Australian Government

Australian Centre for International Agricultural Research

Final report

Small research and development activity

project

Developing and testing processes and tools to generate connected-and-live health security knowledge in Mekong Communities

project number	LS/2018/215
date published	3 February 2021
prepared by	Roy Batterham, Elizabeth Hoban, Richard Osborne
co-authors/ contributors/ collaborators	Mayfong Mayxay, Chhordaphea Chhea, Andrew Corwin, Sysavanh Phommachanh, Stephen Quinn
approved by	Dr Anna Okello
final report number	FR2021-001
ISBN	978-1-922345-87-5
published by	ACIAR GPO Box 1571 Canberra ACT 2601 Australia

Contents

1 Acknowledgments

This project was undertaken with the dedicated work and goodwill of many people in Cambodia, Lao PDR and Australia. We wish to acknowledge the leadership of the national leaders, Dr Chhordaphea Chhea, Director National Center for Health Promotion in Cambodia and Associate Prof. Dr. Mayfong Mayxay University of Health Sciences in Lao PDR. We acknowledge the adivice and practical support offered by the leaders of partner agencies in each Cambodia, Dr Srey Director of the CDC and Dr Davun , National Animal Health Production Research Institute, and the expert panel in Lao PDR which included Dr. Noupat Phomkenthao, Provincial Health Office of Attapeu Province; Dr. Phosadeth Nammounty Director of Institute of Preventive Medicine of Lao Amy; Dr. Bounlom Douangngeun, Director, National Animal Health Laboratory; Dr. Watthana Theppangna, Deputy-Director, National Animal Health Laboratory; Dr. Bounheuang Kounnavong, Head of Defense Threat Reduction Agency (DTRA)-US Embassy; Dr. Khammany Soulideth, Vice-Dean of Faculty of Social Sciences, the National University of Laos; and Dr. Khamla Phoomma, Department of Hygiene and Health Promotion of the Ministry of Health.

We must acknowledge the profound expertise and experience of the project implementation teams led by Dr Tek Channarin in Cambodia and Dr. Sysavanh Phommachanh in Lao PDR. We also acknowledge the local leadership and support of Dr. Nouphat Phomkenthao, Vice Director of the Provincial health office in Attapeu, Lao PDR for his active support and for arranging access to and for selecting villages and engaging a local team that were ideal for the needs of the project at that time.

We thank the expert fieldwork teams in each country from national, provincial. Commune/district and village level. We were extremely fortunate to have experts in animal and human health from multiple levels as part of the fieldwork team in each country and the vigorous, constructive dialogue among these team members was certainly one of the most important and rewarding aspects of the program. The fieldwork teams included:

Cambodia – National personnel:

Dr. Tek Channarin	Team Leader: National Center for health Promotion
Dr. Holl Sinel (m)	Chief of epidemiology and information analysis office, National Animal Health Production Research Institute
Mr. Ratanak (m)	CDC Cambodia, Ministry of Health Cambodia

Cambodia – Provincial, commune and village personnel

Mr. Pith Nareth	Veterinarian and Director of Animal Health, Department of Agriculture and Forestry, Kratié Provincial Office
Mrs. Long Mardy	Head of Health Promotion Unit, Provincial Health Department in Kratié Province
Mr. Bin Vorth	Deputy head of Themei Commune

Lao PDR – National personnel

Dr. Sysavanh Phommachanh	Team Leader: Vice-Director of Institute of Research and Education Development (IRED)
Dr. Soudavanh Soysouvanh	Academic staff of IRED
Miss. Alouny Meksithong	Academic staff of IRED
Lao PDR – Provincial, district and village personnel	
Dr. Nouphat Phomkenthao	Vice-Director, Provincial health office
Dr. Pheng Phimmasone	Academic staff, Provincial health office
Mrs. Phaivieng Noymalaphanh	Academic staff, Provincial agriculture
Mr. Vannasak Namvannavong	Academic staff, District agriculture
Mr. Sithon Thammavong	Academic staff, District agriculture.

We thank all of those at national, provincial, district, commune and village levels who participated so enthusiastically in the field work and gave extensive critical feedback to improve the tools and processes.

We thank the Australian Centre for International Agricultural Research (ACIAR) for providing the funding and for their ongoing close advice through all stages of this project.

Most of all, we thank the participating communities and leaders in Themei Commune in Cambodia and Sanamxay District in Lao PDR for their enthusiastic participation in the interviews and the community workshops, and for the concern they showed to improve the well-being of people and animals in their villages.

2 Executive summary

Many health security threats, including threats arising from interactions between humans and animals, have arisen in remote areas in the Southeast Asian region, including in areas with minority language groups. These people often have multiple challenges in their daily existence, so cannot keep all potential risks as front-of-mind issues. In addition, their relationships with unfamiliar and/or external organisations may be characterised by misunderstanding and mistrust.

This project worked with national, provincial and local agencies and leaders in Cambodia and Lao PDR to develop and field test a process and tools to engage small communities, including minority language communities in:

- identifying the knowledge resources available and how knowledge is shared and used in a community, and
- developing ways to link important knowledge about managing health risks to regular conversations, routines, activities and relationships.

We call this type of knowledge 'connected-and-live knowledge'

The focus of this project was on the knowledge held within villages about how people can raise and live around animals in ways that are safe and beneficial for both humans and animals. The research is not only about the knowledge people have, but also how people share and apply knowledge as families and as a village in daily life, and in various seasonal circumstances.

This project responds to a recognised need to integrate approaches that focus on how people get and use health-related knowledge (health literacy) with approaches that focus on social and environmental determinants of health. It does this by understanding, and seeking to improve, how knowledge is developed, shared and used in family and community groups.

Based on the One Health approach, the process developed in this project involved human and animal health workers at national, provincial, district and village levels working closely together within communities. None of these workers had previously had an opportunity to work in a cross-disciplinary way at the village level, and the opportunity was highly valued by all team members.

Components of the intervention at the village level – as they were planned at the start of the project and as they stand at the completion of the project – are shown in Figure 1. The heart of the process was an interview tool that was used to collect both quantitative and qualitative data about the knowledge that is held by the village and relationships to people closely connected with the village, and how this knowledge is shared and used.

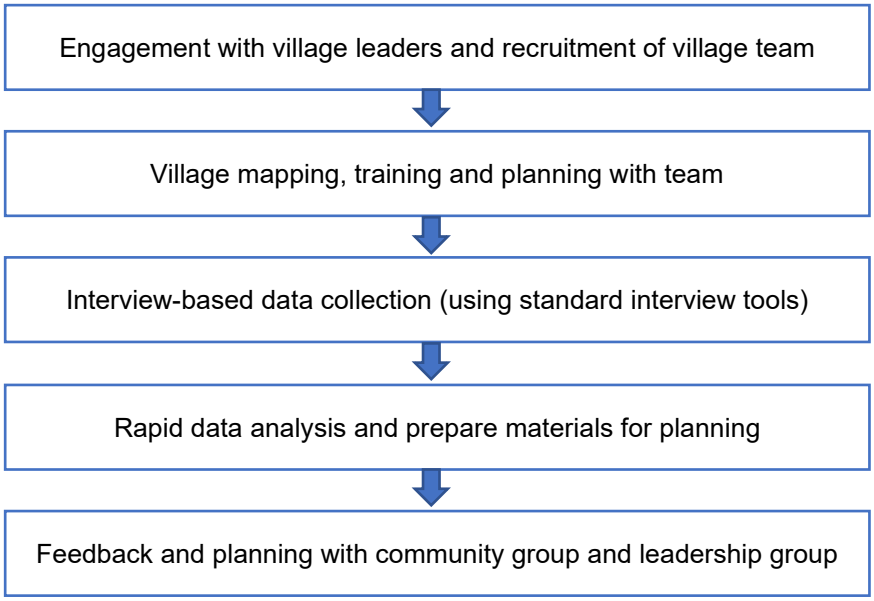


Figure 1: Main stages in the intervention process at the village level

In developing this process, the main priorities were to produce a model of community engagement that can be applied in remote, minority language communities, led by local district and village personnel, and implementable in other population groups in Cambodia and Lao PDR.

Methods

This project aimed to develop the tools and processes identified in Figure 1. Initial planning of the tools and processes was undertaken in workshops with national advisory groups in both Cambodia and Lao PDR. However, the detailed development work occurred through an extensive process of field development and testing in four villages: two in Themei commune, Kratié province in Cambodia and two in Sanamxay district, Attapeu province in Lao PDR. The development process was iterative, seeking to improve the tools through the feedback and experience at each village rather than just replicating them.

Box 1: Key interview questions

1. What is your occupation?
2. What ways does your family earn their livelihood?
3. What types of animals do you raise (probe other animals AND number of animals)?

Live-and-connected knowledge

4. *Refresher: You said you raised these animals (name the animals)*
   a. What things do you do every day or every week to look after the animals?
   b. What things do you do every one or two months to look after the animals?
   c. What things do you do on 'particular occasions'?
      -rainy season or floods
      -dry season, hot weather and droughts
      -near festivals and events with feasts
5. *Thinking about the last six months*
   a. Who do you talk to every day or every week about caring for your animals?

   b. Who do you talk to less often (such as every one or two months) about caring for your animals?
   c. Who do you talk to on 'particular occasions' (rainy and dry season, floods and drought) about caring for your animals?
   d. Are there any other ways you learn about looking after your animals?
6. List all the people in your village who have the good knowledge for looking after the health of animals
   a. Which of the people on the list do you talk to every day or every week (very often) about the health of your animals?
   b. Which of the people on the list do you talk to less often (such as every one or two months) about the health of your animals?
   c. Which of the people on the list do you talk to on 'particular occasions' (rainy and dry season, floods and drought) about the health of your animals?
7. Have you ever eaten meat from a wild animal?
8. Have you ever eaten insects from the forest?
9. What animal and/or insects do you eat from your rice field?
10. What animals and/or insects do you eat from in/around your house?
11. Have you or your family members even been sick from an animal? (Yes/No/Don't know)
    11a. What happened?
    11b. What did you do about this?
    11c. What made you think that you or your family member got sick from the animal?
12. What do you do to care for your health when you are around animals and insects?

13a. What things do you do if animals are sick in your house?
13b. What things do you do if animals are sick near your house?
13c. What things do you do if you notice that animals are sick in the forests and fields around the village?

14a. What things do you do if animals die in your house?
14b. What things do you do if animals die near your house?
14c. What things do you do if you notice that animals are dead in the forests and fields around the village?

Interview data were not treated as a cross-sectional comparative survey but rather as a set of indicators of connected-and-live knowledge (along with the qualitative content of each question). These data were rapidly analysed by the fieldwork team and presented to the villages in planning workshops with community members and with village leaders, including leaders in human and animal health. Within this planning process the villages were guided to focus particularly on how families, neighbours and the whole community could share knowledge and support each other.

Results

The interviews produced a set of indicators for villages that showed substantial variation across villages but also showed strong coherence among related indicators within villages. The findings were confirmed by the qualitative content of the questions, the feedback from the interviewers, and the feedback from the community meetings and

village leaders. While the findings were not strictly comparable across villages due to the evolution of the tool and the process from the first village to the fourth, there were substantial differences between the first two villages in Cambodia and the second two villages in Lao PDR, indicating much lower levels of connected-and-live knowledge in the Cambodian villages. This should not be interpreted as demonstrating national differences but reflects that more people in the Lao PDR project villages indicated that animal rearing was a major part of the livelihood, and they owned a greater diversity and number of animals, than the people in the Cambodian project villages.

The feedback and planning process was received positively in all four villages. The team's summary of knowledge strengths and weaknesses were confirmed by workshop participants, and, most importantly, concrete actions were identified to achieve improvements through working together better for the health of the village.

In the final village in Attapeu province, Lao PDR, the full process was tested to determine if it could be implemented by district and village personnel with minimal input from international, national and provincial staff. The district team with the assistance of village officials were able to implement the process with efficiency and success. Each participating village ended with a list of actions proposed by the community and prioritized actions with dates and responsible people identified. This suggests that the model is potentially scalable to other districts to implement independently.

Conclusions

This project achieved the objective of developing an interview-based tool that provides useful indicators of connected-and-live knowledge about living around and raising animals in ways that are healthy for humans, animals and the environment at the village level. There were clear differences on most indicators between the four villages involved in the development process. Furthermore, the information was viewed as relevant, accurate and useful by village leaders and community members. The final version of the process (Village 2 Sanamxay district, Attapeu province, Lao PDR) was shown to be implementable by a team led by district level personnel after gaining some experience with the process.

There is a need for further research to evaluate the extent to which villages implemented their action plans, and the extent to which they achieve improvements in connected-and-live knowledge and real benefits for people and animals. In Cambodia, a PhD student is commencing looking at these issues. The project has stimulated considerable interest at national levels in Cambodia and Lao PDR, particularly in how this process can be applied to other human and animal health issues.

3 Introduction

3.1.1 Summary statement

Many health security threats, including health threats arising from interactions between humans and animals, have arisen in remote areas in the Southeast Asia Region, including in areas with minority language groups. These people often live in vulnerable circumstances, with many livelihoods risks, which they cannot keep all as front-of-mind issues. In addition, their relationships with external agricultural, health and other organisations may be characterised by misunderstanding and mistrust.

This project worked with national, provincial and local agencies and leaders in Cambodia and Lao PDR to develop and field test a process and tools to engage small communities, including minority language communities, in:

- identifying the knowledge resources available and how knowledge is shared and used in a community, and
- developing ways to link important knowledge about managing health risks to regular conversations, routines, activities and relationships.

We call this type of knowledge 'connected-and-live knowledge'

3.1.2 Background to the problem

In Asia, community resistance and failures of community engagement have often been implicated in the limited success of various One Health and infection control activities and in the emergence of new diseases. In southeast Asia, eliciting an 'event-based' response from the community via hotline reporting (in Lao PDR) was hampered by 'compensation' issues associated with poultry culling activities(1). Similar fears delayed reporting early on during the Nipah virus outbreak in Malaysia (2, 3). Also community reticence and lack of understanding in vaccination initiatives in rural Lao PDR ethnic minority groups contribute to lower vaccine uptake and Vaccine Preventable Disease outbreaks (2015/16), including Vaccine Derived Polio (4).

These instances are linked to a much larger body of work that has analysed the contribution of break-downs in community engagement in managing Ebola outbreaks in Africa (5-7). For example, social resistance to the Ebola response was widespread in Guinea and later in Sierra Leone and Liberia. In the Forest Region of Guinea, where social resistance was the most violent, anthropologists have described how efforts to isolate infected patients and conduct safe burials offended traditional beliefs about the importance of observing proper funeral practices, which are linked to the family's future prosperity (8). Communication messages that linked Ebola infection with certain death made people fearful of seeking treatment. Focus group discussions with affected communities found that there was inadequate knowledge of how Ebola was spread and widespread fears that health workers were infecting people in the community (9).

Need for strengthened community-based strategies

While there have been large investments in downstream systems and services such as surveillance, outbreak modelling, laboratories, vaccines and capacity building, there has

been insufficient investment in upstream approaches to primary prevention. Recommendations for prevention and minimizing risks have included knowledge development, community engagement and relationship building strategies (6, 8). Recommendations also emphasise the need for changed activities in daily life (e.g., hygiene, animal care); collaboration between communities and local authorities; preventive health measures (e.g., vaccines); education on key health issues and risks (e.g., childhood illnesses, medication use, zoonotic illness that are risks or endemic in particular communities); and preparedness for possible infrequent but serious health security events (e.g. emerging infectious disease outbreaks).

