພະຍາດໄຂ້ເລືອດດຳມີຄື	ແມ່ນ	ບໍ່ແມ່ນ
ຫຼີກຫຼ່ຽງການສຳຜັດ-ຈັບບາຍງົວ-ຄວາຍ ເມື່ອມີບາດແຜຢູ່ມີ		
ບໍ່ຂ້າ-ຄົວ ງົວຄວາຍທີ່ເຫງົາ ຫຼື ຕາຍ		
ກິນອາຫານທີ່ປຸງແຕ່ງສຸກດີ-ບໍ່ກິນຊີ້ນດິບ		
ຫາກມີສັດຕາຍ ຖິ້ມຊາກສັດດັ່ງກ່າວດ້ວຍການຊຸດຊຸມ ແລະ ຝັງຊາກສັດດັ່ງກ່າວ		
ເຮັດຄອກສັດໃຫ້ຫ່າງຈາກເຮືອນ ແລະ ອະນາໄມຄອກສັດໃຫ້ສະອາດ		
ສັກວັກແຊງປ້ອງກັນພະຍາດໄຂ້ເລືອກດຳໃຫ້ແກ່ງົວ-ຄວາຍ		

ຫຼີກຫຼ່ຽງບໍ່ໃຫ້ຍຸງກັດ		
ແຫຼ່ງນໍ້າກິນ-ນໍ້າໃຊ້ຂອງສັດ ແລະ ຄົນຕ້ອງແຍກກັນ		

ປັດໃຈອື່ນໆທີ່ກ່ຽວຂ້ອງ:

20. ຜ່ານມາເຮືອນທ່ານເຄີຍມີສັດຕາຍບໍ່? (ສັດທຸດປະເພດ ທີ່ກ່າວມາຂ້າງເທິງ)
- ເຄີຍມີ ບໍ່ເຄີຍມີ
21. ບໍລິເວນເຮືອນຂອງທ່ານເຄີຍຖືກນໍ້າຖ້ວມບໍ່?
- ເຄີຍມີ ບໍ່ເຄີຍມີ

ແບບຟອມສັງເກດການ

22. ມີສັດຢູ່ຕາມບໍລິເວນອ້ອມຂ້າງເຮືອນ?

- ມີ
- ບໍ່ມີ

23. ມີຂີ້ສັດຕາມເດີນບ້ານ?

- ມີ
- ບໍ່ມີ

24. ມີປ່ອນຂັງ-ຄອກສັດ

- ມີ
- ບໍ່ມີ

-ຖ້າ “ມີ”, ໂກຈາກເຮືອນປະມານຈັກແມັດ?.....m

-ສະພາບຄອກສັດເປັນແນວໃດ?

- ສະອາດ
- ບໍ່ເປື້ອນຫຼາຍ
- ເປື້ອນຫຼາຍ

25. ແຫຼ່ງນ້ຳດື່ມຫຼັກຂອງທ່ານແມ່ນຢູ່ໃສ?

.....

26. ແຫຼ່ງນ້ຳອາບຂອງທ່ານແມ່ນຢູ່ໃສ?

.....

27. ແຫຼ່ງນ້ຳດື່ມຫຼັກຂອງສັດລ້ຽງທ່ານແມ່ນຢູ່ໃສ?

.....

ຂໍຂອບໃຈທຸກທ່ານທີ່ໃຫ້ການຮ່ວມມື

APPENDIX D

Time Schedule

Steps	Research activities	Time Frame (Month during 2011-2012)							
		Oct	Nov	Dec	Jan	Feb	Mar	Apr	
1	Literature review and draft tool for data collection								
2	Develop tools for data collection Try out research tool content validity by expert and ethical consideration								
3	Field preparation and data collection								
4	Data analysis and interpretation								
5	Report writing and presentation								

APPENDIX E

Estimated Budget

Items		Quantity	Unit	Unit price (THB)	Total (THB)
Per-diem for interviewers		4	20 days	450	36,000
Orientation meeting (2 PHO and 1 DHO staff + 4 interviewers)		7	1	300	2,100
Accommodation		1	20 nights	500	10,000
Transportation	BKK- Salavan Province	2	trip	3,200	6,400
	Travelling to villages	1	19 days	150	2,850
Printing	Paper + printing + binding(proposal exam)	3	sets	180	540
	Photocopy questionnaires for pretesting	50	Sets	12	600
	Print and photocopy questionnaires	700	Sets	12	8,400
	Photocopy (exam + final submit)	350 pages	14 sets	0.5	2,450
	Binding (exam + submit)	10	sets	150	1,500
	Stationary	4	sets	150	600
Souvenir for participants		670	items	40	26,800
Ethical consideration fee		1		1,000	1,000
Sub Total					99,240 THB
10% miscellaneous					9,924 THB
Grand Total					<u>109,164</u> <u>THB</u>

VITAE

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