This project developed a process and tools to work with farming communities to assess the applied knowledge of human and animal wellbeing issues in villages, and how well this knowledge is rehearsed and refined in conversations with others and reinforced through connection to regular routines and activities; that is, ‘connected-and-live knowledge’.

The community engagement process developed in this project could provide a useful adjunct to a wide range of regional and global agendas, including the World Organisation for Animal Health's (OIE) Performance of Veterinary Services Pathway, the Global Health Security Agenda (GHSA) and the Asia Pacific Strategy for Emerging Diseases (APSED) (10), the latter two of which seek to strengthen the capacity of countries to comply with the International Health Regulations (IHR). These strategy and policy frameworks are dependent on effective community engagement in many ways, but are relatively weak in terms of practical strategies and methods to achieve this.

Both Lao PDR and Cambodia have cultural and linguistic diversity and there are many areas of these countries that are difficult to access. Remote communities often have no written language and, in many cases, few people who speak the country’s majority languages. Other countries in the region have adopted various models of engaging ethnic health workers and various processes for training, supervising and paying workers (11). The need for specific health literacy training for health professionals engaging ethnic communities has been highlighted (12). This project sought to develop a model of community engagement that can be applied in remote, minority language communities, led by local district and village personnel, and implementable in other population groups in Cambodia and Lao PDR.

4 Purpose, aims and objectives

4.1 Aims and objectives

This project is a primary developmental activity to prepare the way for a program of work with the goal:

> *To develop, implement and evaluate a transferable, community-based health literacy strategy that generates sustained awareness and capacity to respond to health security threats in diverse communities including minority language groups.*

The objectives of this SRA were:

1. To develop networks of relationships in Cambodia and Lao PDR in order to:
   a. obtain input into how a community-based health literacy intervention, and the information obtained, could add value to the activities and programs currently being undertaken and how the proposed intervention can be optimized to maximise this added value
   b. to identify and engage partners for active participation / co-design.

2. To develop and field test a process and two tools to engage local communities in:
   a. Identifying the relevant health knowledge resources that already exist within the community as a whole and its relationships with other agencies[1]
   b. Identifying the extent to which knowledge about One Health issues and protective strategies is live and connected in the community[2]

3. To develop a detailed proposal for a three-year program of work to test the implementability, outcomes and scalability of the developed intervention.

In summary, the main priorities were to produce a model of community engagement that can be applied in remote, minority language communities, led by local district and village personnel, and implementable in other population groups in Cambodia and Lao PDR.

[1] *Note gaps will also be identified but the emphasis is on a strengths-based process*

[2] *For example, rehearsed in regular conversations, linked to regular activities and events, embedded in relationships with community knowledge leaders and other resource agencies*

5 Key concepts, models and frameworks

This section describes the key concepts on which the intervention was based and the basis for these concepts. It also describes how the project sought to integrate these into a coherent whole.

The key concepts and frameworks that are considered include:

1. Health literacy and the new and related concept of connected-and-live knowledge
2. The One Health[3] approach
3. Concepts related to participatory co-development
4. Recent work about scaling interventions and understanding scalability.

Table 4 (p 19) summarizes how the conceptual and theoretical principles discussed below were applied within this project.

5.1 Health literacy and connected-and-live knowledge

5.1.1 Health literacy

Many countries now have or are developing specific health policy around health literacy. However, this has mainly been operationalised within the noncommunicable diseases agenda. For example, the WHO's 2016 Shanghai Declaration has positioned health literacy as one of three pillars to support nations to reach the United Nations (UN) health-related Sustainable Development Goals (SDGs).

The concept of health literacy has a long history. It was first used in relation to health education in schools in 1974 (13). Since that time, the concept has undergone many evolutions and there have been numerous definitions with different emphases. These were well collated by Sørensen et al in 2012 (14), at which time the authors attempted a synthesis of prior definitions:

> *People's competences to access, understand, appraise and apply information to make health decisions in everyday life throughout the life course.(*(14)

The elements of accessing, understanding, appraising and applying information are common to most definitions of health literacy. To these four components, the task of remembering or retrieving information at the time and in the manner that it is required can be logically added.

The five components of health literacy activity (accessing, understanding, appraising, retrieving and applying information relevant to health) and modern understandings of how people approach these five tasks and what is helpful to them, are foundational to the process that was developed in this project (Table 1).

[3] *See section 5.2 for more information*

Table 1: Requirements for knowledge that is ready for action rather than for forgetting

Access	Understand	Appraise	Retrieve	Use
People have different preferred learning styles and need to access different sorts of information at different times: • Foundational biological and disease concepts. • For specific health issues need timely 'what to do', 'why to do' and 'how to do' information.	There are many levels of understanding health information including: • Able to follow the discussion intellectually well enough not to feel lost. • Able to express the information conceptually in their own words. • Able to state how the information is relevant to them. • Able to state how the information can be put into actions. • Able to explain to others. • Understand principles sufficiently to undertake problem solving.	More than just believing that it is scientific. It includes: • Deciding if the source is trustworthy. • Deciding if the information is trustworthy. • Resolving conflicts in information. • Deciding if it is relevant for you • Deciding if it is possible for you.	Different forms and levels of remembering: • Can be brought to mind through prompting questions. • Remembered with the aid of notes or environmental prompts. • Quickly accessible to memory and available for decision-making.	Rarely a one-time decision but a decision that people need to make repeatedly Practical knowledge and problem solving is very important. Trial-and-error decision making.

NB: The red text indicates what the project team calls 'live knowledge' – see section 5.1.3

5.1.2 Distributed and community health literacy

Many definitions of health literacy have had a focus on abilities of individuals, but this has been challenged. Kickbusch (2001) cites a resolution of the WHO Fifth Global Conference on Health Promotion in 2000 *to widen the glossary definition to include the dimensions of community development and health-related skills beyond health promotion, and to understand health literacy not only as a personal characteristic, but also as a key determinant of population health*.(15) She then went on to propose the following definition, which emphasizes the life and societal contexts in which decision-making about health occurs:

> *Health literacy is the ability to make sound health decisions in the context of everyday life – at home, in the community, at the workplace, the healthcare system, the market place and the political arena.* (15)

Other research articles and reports contain concerns about the individualistic emphasis on health literacy, which fit uncomfortably with a focus on the WHO social determinants of health (SDH), and have called for an expanded view of the definition of health literacy that is more closely aligned with the SDH.(16-19) In particular, the final report of the WHO Commission on Social Determinants of Health (CSDH), entitled *Closing the Gap in a*

Generation: Health Equity through Action on the Social Determinants of Health, made the following statement:

> *The understanding of the social determinants of health among the general public needs to be improved as a new part of health literacy…The scope of health literacy should be expanded to include the ability to access, understand, evaluate, and communicate information on the social determinants of health* (18)

In a seminal paper, Edwards et al (2013) introduced the concept of distributed health literacy and demonstrated that it is not only the health literacy of individuals that impacts on health outcomes but the shared health knowledge resources of families, peer groups and communities (20).

There has also been increasing evidence that people do not generally approach the five tasks of accessing, understanding, appraising, retrieving/remembering and applying information about health as individual cognitive activities. Rather these tasks are often profoundly social in nature and undertaken through discussions with family members, peers, colleagues, respected community members and others, especially in collectivist cultures. This can be seen as shared health literacy characteristics and knowledge and beliefs in families, peer networks and communities as well as situations where these shared characteristics seem to be stronger determinants of health action and outcomes than individual attributes (21-26).

These developments have occurred in parallel to other attempts to build up the knowledge assets and the knowledge sharing and circulation in whole communities (27-29).

The concerns of this section have been summarized in a scoping review published by Kendir and Breton (2020) who systematically searched for examples of interventions that conceptualized and acted on health literacy as a community attribute rather than solely an individual attribute.

> *Despite a number of authors calling for more research on HL interventions at the community level and an expansion of the definition to cover the SDH, we found that the recommendation of the CSDH has yet to be implemented…We found no instance of HL intervention regarding communities as complex systems of actors sharing a common space and dynamic. We conclude by suggesting a new definition of HL and by drawing attention to the research gap in addressing the upstream SDH through HL actions* (16).

To our knowledge, this project is the first attempt to assess health literacy of *communities as complex systems of actors sharing a common space and dynamic* and to explicitly attempt to change these dynamics. This is necessary if health literacy interventions are to contribute to the complex interaction of human, animal and environmental health issues, all within complex social environments, that is emphasised by the One Health approach. To achieve this, the project developed the concept of connected-and-live knowledge, which firmly locates health literacy within community, family and peer networks.

5.1.3 Connected-and-live knowledge

Building on the concepts and evidence about distributed and community health literacy, the concept of connected-and-live knowledge became the basis for this project.

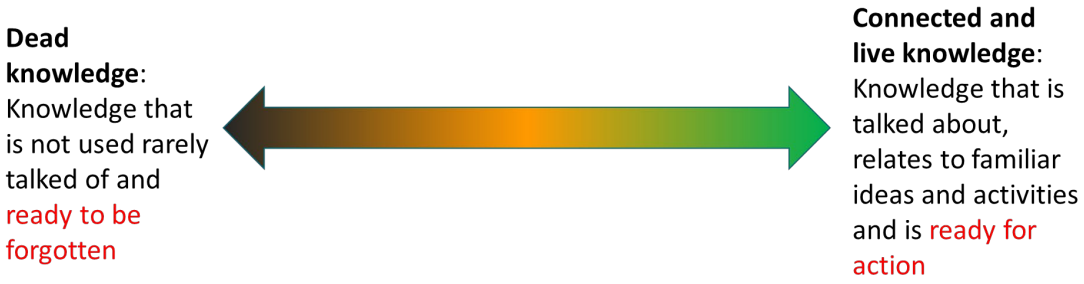


Figure 2: Connected-and-live versus dead knowledge

The concept of connected knowledge relates to the points on distributed and community health literacy discussed in section 5.1.2. The concept of live knowledge seeks to consider what are the characteristics of knowledge that make it ready for action rather than ready for forgetting (Figure 2)

There is considerable evidence in decades of literature about behaviour change and the knowledge characteristics that are facilitators or even pre-requisites of behaviour change. These are summarised in relation to the five health literacy tasks in Table 1.

When we refer to “live knowledge”, we are referring to knowledge that has the characteristics shown in red in Table 1 and that is kept active through regular conversations or regular action.

Connected-and-live knowledge is a combination of these ideas. Our concept of connected-and-live knowledge is derived from many sources, including our own research. Table 2 lists some of the fields and related ideas that have informed our thinking on this concept. A familiar example for many Australians is community fire safety programs, which use a combination of seasonal prompts and conversations/meetings within families, neighbourhood/street groups and whole communities to prompt people’s memories, stimulate and support action and undertake group problem solving. The end result is a set of action plans at family, neighbourhood/street and community levels.

Table 2: Diverse inputs to the concept of and interventions for connected-and-live knowledge

Source	Connected knowledge concepts and intervention strategies
Cognitive neuroscience	• Connecting familiar with unfamiliar concepts • Frequent activation of neural pathways / emotional valence
Knowledge management (corporate and government) (30)	• Timely availability of knowledge from known sources • Recognition that teams have complementary knowledge linked to their role rather than expecting everyone to have the same body of knowledge • Increasing focus on linking people to the right people at the right time, ahead of linking to the right facts at the right time • Valuing tacit/experiential knowledge as an aspect of corporate knowledge • As knowledge is often within routine practices there is no cognitive demand
Development programs (28, 31, 32)	• Numerous strengths-based approaches that recognise the role of key people and agencies and people as repositories of knowledge and leaders of change

Source	Connected knowledge concepts and intervention strategies
	• Flexible, community conversation-based interventions that can be applied in diverse settings utilising available local workforce and/or trained volunteers • Use local experiential and tacit knowledge and co-development strategies • Build on variance and cases of positive deviance within communities.
Prior community-based health security initiatives (33)	• Gaps in understanding between animal and human health officials and the community members • Use of volunteers i.e., for house visits in remote low literacy areas • Longer time required to build understanding in remote, low literacy, minority language and/or poorly serviced communities
Other community risk management plans (e.g., fire safety) (34, 35)	• Development of a schedule of daily/weekly, seasonal and annual activities • Emphasis on regular discussion and rehearsal of knowledge in families, with neighbours and in community groups • Regular program of engagement between community members and relevant authorities (e.g., fire services, local government)
Health literacy (20-26, 36, 37)	• Distributed health literacy: Health literacy of others or average health literacy of the group can sometimes determine outcomes more that the health literacy of the individual • Many health behaviours (good and bad) are contagious within tightly connected groups • People within villages tend to have similar profiles of health literacy strengths and weaknesses

Connected-and-live knowledge at the village level

Recognition of the centrality of family, peer and community conversations and interactions in determining health literacy, behaviour and outcomes enables us to think about community health literacy in a new way. Rather than thinking about the knowledge resources and abilities of individuals, we can think about the knowledge resources and abilities of the village as a whole. This leads us to ask questions such as:

- What is the total pool of knowledge about our issue of concern that exists in the village?
- Who has this knowledge?
- How well does knowledge circulate within the village both generally and at times of need?
- What connections does the village have that enable it to access additional knowledge?

We can apply the analogy of a kind of knowledge physiology to villages and ask questions about its knowledge intake and circulation processes to all parts of the village body. This type of thinking fits well with the concept of connected-and-live knowledge and is the basis for this project. In summary, the project is seeking to identify the knowledge resources and the effectiveness of systems of knowledge intake and circulation and then to work with the villages to improve this.

To explain this concept as simply as possible to participating villages, we adopted the motto:

> **"*Helping each other care for the health of all people and animals in our community*"**

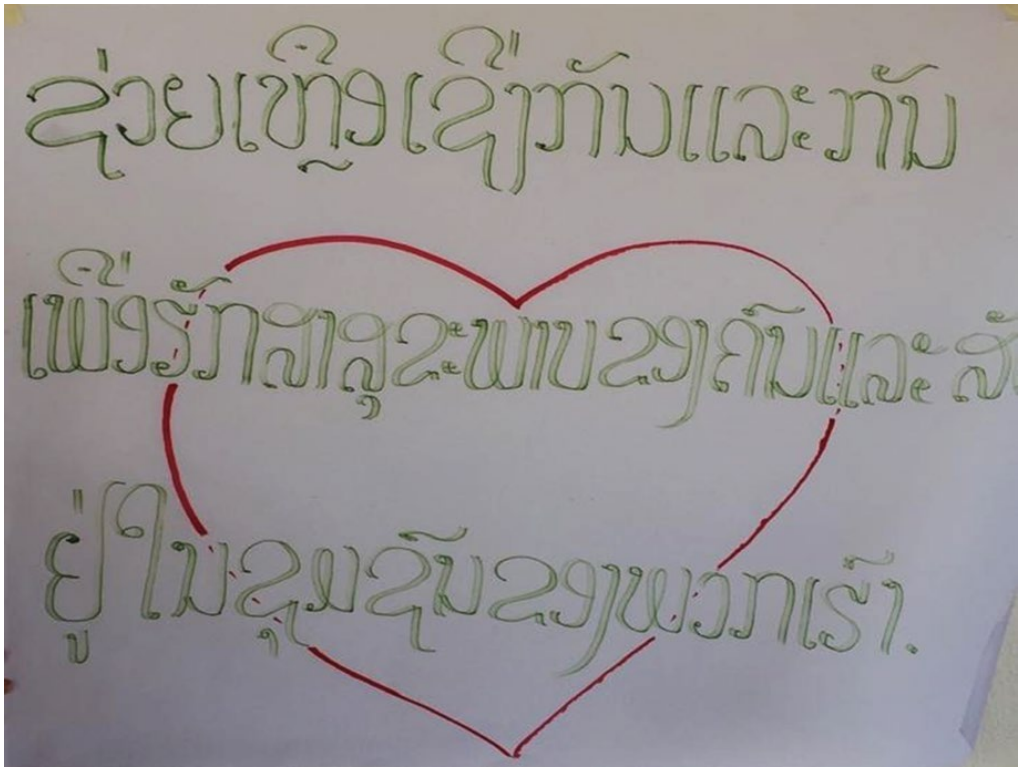


Photo 1: The motto translated into Lao

Implications of the concept of connected-and-live knowledge for methods

The goal of assessing connected-and-live knowledge has implications for how data collection and analysis occurs. Firstly, data needs to be interpreted in terms of broader village characteristics, rather than individuals. Questions that seek to determine the total knowledge holdings, the locations of knowledge and the flow and sharing of knowledge are important in this regard. Section 9 provides more detail on interpretation of the data as a set of indicators of the strengths and weaknesses within each village.

Secondly, the project aimed to detect live knowledge that is 'front-of-mind' and thus 'ready for action' within the features presented in Table 1. The methodology favours open questions, rather than heavily prompted or pre-categorised questions that respondents can guess, or that seek to dredge up knowledge from the back corners of people's minds. For this reason, interviewers are also trained to do minimal prompting and explaining.

5.2 Principles of One Health

One Health recognises the interaction of human, animal and environmental health issues and the need to address these in multi-disciplinary and synergistic ways. A Consortium of the American Veterinary Medicine Association, the American Medical Association and the Centers for Disease Control and Prevention (US), defined One Health as…

> *…the collaborative efforts of multiple disciplines working locally, nationally, and globally, to attain optimal health for people, animals, and our environment.(38)*

A One Health approach requires understanding the interacting influences on human, animal and environmental health and applying this understanding to broad, interdisciplinary collaboration. While One Health is extensively discussed, the number of integrated One Health interventions presented in the literature is small and often only involves joint training activities and/or the sharing of surveillance data. There have been few preventive or community-based One Health interventions globally, and where these have occurred they have often focused on testing of samples from the human, animal and environmental domains rather than on community engagement (39). Experiences with several epidemics, most notable Ebola in west Africa, have led to calls to strengthen the emphasis on social environments and building locally focused, community-based solutions (40, 41).

Our field teams included human and animal health workers from national, provincial, district and village levels. Whilst this was the first experience for many in working in a cross-disciplinary way in local settings, the opportunity to do so was highly valued by all team members. By bringing a cross-disciplinary team into the villages to collaboratively identify the needs of these villages, the project sought to build a deeper understanding of the local, day-to-day aspects of the interaction between humans, animals and the broader environment, and to draw on the expertise of different disciplines to assist villages to address their needs.

Whilst the survey tool focused primarily on human-animal interaction, important aspects of the village environment were included in the process in a number of ways. For example, the mapping activity involved careful identification of different environments in the village and surrounds and selection of people from all area. It was also considered in observational studies and broader questions about seasonal and other weather-related events, and environmental assessment. There was no attempt in this project however, to make an assessment of the 'health' of the natural environment or people's interactions with it apart from the capture of wild animal or insect food sources.

Box 2: One Health in life experiences

Example 1

In April 2019, village leaders in one village in Cambodia told us that most of the small animals in the village (chickens and pigs) had died over the previous few months. They attributed this to a particularly long and hot summer and they had not sought to investigate other possible causes for the deaths. Because these deaths meant that the supply of meat was very low, villagers were eating deceased animals that they normally wouldn't eat and seeking other sources of meat that they normally wouldn't rely on. Thus, the hot weather (or other causes) and a failure of animal care, led to animal deaths, increased food insecurity, reduced incomes, and risky food consumption behaviours.

As well as showing one interaction between environmental, animal and human health, this story raises many issues including a need for knowledge/support in caring for

animals during times of heat and drought; a need to consider causes of animal death; and safe alternatives to address food security crises.

Example 2

In one village in Cambodia, many of the poorest households were in the muddiest areas of the village, in particular a damp, low-lying area close to a marshy area and rice fields. This area had dogs, chickens and pigs walking through mud around the homes, and had poorly protected access paths to the houses that required people to walk through this same mud. This inevitably resulted in poorer sanitation around and inside poorer households, with the potentially increased risk to both humans and animals of soil-borne disease such as parasites or leptospirosis (See marks 1 and 4 on the map of Themei V1, page 40.)

5.3 Participatory Co-creation

We have just discussed One Health in terms of the daily lives and the social as well as the physical and biological environments of living of people in communities and that this suggests a need to prioritize building locally focused, community-based solutions. Okello (2012) highlighted this need in proposing that "*the evolution of One Health from the emergency to the everyday necessitates integration of local perspectives*", but she also indicates that there have been many difficulties in achieving this (42).

This project fits within an extensive tradition of participatory co-development as a '*common part of everyday development discourse*' (42). It aims to foster mutual understanding of a problem by the people living in, or relating to, particular village communities, and to enable those communities to identify and implement effective solutions.

The theoretical benefits of participatory co-creation approaches have been widely touted but the failure of specific co-creation activities to live up to this promise has also been recognised. In a recent systematic, narrative review Greenhalgh et al (36) suggested that many of the failures resulted from not following the three key principles:

> *(1) a systems perspective (assuming emergence, local adaptation, and non-linearity);*
> *(2) the framing of research as a creative enterprise with human experience at its core; and*
> *(3) an emphasis on process (the framing of the program, the nature of relationships, and governance and facilitation arrangements, especially the style of leadership and how conflict is managed)* (43).

Two points are of particular importance in successful participatory co-creation. First, the participation must genuinely extend to the communities being involved in setting their own priorities rather than just solution finding for priorities of researchers or policy-makers. In particular, both the problems and the solutions need to be clearly relatable to important experiences in the lives of participants. Secondly, the process needs to encompass conflicting points of view in a constructive manner. Practising the resolution of such

conflicts is an important part of developing solutions that will function in the real world of conflicting values and points of view.

5.3.1 Asset/strengths-based approach

It is well established that simply giving community members more information alone does not lead to substantial direct behaviour change for many people. It is still less effective for disadvantaged groups, including language minority groups (44). To develop an effective One Health intervention at the community level, we need to apply interventions that enable new knowledge to 'stick' and be readily available in practical forms when people might need it.

Consequently, this project took an assets-based approach to assist communities to activate the resources, including knowledge, that they already have. The focus is not on identifying knowledge gaps but rather on the need for timely, practical and contextual access to information. This type of 'how to do' knowledge cannot usually be imposed from outside. It is better developed through direct engagements (i.e., through conversations, and through seeing friends and local trusted authorities actually do the tasks using local resources/know how) (32). This enables some people to be role models for others and to share in practical problem-solving activities.

In this situation, external knowledge providers (such as sub-district animal health staff/health promotion officers) function as resource people. Often, the most valuable input that external knowledge providers can give is to broker farmer-to-farmer knowledge transfer through the sharing of experiences and practical knowledge between farmers in different communities.

5.4 Consideration of future scaling and scalability of the approach

This project sought to build a scalable approach to mitigating and managing threats to animal and human wellbeing in communities. There are many frameworks and guidelines that have been developed to assist the development of scalable interventions, for example the Expand model developed and promoted by WHO (45). This project was however guided by models widely adopted in Australia by Milat and colleagues (46-48), which in turn were largely guided by a framework developed by the Institute for Healthcare Improvement (IHI), based on experiences in Africa (49).

The IHI framework emphasises that planning for scalability needs to commence from the earliest stages of intervention development and that development of a scalable intervention usually proceeds through a series of tests and refinements of the intervention at different scales commencing with very small-scale tests at the level of a single district or community. There are two critical concepts within the IHI framework: the intervention being taken to scale and what they call the scalable unit, which is the type of agency (e.g., hospitals) or administrative level (e.g., district) that will be responsible for implementing the intervention. Scaling therefore involves transferring the intervention from few to many of the scalable units.

The actual strategy for scaling depends on the nature of the intervention, in particular whether it is a highly standardized intervention that is to be reproduced exactly or a principle guided process with considerable room for local adaptation. The latter is the case in this project. Table 3 describes the components of the scalable model for this project based on the IHI framework.

Table 3: Components of the scalable model developed in this project

Component of the IHI* framework	Description for this project
Scalable intervention	A village-level co-creation process built around the assessment of connected-and-live knowledge about humans and animals living healthily together, with five main components as documented in Section 6. This intervention emphasises local responsiveness and adaptability rather than standardisation and strict replication.
Intervention unit	Villages or communities living in close proximity that have the potential to share in daily tasks and conversations about living with and caring for animals.
Scalable unit	Districts or communes made up of 10 to 50 villages and with organisations and workers that have a responsibility for the villages in the area
Planning and training and support to scalable units	Multi-disciplinary national and provincial team (with expertise in human and animal health as well as epidemiological data collection and health promotion approaches) develops materials and conducts training and establishment of teams at the level of the scalable unit (district or commune).

* Institute for Healthcare Improvement

5.5 Summary: principles applied to the design of the Health Literacy intervention applied by this project

Based on the concepts and frameworks described above, the principles – and their application within he project - are summarised in Table 4.

Table 4: Application of key principles to intervention design

Key principles	Operationalization in this project
Focus on live knowledge	• Asking open questions with minimal prompting • Searching for evidence of knowledge that is built into regular routines or conversations
Focus on connected, distributed knowledge as an attribute of villages	• Identification of sources of good knowledge within the village and in agencies and people regularly connected to the village • Assessing extent and regularity of knowledge flows and practical sharing • Engaging animal and human health workers who have an ongoing relationship with the villages directly in the fieldwork to strengthen connections and mutual understanding
One Health approach that integrates human, animal and environmental health	• Teams that include animal and human health workers at all levels (national, provincial, district/commune, village) • Questions that focus on human-animal interaction in different seasons and environmental settings

	• Triangulation of multiple data sources including interviews, meetings with community leaders, direct observation and community meetings • Care to achieve geographical representativeness in the sample of interviewees in a village
Asset-based co-creation	• Identification of people considered to be holders of good knowledge within or related to the village • Interview schedule focused on identifying what people do ahead of what they don't do • The whole intervention is shaped to lead rapidly to community planning workshops • Presentation of results focused on strengths ahead of weaknesses and planning activities emphasise how to utilise strengths
Clear identification of the scalable intervention and scalable unit	• Clear description of the components of the scalable intervention (Section 6) and its nature (local co-creation rather than strict replication) • Clear focus on a scalable unit that is the lowest level that generally has personnel that have an ongoing relationship with villages (district, sub-district or commune) • Testing that the intervention was implementable by people at that level
Recognition of a pathway for developing scalable interventions that begins with conceptualisation and the earliest small trials	• This project focused on intimate partnerships with a small number of villages with a development pathway focused on building a model that could easily be implemented by district/sub-district/commune personnel with the villages that make up their constituency • National and provincial personnel directly involved at the village level

6 Intervention Methods and Tools

In considering the workforce and local networks through which the intervention could be feasibly and sustainably implemented, it became clear that in both Cambodia and Lao PDR the commune/district level was most relevant, given the direct and ongoing relationship between health actors and the villages. The final stages of this project sought to explicitly test if the model could be implemented by a team made up almost exclusively of district and village level personnel, and other interested community members, ensuring representation of both genders. We also considered that there was potential to achieve efficiencies at the commune/district level by facilitating sharing of ideas among different villages (see discussion in Section 11).

6.1 Methods

Components of the intervention at the village level are shown in Figure 3 (also used in the executive summary). The heart of the process was an interview tool that was used to collect both quantitative and qualitative data about the knowledge that is held by the village and relationships to people closely connected with the village, and how this knowledge is shared and used.

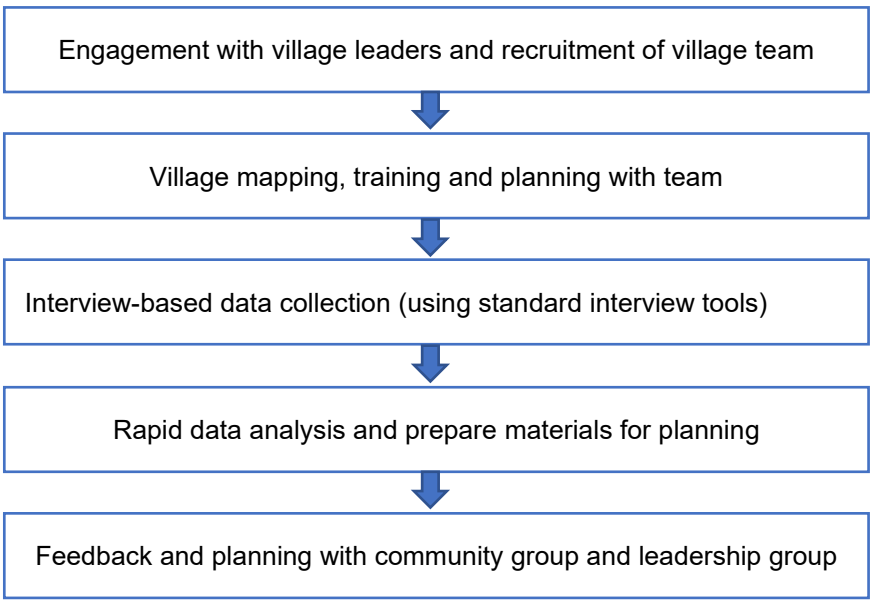


Figure 3: Main stages in the intervention process at the village level

6.1.1 Engagement with village leaders and recruitment of village team

Village head leaders were approached with the approval and support of provincial and commune/district authorities. A brief information sheet for village leaders was prepared and translated and was approved by the relevant Human Research Ethics Committees in each country (see Section 8.1.1). In setting up the appointment, the village head was asked to invite other people to the preliminary briefing that he thought might be relevant. The initial briefing included a short outline of the activities and an introduction to the interview tool. The briefing included emphasising that the data was mainly for their use

rather than for use by outsiders and emphasised the importance of including a range of people from all geographical parts of the village, inclusive of social status, age and gender. We also emphasised the need to include both genders among those villagers who would assist with the process.

Box 3: Building trust and understanding

Sanamxay V2 village in Attapeu Province, Lao PDR, was the most diverse village in terms of ethnic groups and languages. When we first introduced the project there was clearly some anxiety about it. The leaders were invited to attend the final community meetings at nearby Sanamxay V1 village and saw that the process was both enjoyable and useful to that community. Seeing the end point of the process created greater trust and a high level of enthusiasm to be involved among the village leadership.

In Cambodia, the village leaders were asked to identify at least three people who could join three data collection teams. Where possible, these people should include those who have designated roles or known expertise in human and animal health and have both genders represented in the groups (See Photo 5 and 6). In Lao PDR, the model was changed to include two village people in each data collection team, one male and one female, and the team was led by district personnel and with national staff providing supportive assistance. This change in the Lao PDR model was to test if the intervention could be autonomously undertaken by district-led teams (see also Sections 6.2 and 8.2). In Cambodia and Lao PDR the village groups consisted of Commune Health Centre staff, school teachers, community health volunteers, lay people and the local village veterinary worker. (In Cambodia the village veterinary worker had been trained by the Kratie Provincial Animal Health authorities and now works privately, whereas in Lao PDR he was a District level government veterinary worker trained by Attapeu Province Animal Health authorities).

6.1.2 Village mapping, training and planning with team

The first half day of the field work involved familiarising the male/female interviewing teams with the interview tool and giving them opportunities to provide feedback, to practice conducting the interviews, to create a village map, and to develop a plan of action to collect data from representatives of 40 families. The second half day was a continuation of the training in which the data collection teams practised conducting the interviews with representatives of one or two families, ensuring they collected data from both genders in the sample households, and then returned to share their experiences, offer feedback and ask questions.

One of the main reasons for constructing the village map was to assist in the process of identifying a sample that was as representative as possible. The map enabled a discussion about where poorer households, single heads of households and people with disabilities lived, where environmental features and hazards were, and to confirm the physical layout of the village.

6.1.3 Interview-based data collection (using standard interview tools)

The teams put a great deal of time and energy into developing an interview tool based on a set of key questions that were initially proposed. The mixed gender national team in Cambodia included the Director of the National Field Epidemiology Training Program for Animal Health and others with considerable field epidemiology training who were able to provide guidance to the development of the tool. (For more details see Section 8.2) The core interview questions used across the four villages are displayed in Table 5. As can be seen in Table 6 (page 39), in 58% of households the primary interviewee was female.

Table 5: Core questions for assessing connected-and-live knowledge.

Background

1. What is your occupation?
2. What ways does your family earn their livelihood?
3. What types of animals do you raise (probe other animals AND number of animals)?

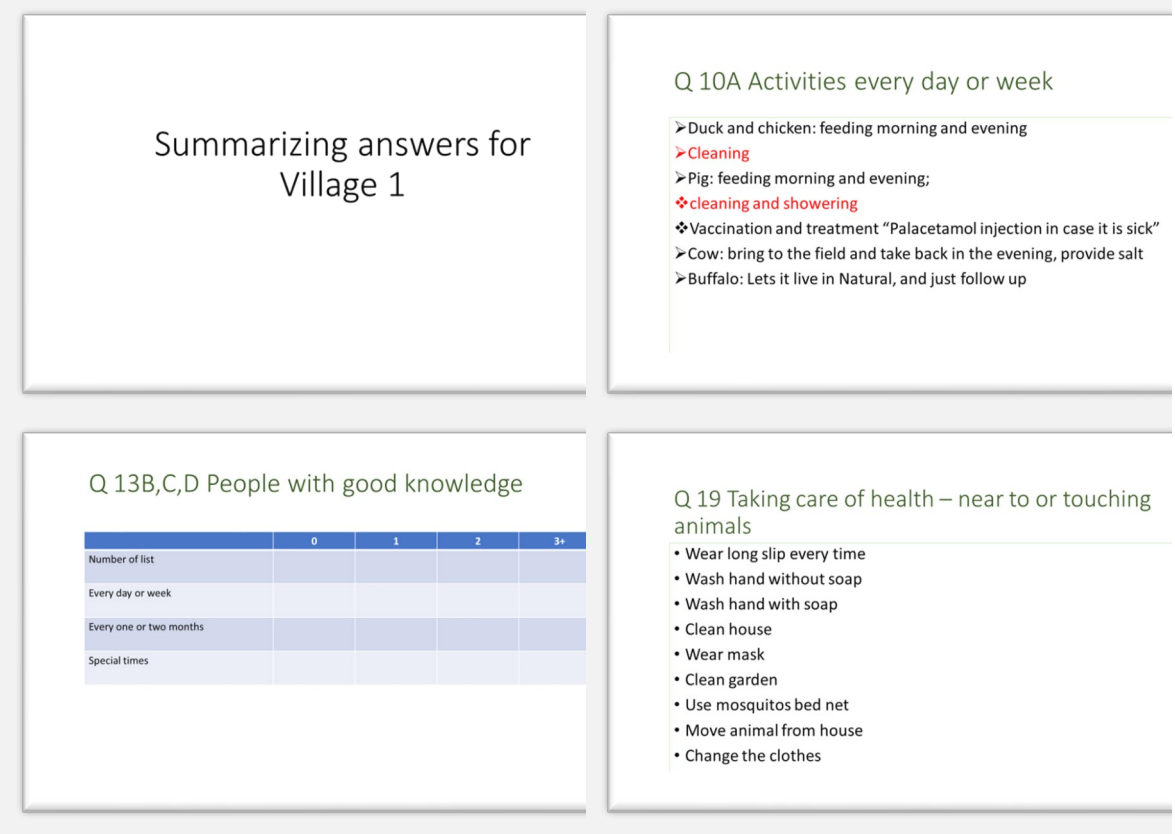
Live-and-connected knowledge

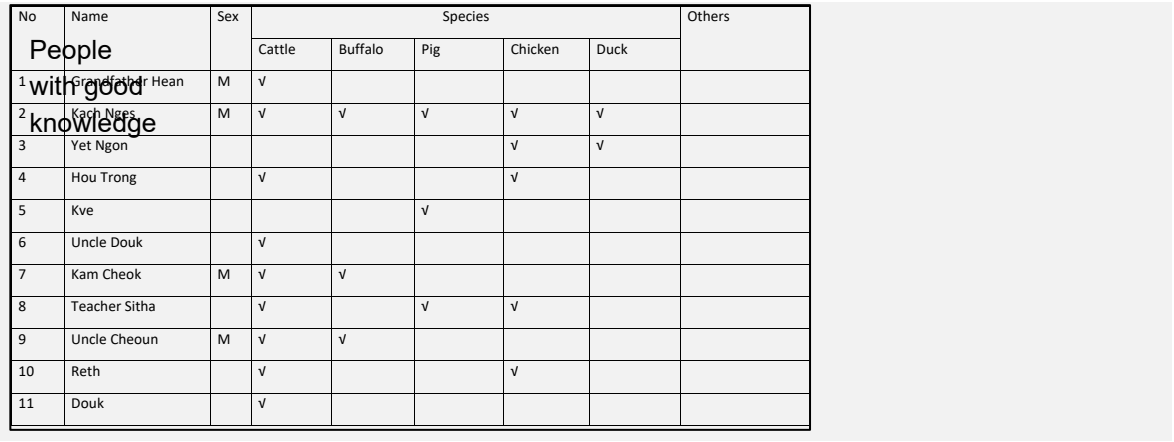
4. *Refresher: You said you raised these animals (name the animals)*
   a. What things do you do every day or every week to look after the animals?
   b. What things do you do every one or two months to look after the animals?
   c. What things do you do on 'particular occasions'?
      -rainy season or floods
      -dry season, hot weather and droughts
      -near festivals and events with feasts
5. *Thinking about the last six months*
   a. Who do you talk to every day or every week about caring for your animals?
   b. Who do you talk to less often (such as every one or two months) about caring for your animals?
   c. Who do you talk to on 'particular occasions' (rainy and dry season, floods and drought) about caring for your animals?
   d. Are there any other ways you learn about looking after your animals?
6. List all the people in your village who have the good knowledge for looking after the health of animals
   a. Which of the people on the list do you talk to every day or every week (very often) about the health of your animals?
   b. Which of the people on the list do you talk to less often (such as every one or two months) about the health of your animals?
   c. Which of the people on the list do you talk to on 'particular occasions' (rainy and dry season, floods and drought) about the health of your animals?
7. Have you ever eaten meat from a wild animal?
8. Have you ever eaten insects from the forest?
9. What animal and/or insects do you eat from your rice field?
10. What animals and/or insects do you eat from in/around your house?
11. Have you or your family members even been sick from an animal? (Yes/No/Don't know)
    a. What happened?
    b. What did you do about this?
    c. What made you think that you or your family member got sick from the animal?
12. What do you do to care for your health when you are around animals and insects?

13. What things do you do if
    a. Animals are sick in your house?
    b. Animals are sick near your house?
    c. You notice that animals are sick in the forests and fields around the village?
14. What things do you do if
    a. Animals die in your house?
    b. Animals die near your house?
    c. You notice that animals are dead in the forests and fields around the village?

6.1.4 Rapid data analysis and preparation of materials for planning

The purpose of this component was to rapidly summarise the qualitative and quantitative data obtained from the villagers in a form that could be easily presented to villagers and leaders including people with no or low literacy in the local language.




People with good knowledge

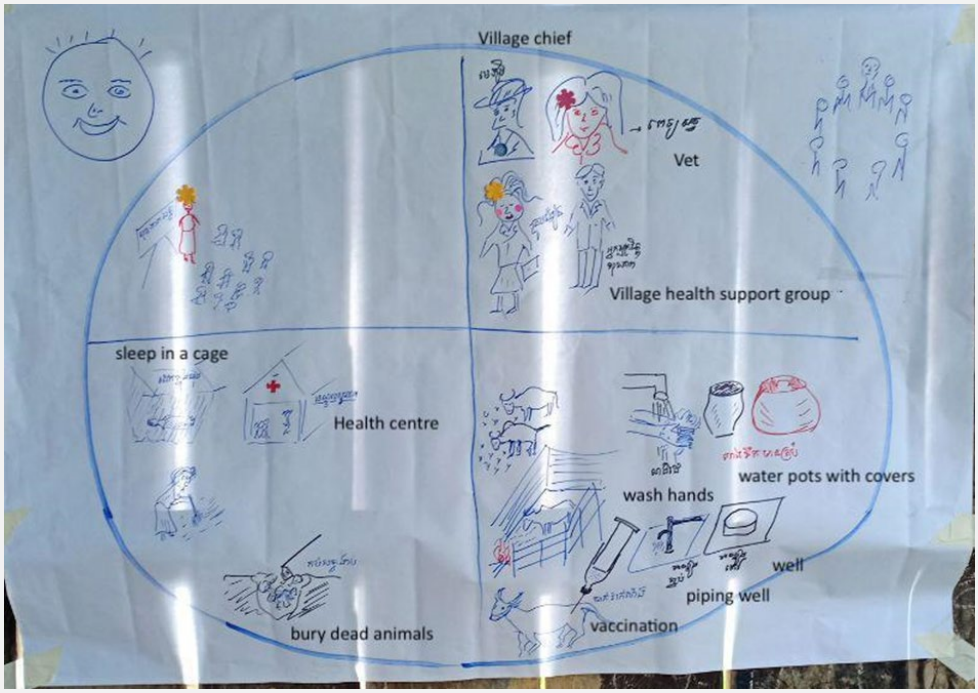
No	Name	Sex	Species					Others
			Cattle	Buffalo	Pig	Chicken	Duck	
1	Grandfather Hean	M	√					
2	Kach Ngee	M	√	√	√	√	√	
3	Yet Ngon					√	√	
4	Hou Trong		√			√		
5	Kve				√			
6	Uncle Douk		√					
7	Kam Cheok	M	√	√				
8	Teacher Sitha		√		√	√		
9	Uncle Cheoun	M	√	√				
10	Reth		√			√		
11	Douk		√					

Figure 4: Example of slides used for the group data analysis process
NB the rapid analysis was conducted in Khmer and Lao languages. The above pictures are translations.

The analysis process needed to be simple but accurate and to provide an opportunity to integrate the interview data with data collected during informal observations and conversations. To achieve this, the project team invited as many members of the data collection team as possible to join a half-day data analysis workshop. At the workshop each participant was given a bundle of the interview records to analyse. Slides were shown on a screen for each question and the group was asked to share a) common responses to that question and b) additional responses. The responses were collated on the slides in the original language (Figure 4).

Based on the results of the interviews, but also considering additional observations and conversations that occurred in the village, and what wasn't said as much as what was said, the team created a graphical summary of the village's main strengths and weaknesses (Figure 5).

Village strengths



Village weaknesses/problems

Figure 5: Sample of prepared summaries for presentation to village meetings

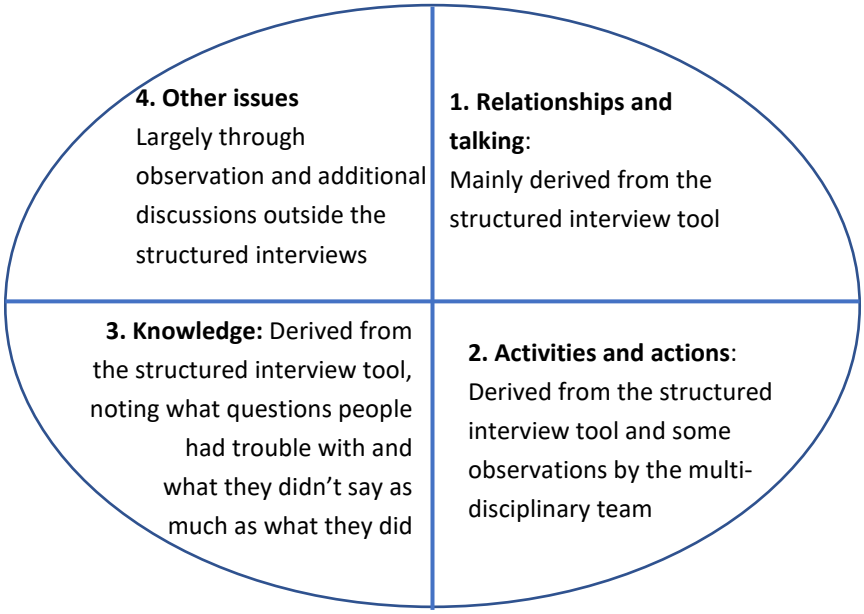


Figure 6: Template used for feedback and discussion of strengths and weaknesses

The template used for the presentation and discussion of results (Figure 6) is consistent with other assets-based planning processes, focusing on strengths in four quadrants: 1) relationships and talking, 2) activities and actions, 3) knowledge and 4) other issues identified through observation and discussion such as environmental issues. The same four quadrants were used to summarize weaknesses/problems.

It is recognised that subjective judgements play a large role in the development of these summary materials. Members of the team who were closely associated with the village were asked to consider the accuracy of the materials and, in addition, the villagers themselves commented on the accuracy of the summaries and added or delete things during the village planning meeting when asked their thoughts.

Box 4: Integrating quantitative and observational data in understanding about how people get sick from animals

The interview question that asked respondents if they or their family had ever been sick from animals, and if so, what happened, was considered the most difficult of all of the questions for people to answer. The answers were concentrated in a narrow range with bites and insect related diseases accounting for nearly 80% of all responses.

Bites	26.5%
Stings	7.1%
Malaria	21.4%
Dengue	18.5%
Scrub typhus	5.0%
Total	*78.5%*

Based on the difficulty that people had responding to this question, and the discussions about the question, our team members identified a lack of knowledge about how people can become sick from animals as a major issue in all villages. The teams' conclusions

were reinforced by the answers to the question about what people do to look after their health when they are near or touching animals, as shown below.

	Themei V1	**Themei V2**	**Sanamxay V1**	**Sanamxay V2**
Number	37	32	44	40
Clean/change body, clothes, equipment	0 (0%)	0 (0%)	8 (18.2%)	13 (32.5%)
Mask	2 (5.4%)	0 (0%)	11 (25%)	8 (20.0%)
Mosquito net	7 (18.9%)	8 (25%)	1 (2.3%)	0 (0%)
Protective clothes	2 (5.4%)	2 (6.3%)	2 (4.5%)	16 (40%)
Wary of/avoid animals	3 (8.1%)	0 (0%)	3 (6.8%)	0 (0%)
Wash hands	28 (75.7%)	13 (40.6%)	29 (65.9%)	22 (55%)
Other	3 (8.1%)	0 (0%)	1 (2.3%)	4 (10%)

The emphasis on handwashing and, in Sanamxay V2 village, clean clothes and equipment, indicates some awareness of the possibility of infection as a means of getting sick from animals.

Feasibility of the data analysis process for scaling

It was a high priority to develop a process for analysing, summarising and presenting the data that was simple and quick enough to be completed by local personnel in less than a day. In the final village, we tested the ability of district and village personnel to undertake this process with minimal input from national or international team members after having experienced the process one time already. The local team was able to complete this step effectively.

Photo 2: Preparing feedback summary

6.1.5 Feedback and planning with community group and leadership group

Following the data analysis and preparation of materials, a community feedback and planning process was conducted. The components of this process were:

- Summarise key strengths including knowledgeable people; actions that people do regularly in groups of people or pockets in the village where people are active in animal-human health; seasons and events when people think, talk and do more to care for their animals; knowledge strengths identified by experts
- Brainstorm other strengths such as the good aspects of water supply, shade and shelter, personal and community infrastructure, connections with sub-district or district services
- Present some of the distributional findings such as parts of the village where people are less engaged or have less knowledge or report greater problems or special issues for subgroups. Also consider the negative side of seasonal awareness such as threats associated with the hot season or rainy season
- Consider some of the knowledge and action gaps and risky behaviours
- Identify three or four issues that the village would like to improve
- Consider the strengths and problems for each issue
- Develop intervention ideas
- Allocate responsibilities and develop a structure for oversight
- Negotiate agreements for support/assistance with local agencies.

6.2 Commune/District level implementation

While the core intervention was carried out at the village level we also had discussions about how the intervention could be implemented efficiently with multiple villages at a larger scale. This was stimulated by the Deputy Leader of the Themei commune who participated closely in the process and said he would like to replicate it in all villages in the commune. While this is possible, it may be more efficient and beneficial to implement the process with a small sample of villages and then to bring together leaders and key people from all villages to discuss what has been learned and to plan actions at both the village and commune (district/sub-district level). In future applications of this intervention, we propose to treat it as a commune/district/sub-district level package rather than just a village level package.

7 Research locations

7.1 Participating villages and local partnerships

The development activities were undertaken in four villages: two within the Thmei Commune in Kratié Province in Cambodia and two within the Sanamsai District in Attapeu Province in Lao PDR. The development process, described in detail in Section 8, was not a simple replication in each village. Rather there was a cumulative development process with specific aims for the process in each village that built upon the developments that occurred in previous villages.

Village 1: Themei V1

The first village where we worked was a majority Khmer speaking language village with a substantial proportion also speaking the ethnic minority language Kuoy. It is located approximately one hour from Kratié city, half an hour from the main road and about 10 minutes from the village containing the main commune officers for Themei commune.

At the time of data collection, more than one third of the villagers were absent, because they were working in rice fields several kilometres away. The village had received considerable rainfall and large parts of the village were very muddy with a variety of animals moving through the muddy areas. The village appeared poorer than the other three villages with most households accessing water from three drilled wells that had been constructed by non-government organisations (NGOs). Few houses had their own water collection and storage systems or specific facilities for hand washing.

There were no immediately adjacent forest areas but there was a very low-lying damp area, shown near the bottom left corner of the map below (1), and a large lake beside the road out of the village, near the top right of the map (2). Most of the more affluent houses were located on the long road that goes from one side of the map to the other (3). Houses in the lower left and far left were of noticeably lower quality and tended to be in low-lying muddy areas (4).

The village had participated in education projects about animal care including helping at one home to build model chicken and duck enclosures that were provided by NGOs (5) (see Photo 4). Animal holdings tended to be small in both the size and number of animals. (For details see Table 6, page 39)

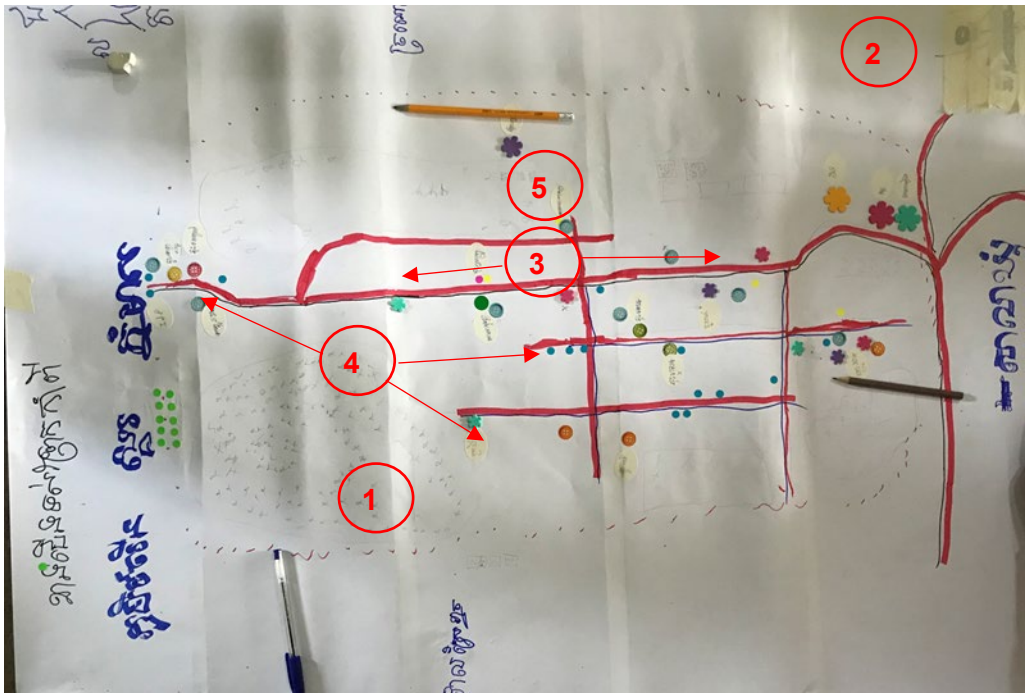


Photo 3: Map of Themei V1 village

Photo 4: Model chicken enclosure built by an NGO

Village 2: Themei V2

In the second village, Themei V2, most people spoke Khmer fluently, but a majority of the population spoke Pnong in their homes. The village is located approximately 90 to 100 minutes from Kratié city, an hour from the village containing the main commune officers for Themei commune.

There were many differences in the village features compared with the first village. In general, the many hoses had been recently improved. Many houses had a tiled roof and

large and small covered jars for capturing and storing rain water, and good bathing and washing stations. There was a single well that was used mainly as a supplement to other water sources. The village was located very close to a large forested area on the lower part of the map. There was also a small river running through the forest close to the village. People believed that there was a risk of dengue associated with living close to the forest, and most families had multiple experiences of dengue.

There were considerable variations in wealth in the villages with the poorest families located at the far left and right of the map. Families tended to have larger animal holdings than in the first village and, in particular, there were large numbers of cattle. The cattle were taken into the forests to graze each day.

One couple had a significant influence on both animal and human health activities in the village. The woman in this couple was both the village health volunteer for human health and the village vet. Her husband did most animal vaccinations in the village. This couple had accurate knowledge of every household and person in the village as well as the animal holdings of each household.

On talking to the village leader about committees and working groups in the village, it was revealed that the only village standing committee is the group that manages the school. Otherwise there was a committee that works on a forest maintenance project with an NGO, and they have had project specific committees with NGOs in the past.

Photo 5: Map of Themei V2 village, Cambodia

7.1.1 Partners and participating sites in Attapeu Province, Lao PDR

Two members of the Lao PDR team undertook the identification and recruitment of villages before the main research team joined them. They had been asked to identify one village where most people spoke Lao at home and one village where the majority spoke other languages at home. As discussed in Section 8, they were also informed that we

wanted to implement the process using district and village level personnel as much as possible with minimal input from provincial, national or international personnel. The Attapeu team visited several possible sites before deciding on Sanamsai District and the villages of Sanamxay V1 and Sanamxay V2 as meeting the specified requirements. After the initial training activities, the provincial, national and international personnel sought to leave the implementation to district and village personnel as much as possible with the District Vet and District Health Officer providing primary leadership.

Both villages were located alongside a river that forms the border between Lao PDR and Cambodia and have ethnic affiliations with communities in Cambodia. In the past there has been considerable interchange across the river but in recent times this has been reduced through more rigorous border protection activities on both sides.

The two villages are about 10 minutes apart and about an hour drive from Sanamsai township and two hours from Attapeu city.

Sanamsai District was one of the districts substantially affected by the dam collapse and subsequent flooding in 2018 and many people within the district have been relocated. The villages that participated in this project were not greatly affected but had absorbed some of the relocated families.

Village 3: Sanamxay V1

Sanamxay V1 village is a large village that extends along the river for over two kilometres and has 15 distinct subunits, each of which has a leader. Compared with the two villages in Themei Commune, this village seemed to have a strong organisational structure based around the headman and his deputy, section leaders, a woman's leadership group, and other standing committees. The village has a mixed primary/secondary school with approximately 200 students. The village has a range of communal facilities that are of a much higher standard than the villages in Thmei Commune and the housing was of generally high quality except at the westernmost end of the village. Most houses had their own water capture and storage facilities and many had a toilet. Most had some obvious animal enclosures.

The headman and other village leaders were very efficient in selecting people to participate in the interviews and arranging for them to come to set locations at specific times. The sense of a strong and accepted leadership structure was also seen in the number of people that said at interview that if they noticed any problems with animals that they would report the problems to either the village vet or the headman. In addition, the district vet clearly knew most of the families in the village and had established relationships with them.

In many ways, this village seemed to have the strongest social capital and most well-developed infrastructure of all the villages we worked in. The village has many shops and small restaurants and a number of medium size businesses related to handling agricultural products. The village's location alongside the river means that flooding tends to occur annually, at which time people move most of their animals to higher ground about five kilometres away.

Photo 6: Map of Sanamxay V1 village, Lao PDR

Village 4: Sanamxay V2

Sanamxay V2 is located about five kilometres from Sanamxay V1 village. It is a much smaller village with 81 households. It is also a highly ethnically diverse village with people from five ethnic groups, the largest of which is Sou. Most of these people spoke Sou at home though they also spoke Lao fluently. The village organisational structure was less extensive than in Sanamxay V1 and focused mainly on the headman and his deputy. There was also an informal women's leadership structure. The village has one main building where meetings are held and no shops or obvious commercial buildings. The village is quite heavily treed, and it backs onto a dense forest on the northern edge. Most houses have water capture and storage facilities and a place for washing but very few have their own toilet. Again, the district vet knew most of the families in the village.

Photo 7: Map of Sanamxay V2 village, Lao PDR

8 The Development Process

This project developed and refined a community engagement and decision-making process informed by the development and application of an interview-based survey tool. Both the tool and the process continued to progress, based on the experiences that were gained at each village and the deliberations of the local and national teams. This project is not a descriptive cross-sectional study and there was no point at which we decided that the tool or the community engagement process were fixed and standardised.

For this reason, when we present data from the project (see Sections 9 and 10), we do not consider it as data from survey results, but rather as a set of quantitative and qualitative indicators that have the potential to inform effective community engagement and decision-making within a simple and scalable model.

8.1 Development of tools and processes prior to undertaking fieldwork

Prior to the commencement of fieldwork, there was an extensive set of consultations in Phnom Penh and Vientiane with the people identified as members of the advisory group in each country. These consultations took a somewhat different form in each country.

In Cambodia, there were two brief joint meetings with representatives of the advisory group. The first focused on orientation to the project, the second on developing an initial draft of the interview tool and detailed planning of the fieldwork. Not all members of the advisory group were able to attend both meetings and the major group meetings were supplemented by individual meetings government officials in both countries. An additional briefing and planning session was held at the office for Animal Health, Ministry of Agriculture, Forestry and Fisheries.

In Lao PDR, the advisory group participated in a half-day workshop that incorporated briefing and fieldwork planning activities as well as consideration of the core interview questions. Key recommendations from the workshop included:

- Due to difficulties translating the concept health literacy, use the term '*Being wise and knowledgeable about health'*
- Many suggestions about how local communities should be approached and engaged including, a) engaging multiple community leaders including not just village officials but ethnic leaders, b) need a gentle approach, c) recognize that people want practical information on how to do things.

"We must not be bossy with leaders/villages, must be friendly, not order them about. They have had this approach before from Central authorities and it is not helpful/best approach. People in villages can be scared of people from Central Lao Authorities. Village leaders can hide people/children in the forest when vaccination/health initiatives enter the village if leaders are not comfortable with what is being proposed."

- Recognizing that often the problem is not lack of knowledge but of behaviour change
- Emphasizing local solutions of real threats that are economically and culturally viable and make sense for the household and community as a whole.

- First need to find out what information exists in the villages and how they want it imparted, examples provided were:
    - People themselves in a village made public signage for improving the environment – e.g., protecting a lake/pond from pollution.
    - In one village, the Monks provide education and particularly engage with elderly people who come to the Monastery to get the education – they then go back to the village to educate the young people.
- Need to focus on understanding people's experiences
- Need to engage people in a positive way about the benefits they get from their animals and that their animals wellbeing is linked to their own security
- Specific content recommendations including:
    - Three cleans: 1 Eating (safe/clean food), 2 Dinking (clean food), 3 Clean Environment.
    - Specific animal illnesses
    - Vaccination.
- After consulting with many villages need to bring the ideas together to inform larger consultation processes such as between ministries and peak organizations at the national level.

The draft version of the tool that was developed in these workshops underwent some initial field testing in July 2019 in Themei V1 and Themei V2 villages in Cambodia. The team tested using and explaining the tool to the villagers who had been identified to assist with the interviews and as a result many changes were made before the first formal field testing.

8.1.1 Human Research Ethics Approval

Human research ethics approval was obtained initially through Swinburne University of Technology and subsequently through the human research ethics committees at the University of Health Sciences in Lao PDR and through the Ministry of Health in Cambodia.

8.2 Continuing development throughout the fieldwork in four villages

8.2.1 Development of the interview tool and processes

By the time of commencement of fieldwork in the first village, we had a draft tool that had input from the advisory groups in Cambodia and Lao PDR and some preliminary testing with villages in Cambodia. In training and practicing with the village workers, further points where there was a lack of clarity or sub-optimal ordering of questions were identified and major revisions were undertaken after each of the first two days of data collection. Further refinements of the tool continued throughout the field work although from day 3 in the second village onwards many of the refinements were improving translations in both Cambodia and Lao PDR.

There was also a need to refine the interviewing process and related training. During the first day of data collection the interviews were taking much longer than expected, largely due to the interviewers talking a lot during the interview and giving long winded explanations. The improved clarity of the questions helped with this, but the interviewers were also instructed, and given additional practice, in conducting the interviews with an

absolute minimum of prompting. They were encouraged instead to spend some time talking at the end of the formal interview.

In Lao PDR, the alterations to the interview tool were minor and mostly related to translations. Two additional questions were added late in the interview: one related to reporting health events that people observe to relevant authorities and another open question inviting suggestions. The Lao PDR tool dropped the question on 'poor cards' as that program does not exist in Lao PDR. It also added goats to the list of animals that people were asked about. Otherwise, the final tool in Lao PDR was the same as used in Cambodia.

The interview tool was developed and refined through multiple cycles. There was extensive on-the-ground input from people at all levels from leading national animal and human epidemiologists through to village members who had the task of using the tool and including health promotion experts and key administrators at all levels.

8.2.2 Development of the rapid analysis, feedback and planning processes

Due to the time spent refining the tool during the fieldwork and slow initial progress conducting the interviews, there was insufficient time to complete the rapid data analysis and then prepare the materials. For this reason, the summary of strengths and weaknesses was in written rather than pictorial form (see Photo 8, p47). It was also clear that the team needed more training on the purpose and design of the rapid analysis and planning activities before undertaking the rapid data analysis. In all subsequent villages, this process was undertaken.

In both Cambodia and Lao PDR, the local teams (provincial and district or commune level), took substantial ownership of the data analysis, preparation of materials and the feedback and planning sessions in the second week compared to the first week. For example, in the second village in Cambodia, the Provincial Veterinarian, Director of Animal Health and the Provincial trainer of village veterinary workers took leadership in identifying strengths and problems and in presenting the results. For the second village in Lao PDR, the district personnel, with some support from provincial officers, led the whole process.

It was clear that experiencing the analysis-feedback-planning process at least once was very important for local teams to fully understand the process. However, once they had experienced it, they were able to take considerable leadership and complete most of the process with minimal outside input.

9 Results: Indicators of connected-and-live knowledge

This section presents quantitative and qualitative results from the interviews and considers the potential utility of the interview questions as indicators of connected-and-live knowledge, in particular to inform decision-making and planning within a village or community.

While the data displays stark differences between the participating communities, it is very important not to over interpret these differences at this stage and to remember the developmental processes described in Section 8. This study was undertaken as a developmental project and not as a systematic cross-sectional survey. It is also necessary to remember that while there are major differences between the villages in Cambodia and Lao PDR, these villages can in no way be taken as indicative of the general situation in each country. There is significant diversity in each country. What the differences do indicate is that the tool and the process can provide useful information and a sound planning process in communities with both relatively high and relatively low connected-and-live knowledge and social capital.

Finally, it is important to note that these indicators are treated as part of a holistic process of assessment that involves qualitative data, observations from the team and several rounds of community discussions (see example in Box 3, Section 6.1.4). The indicators are data elements that are interpreted and applied by the community members themselves in the first instance.

9.1 Testing of potential quantitative indicators of connected-and-live knowledge

9.1.1 Indicator data

Table 6 presents a large number of candidate indicators from the structured interview tool that have potential utility to inform community-based decision-making. They include indicators that refer to the situation and practices of individuals within the community and have the potential for disaggregation across different groups in the community (we refer to these as individual/household indicators), as well as indicators that indicate characteristics of the village as a whole and may reflect the knowledge physiology of the community as described in Section 5.1.3.

When we refer to individual/household indicators, we are acknowledging that not only did many respondents attempt to answer many questions on behalf of their household but in many cases more than one family member was present for the interview. The responses of the primary interviewee were often discussed with other family members.

We have grouped the indicators under the following headings:

- Participation in animal rearing
- Regular animal care activities
- Talking with other people about living with and caring for animals
- Living safely with animals.

A principal components factor analysis largely confirmed these four sets of indicators. However, the first two – participation in animal rearing and regular animal care activities – were very strongly related.

Table 6: Quantitative results of the interviews and candidate indicators

	Themei (Cambodia)			Sanamxay (Lao PDR)			Total
	Themei V1	Themei V2	Total	Sanamxay V1	Sanamxay V2	Total	
Number of respondents	37	32	69	44	40	84	153
Number of female respondents[4]	25	18	43	23	23	46	89
% of female respondents	68%	56%	62%	52%	58%	55%	58%
Participation in animal rearing							
Number reporting animal/raising sales as part of livelihood	9	8	17	24	37	61	78
% reporting animal/raising sales as part of livelihood	24.3%	25.0%	24.6%	54.5%	92.5%	72.6%	51.0%
Average number of animal species raised	3.2	3.2	3.2	5.0	4.0	4.6	3.9
Average number of animals they are raising	20.0	18.7	19.4	64.0	41.1	53.1	37.9
Number raising some large animals (cows, buffalo)	25	23	48	44	34	78	126
% raising some large animals (cows, buffalo)	67.6%	71.9%	69.6%	100.0%	85.0%	92.9%	82.4%
Average number of large animals (cows, buffalo)	3.3	4.9	4.1	20.5	8.3	14.6	9.9
Number raising some medium size animals (pigs, goats)	8	10	18	25	29	54	72
% raising some medium size animals (pigs, goats)	21.6%	31.3%	26.1%	56.8%	72.5%	64.3%	47.1%
Average number of medium size animals (pigs, goats)	0.5	0.4	0.5	1.7	2.9	2.3	1.5
Number raising some small animals (chickens, ducks)	32	26	58	43	39	82	140
% raising some small animals (chickens, ducks)	86.5%	81.3%	84.1%	97.7%	97.5%	97.6%	91.5%
Average number of small animals (chickens, ducks)	13.8	10.8	12.4	39.7	28.7	34.4	24.5
Regular animal care activities							
Number doing some animal care activities every day-week	34	28	62	44	40	84	146

[4] *N.B. In most interviews multiple members of the household of both genders were in attendance and often contributed.*

	Themei (Cambodia)			Sanamxay (Lao PDR)			Total
	Themei V1	Themei V2	Total	Sanamxay V1	Sanamxay V2	Total	
% doing some animal care activities every day-week	91.9%	87.5%	89.9%	100.0%	100.0%	100.0%	95.4%
Average number of animal care activities that are done every day-week	2.1	2.0	2.0	4.1	2.9	3.5	2.9
Number doing some animal care activities every 1-2 months	9	6	15	44	40	84	99
% doing some animal care activities every 1-2 months	24.3%	18.8%	21.7%	100.0%	100.0%	100.0%	64.7%
Average number of animal care activities that are done every 1-2 months	0.3	0.3	0.3	1.5	2.0	1.7	1.1
Number doing some animal care activities at special times	25	14	39	44	40	84	123
% doing some animal care activities at special times	67.6%	43.8%	56.5%	100.0%	100.0%	100.0%	80.4%
Average number of animal care activities that are done at special times	1.4	0.8	1.1	2.2	2.7	2.4	1.8
Talking with other people about living with and caring for animals							
Number who talk to at least one other person every day-week	13	14	27	43	36	79	106
% who talk to at least one other person every day-week	35.1%	43.8%	39.1%	97.7%	90.0%	94.0%	69.3%
Average number of people talked to every day-week	0.4	0.6	0.5	1.9	1.7	1.8	1.2
Number who talk to at least one other person every 1-2 months	5	6	11	44	37	81	92
% who talk to at least one other person every 1-2 months	13.5%	18.8%	15.9%	100.0%	92.5%	96.4%	60.1%
Average number of people talked to every 1-2 months	0.2	0.3	0.2	1.6	1.6	1.6	1.0
Number who talk to at least one other person at special times	8	5	13	42	36	78	91
% who talk to at least one other person at special times	21.6%	15.6%	18.8%	95.5%	90.0%	92.9%	59.5%
Average number of people talked to at special times	0.4	0.2	0.3	1.7	1.5	1.6	1.0
Number who talk to at least one other person with some regularity (day-week, 1-2 months, special times)	18	17	35	44	38	82	117
% who talk to at least one other person with some regularity (day-week, 1-2 months, special times)	48.6%	53.1%	50.7%	100.0%	95.0%	97.6%	76.5%

	Themei (Cambodia)			Sanamxay (Lao PDR)			Total
	Themei V1	Themei V2	Total	Sanamxay V1	Sanamxay V2	Total	
Knowledge of people with good knowledge of how to care for animals in or associated with the village							
Number who listed at least one person with good knowledge	19	20	39	44	40	84	123
% who listed at least one person with good knowledge	51.4%	62.5%	56.5%	100.0%	100.0%	100.0%	80.4%
Average number of people with good knowledge listed	0.8	1.2	1.0	2.3	1.7	2.0	1.5
Number who talk to at least one person with good knowledge every day-week	4	3	7	38	38	76	83
% who talk to at least one person with good knowledge every day-week	10.8%	9.4%	10.1%	86.4%	95.0%	90.5%	54.2%
Average number pf people with good knowledge talked to every day-week	0.1	0.1	0.1	0.8	0.7	0.7	0.4
Number who talk to at least one person with good knowledge every 1-2 months	4	7	11	38	34	72	83
% who talk to at least one person with good knowledge every 1-2 months	10.8%	21.9%	15.9%	86.4%	85.0%	85.7%	54.2%
Average number pf people with good knowledge talked to every 1-2 months	0.2	0.3	0.3	1.0	1.1	1.0	0.7
Number who talk to at least one person with good knowledge at special times	3	6	9	44	39	83	92
% who talk to at least one person with good knowledge at special times	8.1%	18.8%	13.0%	100.0%	97.5%	98.8%	60.1%
Average number pf people with good knowledge talked to at special times	0.1	0.2	0.1	1.1	1.3	1.2	0.7
Number who talk to at least one other person with some regularity (day-week, 1-2 months, special times)	7	10	17	44	40	84	101
% who talk to at least one other person with some regularity (day-week, 1-2 months, special times)	18.9%	31.3%	24.6%	100.0%	100.0%	100.0%	66.0%
Number who identified at least one other method for obtaining information	26	29	55	50	45	95	150
% who identified at least one other method for obtaining information	70.3%	90.6%	79.7%	113.6%	112.5%	113.1%	98.0%
Average number of other methods used to gain information	0.5	0.6	0.5	1.0	1.0	1.0	0.8
Living safely with animals							
Number reporting eating wild animals	26	31	57	43	40	83	140
% reporting ever eating wild animals	70.3%	96.9%	82.6%	97.7%	100.0%	98.8%	91.5%

	Themei (Cambodia)			Sanamxay (Lao PDR)			Total
	Themei V1	Themei V2	Total	Sanamxay V1	Sanamxay V2	Total	
Number reporting eating insects from the forest	6	21	27	43	39	82	109
% reporting ever eating insects from the forest	16.2%	65.6%	39.1%	97.7%	97.5%	97.6%	71.2%
Number reporting eating animals, fish or insects from the rice fields	35	32	67	44	40	84	151
% reporting ever eating animals, fish or insects from the rice fields	94.6%	100.0%	97.1%	100.0%	100.0%	100.0%	98.7%
Number reporting eating animals or insects from around their house	34	32	66	43	39	82	148
% reporting ever eating animals or insects from around their house	91.9%	100.0%	95.7%	97.7%	97.5%	97.6%	96.7%
Number that agree with the statement that people can get sick from animals	0	0	0	32	28	60	60
Number that agree with the statement that people can get sick from animals	0.0%	0.0%	0.0%	72.7%	70.0%	71.4%	39.2%
Number reporting that they ever got sick from animals	24	32	56	29	25	54	110
% reporting that they ever got sick from animals	64.9%	100.0%	81.2%	65.9%	62.5%	64.3%	71.9%
Number reporting things that they do to care for their health around animals	33	26	59	44	40	84	143
% reporting things that they do to care for their health around animals	89.2%	81.3%	85.5%	100.0%	100.0%	100.0%	93.5%
Average number of things people report to care for their health around animals	2.0	1.8	1.9	1.6	1.3	1.5	1.7
Number reporting that they eat or sell sick animals from their house	1	9	10	0	0	0	10
% reporting that they eat or sell sick animals from their house	2.7%	28.1%	14.5%	0.0%	0.0%	0.0%	6.5%
Number reporting that they eat or sell sick animals from forest or fields	2	3	5	0	0	0	5
% reporting that they eat or sell sick animals from forest or fields	5.4%	9.4%	7.2%	0.0%	0.0%	0.0%	3.3%
Number reporting that they eat or sell animals that have died from their house	25	18	43	0	1	1	44
% reporting that they eat or sell animals that have died from their house	67.6%	56.3%	62.3%	0.0%	2.5%	1.2%	28.8%
Number reporting that they eat or sell animals that have died from in the forest or fields	7	6	13	0	0	0	13
% reporting that they eat or sell animals that have died from in the forest or fields	18.9%	18.8%	18.8%	0.0%	0.0%	0.0%	8.5%

Table 6 provides evidence that most of the candidate indicators have value as diagnostic indicators of connected-and-live knowledge within villages. Not only is there high variance

across the four villages, there is a high level of concordance between indicators for each village in each of the major sections (see the section on principal components analysis below for more detail).

In addition to the construction of quantitative indicators, we also categorised and analysed the qualitative content of the responses to the questions, as illustrated in Table 7. Some of these findings are reported at different points in this report. In general, this analysis matched with the rapid analyses conducted by the field teams and confirmed their conclusions.

Table 7: Summary of reported actions to care for health near or touching animals

	Themei V1	Themei V2	Sanamxay V1	Sanamxay V2
Number	37	32	44	40
Clean/change body, clothes, equipment	0 (0%)	0 (0%)	8 (18.2%)	13 (32.5%)
Mask	2 (5.4%)	0 (0%)	11 (25%)	8 (20.0%)
Mosquito net	7 (18.9%)	8 (25%)	1 (2.3%)	0 (0%)
Protective clothes	2 (5.4%)	2 (6.3%)	2 (4.5%)	16 (40%)
Wary of/avoid animals	3 (8.1%)	0 (0%)	3 (6.8%)	0 (0%)
Wash hands	28 (75.7%)	13 (40.6%)	29 (65.9%)	22 (55%)
Other	3 (8.1%)	0 (0%)	1 (2.3%)	4 (10%)

9.1.2 Interpreting comparisons between villages in Themei, Cambodia and Sanamxay, Lao PDR

From the data in Table 6, there are major differences between the results for the two villages in Themei, Cambodia and the villages in Sanamxay, Lao PDR. From the start, animal raising is a more integral part of the livelihoods of people in Sanamxay with 54.5% and 92.5% indicating that it was an important component of their livelihood compared with 24.3% and 25% in the villages in Themei (Table 8). Similarly, the number of different types of animals raised and the actual numbers of animals owned was substantially higher in Sanamxay than in Themei (Table 9).

Table 8: Participation in animal raising across the four villages

	Thmei (Cambodia)			Sanamxay (Lao PDR)			Total
	Themei V1	Themei V2	Total	Sanamxay V1	Sanamxay V2	Total	
Number of respondents	37	32	69	44	40	84	153
Participation in animal rearing							
Number reporting animal/raising sales as part of livelihood	9	8	17	24	37	61	78
% reporting animal/raising sales as part of livelihood	24.3%	25.0%	24.6 %	54.5%	92.5%	72.6 %	51.0 %
Average number of animal species raised	3.2	3.2	3.2	5.0	4.0	4.6	3.9
Average number of animals they are raising	20.0	18.7	19.4	64.0	41.1	53.1	37.9

Table 9: Average number of animals of different types owned by responding families in the four villages

	Chicken	Duck	Pig	Cow	Buffalo	Dog	Cat	Goat
Cambodia								
Themei V1	12.9	10.9	2.3	4.9	3.3	2.4	1.2	
Themei V2	11.9	5.2	1.4	6.6	3.0	2.5	1.7	
Lao PDR								
Sanamxay V1	26.3	18.2	2.1	16.2	10.3	1.7	2.0	3.5
Sanamxay V2	26.5	6.6	2.3	10.0	5.3	1.9	1.5	18.0
Grand Total	**20.2**	**13.0**	**2.1**	**10.5**	**7.6**	**2.2**	**1.7**	**8.3**

While the majority of indicators presented in Table 6 showed great differences between the two villages in Cambodia and the two villages in Lao PDR, the sample is clearly too small to draw any conclusions about national differences. Furthermore, there were other factors indicated in the data and in the detailed village descriptions given in Section 7.1 that may contribute more to the differences. Firstly, as just noted, the villages in Lao PDR and Cambodia were very different in the extent of animal raising and the extent to which they recognized it as a key part of their livelihood. Secondly, the villages in Lao PDR had more strongly formalised social organisational structures. There were many more village committees and a hierarchy with leaders in sections reporting to the village head. There was also a specific women's leadership structure. This is reflected strongly in the data in that people in the Lao PDR villages were much more likely to report noticing sick or dead animals to the village head or another authority than were their counterparts in Cambodia.

9.1.3 Factor analysis of quantitative indicators

The researchers undertook Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA) of those quantitative indicators which can be applied to individuals rather than indicators at the whole of sample/village level. The suitability of the data for factor analysis was assessed via the Kaiser-Meyer-Olkin measure (KMO) and Bartlett's test of sphericity ($p<0.001$). The analysis was undertaken using SPSS 27 and AMOS. This analysis was undertaken for three reasons:

- To assess if there were coherent patterns in the indicators, as would be expected
- To explore options for reducing the number of questions
- To explore the possibility of constructing a village index of connected-and-live knowledge in the future after there is data available from more villages.

EFA was conducted to examine construct validity of the data, using Principal Axis Factors which does not require the data to meet multivariate normality assumptions and Promax rotation which allows for correlated factors. The initial 14 items were reduced to 10 items in three factors. Factor 1 (Actively talks about caring for animals) loaded on 4 items and explained 39% of the variance. Factor 2 (Actively caring for animals) loaded on 4 items and explained 8% of the variance. Factor 3 (Animal numbers and types) loaded on 2 items and explained 4% of the variance. Internal consistency was assessed using Cronbach's alpha and for Factors 1-3 was 0.8,0.6 and 0.1, respectively. The low consistency of Factor 3 is partly explained by it consisting of 2 items, but also indicates

that the items are measuring different concepts. Both items are important questions and will be retained as individual items in the analysis to follow.

The 3-factor structure was confirmed using CFA and the standardised factor loadings are displayed in the table below. The model had very good fit with CMIN/DF = 1.1, CFI = 0.99, GFI = 0.96, RMSEA = 0.02 and PCLOSE = 0.83. No errors within or between factors were correlated. All loadings were significant at the p = 0.001 level.

Table 10: Standardized factor loading for the three factors.

Item	Factor 1 Actively talks about caring for animals	Factor 2 Actively caring for animals	Factor 3† Not treated as a factor. Number of animals and types
Number of people talked to every 1-2 months	0.84		
Number of people talked to at specific times	0.71		
Number of people with good knowledge talked to every day-week	0.76		
Number pf people with good knowledge talked to every 1-2 months	0.69		
Number of animal care activities that are done every day-week		0.60	
Number of animal care activities that are done every 1-2 months		0.58	
Number of animal care activities that are done at special times		0.57	
Number of other methods used to gain information [about caring for animals]		0.71	
Number animal types			0.78
Number animals			0.74

†items will be retained as individual items in the analysis

As noted above, there was a high level of coherence between indicators in the areas of regular animal care activities, talking with other people about living with and caring for animals, and living safely with animals. The indicators for participation in animal raising related strongly to the indicators of regular animal care activities. The indicator based on the number of different types of animals that people raised had a strong relationship to the indicators on regular animal care activities and also to the indicators about people talking with others. Indeed, this seems to be a strong predictor of people's connected-and-live knowledge.

In terms of possible data reduction, there was one particularly interesting finding. Some members of the fieldwork teams had queried the value of the questions about activities undertaken every one or two months and people talked to every one or two months because there were many people who had no or few answers to these questions. However, as shown in Table 10, the two indicators derived from those questions have strong loadings on the corresponding factors, indicating that they are among the best indicators of that factor. This suggests that if people do have multiple activities that they do every one or two months and/or multiple people that they talk to every one or two months, it is in general a strong indicator of high levels of connected-and-live knowledge.

10 Action planning

This section describes the results of the action planning activity within each of the participating villages. As discussed in Section 8.2, the action planning activities evolved and were refined in each village. None-the-less, this component of the intervention involved some standard elements and products in each village. These were:

1. A community feedback meeting in which the results of the interviews and the teams' analysis were fed back to the community as a summary of strengths and potential weaknesses. The community was invited to comment on whether they agreed with the conclusions or would like to add or change anything.
2. A small group activity with the community in which they split up into groups of both genders and were asked to identify one to two things that the community could do to address the issues presented.
3. A subsequent meeting with community leaders, people identified as knowledgeable about animals, and/or other representatives who were nominated by their small groups, who included both genders, people with disabilities and people from poorer and more geographically isolated households. They selected one or two action areas identified by the community groups and developed an action plan.

10.1 Action planning for each village

10.1.1 Action planning in Themei V1 village

Themei V1 village was the first village and, as discussed in Section 7.1, due to local logistics, the strengths and weaknesses were presented as text rather than pictures (Photo 8). There was strong assent to the summary findings and some detailed discussion about who the people with good knowledge were in the village. The people attending the community meeting broke up into four small groups that identified the following concerns and action ideas:

Issues of concern

- Mosquito bites on cows (not putting mosquito nets on cows)
- It is difficult to treat animals because the animals are free range
- Sometimes other people do not follow
- Animals are vulnerable to dog bites
- Concerns about diseases going from chickens to humans
- Concerns about children being bitten by mosquitoes in the evening

Action ideas

- Sharing with each other about animal husbandry (feeds, water…) and care
- Share about health care (handwashing with soap)
- Raising pigs in pens (clean the pen 3 times a day)
- Making a bonfire to prevent mosquitos from biting cows and buffalos
- Giving feed to chickens, ducks, dogs and cats three times a day
- Wash hands with soap regularly before and after touching animals
- When a family member is sick, bring him/her to the hospital
- Use a mosquito net and prevent children from playing in the dark

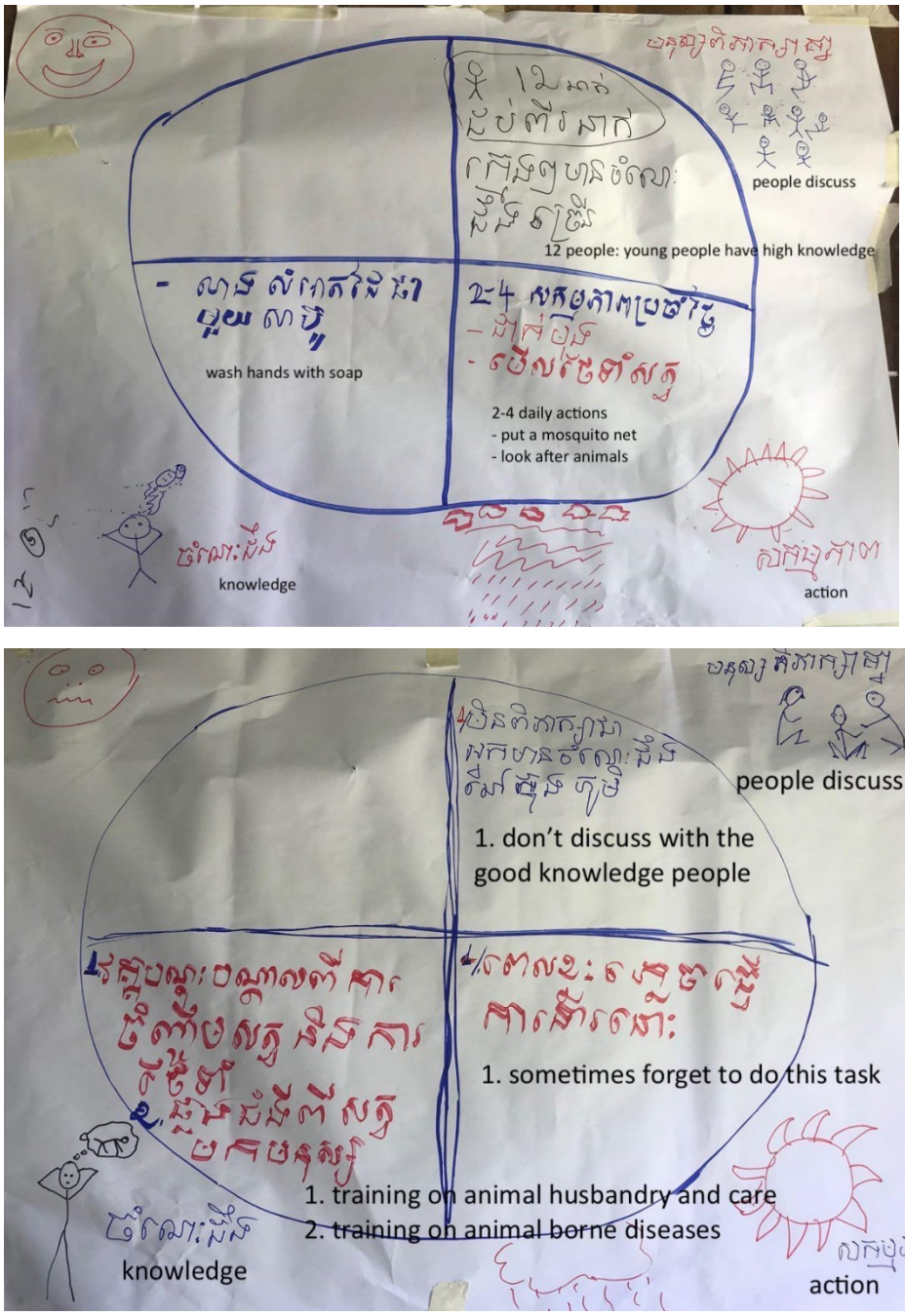


Photo 8: Strengths and weaknesses summary for Themei V1

Action decisions in Themei V1 village

Based on the input from the community small groups, the leadership group prioritised two issues for action. These were to increase handwashing, especially after contact with animals, and to better protect children from mosquito bites.

Action area 1: Increase hand washing	Action area 2: Protect children from mosquito bites
I. Problem: some people do not wash their hands II. Solutions • Explain importance of handwashing • Explain how to wash hands • Explain when to wash hands • Explain where to wash hands III. Objective: proper handwashing for good health IV. Action Plan: a. Staged education based on housing clusters b. Show model hand washing stations and teach people how to make them	I. Problem: preventing children from getting mosquito bites II. Solutions • Sleep under mosquito nets • Clean the forest surrounding the house, cover any puddles • Prevent children from playing in the dark areas III. Objective: destroy mosquito nests and mosquitoes in the village IV. Action Plan: a. Use preparation for festivals as a time to clear forests around the house b. To clear puddles and collect any items with still water c. Check and teach people how to wash and cover the water pots or water storage – twice a year in the dry season and six times in the rainy season

10.1.2 Action planning in Themei V2 village

Themei V2 village was the first village where we completed the rapid data analysis and action planning process as planned. The process was coloured by an outbreak of disease among pigs that occurred during the second day of data collection that led to the killing of all pigs in the village over a period of about 36 hours. In conjunction with concurrent concerns about swine fever, it is unsurprising that concerns about the health of pigs was dominant in the village's planning.

Photo 13 shows the summary of strengths and weaknesses as summarised by the team that did the rapid data analysis. As previously described, the upper right quadrant is about people and relationships, the lower right quadrant is about actions, the lower left quadrant is about knowledge, and the upper left quadrant is about other observations from the team.

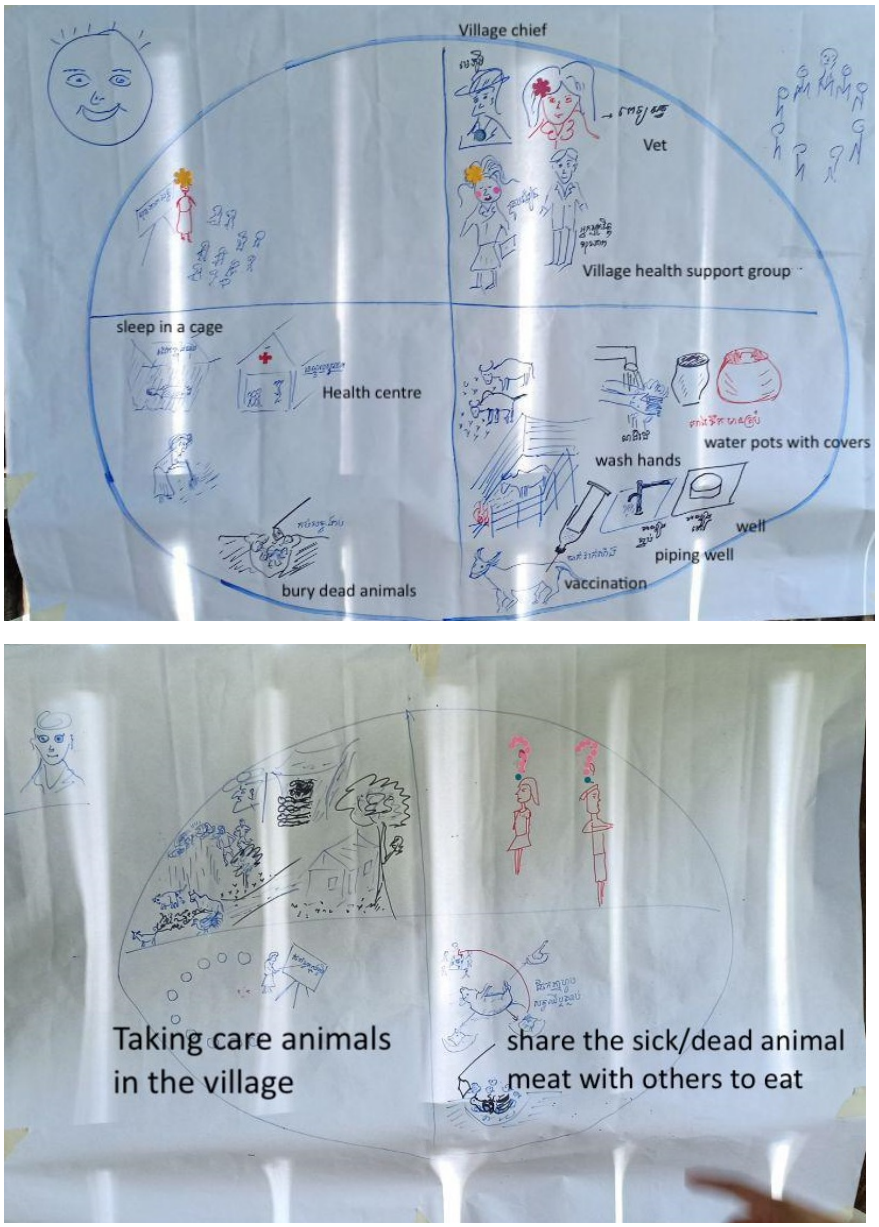


Photo 9: Strengths and weaknesses summary for Themei V2

The community meeting and the leaders planning meeting in Themei V2 village had three aspects that distinguished it from the process in other villages:

1. It was dominated by the recent need to slaughter all pigs in the village
2. It was a multi-generational meeting and children participated actively in the discussions
3. The feedback session was led largely by the provincial vet and had a substantial educational component.

Action decisions in Themei V2 village

Unsurprisingly, the main problems identified in the small group discussions were around sick and dying pigs with proposed actions including:

- Treat when sick
- Bury when dead
- Stop eating pigs who died from diseases

- Stop eating sick pigs
- Separate sick pigs from normal pigs
- Don't bring sick pigs' meat to the village

Following the community discussions, the leadership group developed the action plan shown in Table 11. They also decided that they wanted to set-up a One Health committee. However, the committee was not planning to meet for about three months due to the current absence of pigs in the village.

Table 11: Action plan produced by Themei V2 village to reduce deaths of pigs

No	Action	Time	Place	Focal point	Indicator
1	Raise pigs in pens • Reduce conflict • Prevent disease transmission • Easy to monitor and provide treatment • Easy to raise	Make a pen before raising animals May and June are good months to raise pigs	Under the house or not in the wind direction	owners VHSG	50% of family who raise pigs
2	Practice hygiene • Clean the pig pen, food trough, water trough • Bathing the pig • Use clean water (well water) • Cook the food waste well before giving to the pigs • Wash the trough before giving more food • Wash hands and feet after getting in contact with the animals	Every day	The animal area	Owners	50% of family who raise pigs
3	Meeting and promotion	Every quarter	community hall	Village chief VHSG	25 families participating (including youths and children)

Thus far, we have not had the opportunity to follow-up the actions taken in the two villages in Themei commune in Cambodia. Themei V2 village will not have opportunity to implement its proposed actions until people consider obtaining pigs again. However, there is a Cambodian PhD student who will be undertaking follow-up with these villages, validation of findings, and other activities related to expanding the intervention in Kratié province.

10.1.3 Action planning in Sanamxay V1 village

The team's rapid data analysis process took a long time for Sanamxay V1, which led to rather rushed preparation of the summary diagrams in Photo 14.

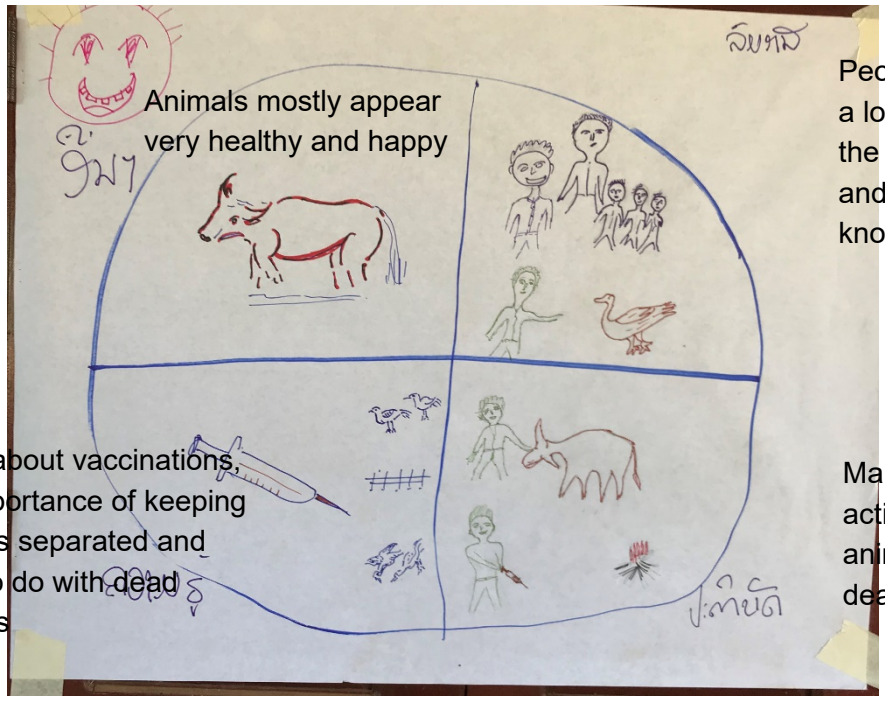


Photo 10: Strengths and weaknesses summary for Sanamxay V1

The community meeting strongly confirmed the main findings and identified additional concerns as listed in Table 12. The discussion in the community meeting was vigorous but not argumentative. Rather, people were loudly encouraging each other to do more. As previously discussed, leaders from Sanamxay V2 village were invited to observe and participate in these meetings to help them understand what would be happening next in their village.

Table 12: Recommendations from community small groups in Sanamxay V1

Group 1 1. Establish harmony within the village. 2. Keep environment clean and separate animals from their house. 3. If animals are sick, they must consult with family members and veterinarian for injection medicine to them. 4. Prevention of diseases by separating sick animals from normal animals. 4. Need academics to give advice about the coexistence of human and animals. 5. When touched sick animals, we have to wash our hands with soft and take a shower, take cloths off after we touch them. 6. When animals were sick, they should not buy and give medicine by themselves, we should consult with veterinarian.	**Group 2** **How to look after human's health** 1. Cleaning helps to look after people's health. 2. While sleeping must use mosquito net. 3. Cook the food well and drink boiled water. **How to look after animals' health** 1. Clean animal stall every day. 2. When animals are sick, we must bring them to veterinarian for treatment, and when they die, we must burn or bury them. **Advice** Request all type of animals' vaccine to stock in the village. Animals should be vaccinated 3-6 months. In addition, make sure that the area of each village are separated and need to be responsible to prevent the spread or outbreak of the diseases from sick animals.
Group 3 **Human's health** - Eat clean food and stay in clean house. Should not eat raw food. When people get sick, they should go to see doctor. **Animals' health** - Feed animals every day as usual and clean animal stall every week. - Let animals go out in the morning and tie them in the evening.	**Group 4** 1. Taking care of animals' health. If animals are sick, animal owner should consult with chief village or veterinarian. 2. Taking care of people's health. If the villagers get sick, they should consult with village health volunteers for treatment or they should go to the health center or hospital. Do not take medicine by themselves. 3. Treatment of animals. - When animals are sick, animal owner should separate them from other healthy animals for treatment of sick animals. - When dry season, we must prepare water and straw for animals. - When rain season, we bring animal to high ground for safety reason.

Action decisions in Sanamxay V1 village

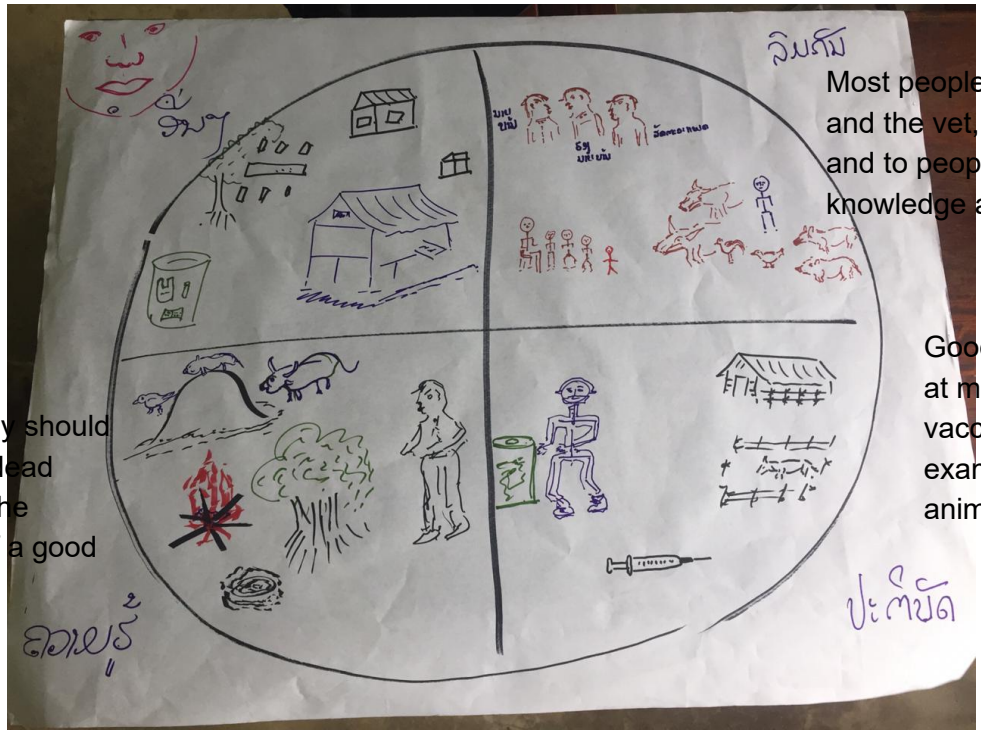
The leadership and planning group in Sanamxay V1 village chose to establish a One Health committee with most people who were in the leadership and planning group wanting to join that committee. The first priorities for the committee were to be:

1. General cleanliness around houses in the village and improving hand-washing facilities
2. Keeping animals better separated by building more and better enclosures
3. Increasing the extent and speed with which people contacted the vet.

The leadership group also identified that they wanted more education about living healthily with animals and what sicknesses they need to look out for.

10.1.4 Action planning in Sanamxay V2 village

In undertaking the rapid data analysis and preparation of feedback materials for Sanamxay V2 village, we attempted to have the process led by district level personnel as much as possible. The process was much faster and more streamlined than the analysis for Sanamxay V1 the previous week. And the local team also prepared the materials shown in Photo 15.



Most people talked to leaders and the vet, in their family and to people with good knowledge about animals

Good hand-washing facilities at most houses, people vaccinate large animals, examples of very good animal enclosures

Know that they should burn or bury dead animals and the importance of a good environment

Need to know signs and symptoms of sicknesses from animals and how to prevent them and care for them

Some people kill and eat forest animals and some throw dead animals in the river

Photo 11: Strengths and weaknesses summary for Sanamxay V2

The group meeting confirmed the points in the summary and added some points about needing to know more about sicknesses from animals. They split into three groups and the main issues and suggestions from the groups are listed in Table 13.

Table 13: Recommendations from community small groups in Sanamxay V2

Group 1	Group 2	Group 3
Main focus: Human health and animals' health **Human health** Look after family and villagers by 1. Cleaning inside and outside the house, the villager should cook and eat cleaned food. 2. If the villagers are sick, they should consult with village health volunteers for treatment or they should go to health center nearby or go to hospital. Do not take medicine by themselves. **Animals' health** 1. Monitoring of animals every day. 2. If the animals are sick, owner should consult with village veterinarian for treatment their animals. 3. During dry season, they prepared straw and water to feed them. 4. When flooding, they took animals to high ground and make animal stall.	**People** Take very good care for human health; cleaning environment has to be done. -Eating and living clean. -When people are sick, they should not take medicine by themselves. They should go to health center or hospital then they should take medicine that doctor provide/advice about how to take medicine. - Keep cleaning environment around house. **Animals** - Have to clean animal stall and tight them. - Making animal stall and bind big animals. - When animals are sick, owner animals should separate sick animals from other healthy animals, and provide treatment and vaccination for them in order to prevent other animals. -When we found death animals in the forest, we informed the chief of village and villagers to find owner of death animals. If could find animals owner, they must bury or burn them to make sure that people and animals are safe.	Focus on people's and animals' health 1. First problem: solving about toilet issue, which related to health of people and animals. 2. Second problem: keep environment clean, such as eating, leaving, and sleeping clean. 3. Solving problems of animals, such cleaning them, and vaccination every three to six months. 4. We consult with veterinarian and village chief about their animal's problems.

Action decisions in Sanamxay V2 village

As with Sanamxay V1, Sanamxay V2 village chose to establish a One Health committee. The first priorities for the committee were to be:

1. Improving general cleanliness around the village
2. Obtaining access to mass vaccinations for animals
3. Keeping animals better separated by building more and better enclosures.

The leadership group also identified that they wanted more training on animal raising and on how to protect themselves from getting sick from animals.

10.1.5 Follow-up with villages on Sanamxay district in Lao PDR

The senior district vet in Sanamxay district has confirmed that the new One Health committees in Sanamxay V1 and Sanamxay V2 villages have been meeting and that they have been starting with a focus on general cleanliness around their houses and building animal enclosures. Multiple houses have already been built and they are using new animal enclosures.

11 Discussion and considerations for the future

This section discusses what has been developed and learned through this project and what remains to be developed, learned, and further researched to meet the overall goal towards which this project is working…

> *To develop, implement and evaluate a transferable, community-based health literacy strategy that generates sustained awareness and capacity to respond to health security threats in diverse communities including minority language groups.*

…as well as the specific objectives of this small developmental project:

1. To develop networks of relationships in Cambodia and Lao PDR in order to:
    a. obtain input into how a community-based health literacy intervention, and the information obtained, could add value to the activities and programs currently being undertaken and how the proposed intervention can be optimised to maximise this added value.
    b. identify and engage partners for active participation / co-design.
2. To develop and field test a process and tools to engage local communities in:
    a. identifying the relevant health knowledge resources that already exist within the community as a whole and its relationships with other agencies (gaps will also be identified but the emphasis is on a strengths-based process)
    b. identifying the extent to which knowledge about One Health issues and protective strategies is live and connected in the community (i.e., rehearsed in regular conversations, linked to regular activities and events, embedded in relationships with community knowledge leaders and other resource agencies).
3. To develop a detailed proposal for a three-year program of work [to test the implementability, outcomes and scalability of the developed intervention]

11.1 Limitations and points requiring further refinement and development

As discussed in detail in Section 8, the project was an active, iterative co-creation process that continued throughout the work with each of the four villages. Each village provided feedback and made their own alterations to the process. For this reason, none of the components of the intervention described in Section 6 can be said to have achieved a final and stable form. As discussed in Section 9, there is still much that can be done to streamline and maximise the efficiency and utility of the interview tool, and as noted in Section 10, there is still a need to find ways to fit the planning activities of this process into activities and approaches that are comfortable and familiar to people in the villages.

Within the first village in each country there were severe time pressures that led to the use of a somewhat abbreviated process for the rapid data analysis and preparation of materials, which carried over to pressures of time in the community planning meetings. The process of analysing data and preparing materials was certainly most streamlined in the fourth village and was led by the district and provincial team members.

There were also limitations related to selection, engagement and recruitment. While two villages had a substantial proportion of people whose main language spoken at home was an ethnic minority language, most of these people still spoke the majority language fluently. Therefore, the aim of testing the applicability of the model in communities where few people speak the majority language remains to be met. There were also some questions about the representativeness of the families interviewed in Cambodia since the interviews were conducted at a time when many families had closed their houses and were working in rice fields several kilometres away. In these households there were often older men and women who were the caretakers of one or more family homes; the inclusion of the elderly males and females was valuable and informative.

As discussed in Section 9.1.2, there is a need for great care when comparing the interview results between the villages in Cambodia and Lao PDR. Clearly two villages is in no way representative of the situation in either country and it is more important to consider the specific contexts in each village (as described in Section 7.1) than to attempt generalisations or comparisons about the commune/district, province or country. In particular, the fact that animal rearing was a much lesser part of people's livelihoods in the Cambodian villages than in the Lao PDR villages, and that the animal rearing activities were generally on a smaller scale, is probably a more important consideration than the country where these villages are located.

There are two substantial limitations to this research that need to be addressed through future follow-up or research activities.

1. The first is to follow-up with the villages to see if the proposed actions were actually undertaken and if they have increased the level of sharing and communication about living with animals in a way that is healthy for humans, animals and the environment (connected-and-live knowledge). In Cambodia, Swinburne University of Technology and the Cambodian Project Lead (Dr Chhordaphea Chhea) will be supervising a Cambodian PhD candidate who will take up this task.

2. Another important research task is to validate the snapshot of connected-and-live knowledge that was obtained through this rapid, selective interview process with a more comprehensive data collection and analysis process that documents the levels and locations of knowledge and the pathways and strength of communication and knowledge sharing. A full social network analysis in one or more villages based on patterns of communication and collaboration around living with and caring for animals could meet this need and may also provide guidance to alternative sampling strategies for the type of rapid assessment taken in this project (e.g., respondent driven sampling)(50, 51). Validation of this type will also be considered by the PhD candidate in Cambodia.

Additionally, there is a need to modify the tool so that connection between the health of animals and humans is reinforced rather than making people concerned or fearful of animals.

11.2 Potential and planning for scaling

As noted in the early discussion of scaling and scalability (section 5.4), the models for scaling that are currently used in Australia, Africa and many other places focus on the

scalable unit and how this unit can be effectively enabled. A scalable unit is the level or type of jurisdiction or organisation that will implement the intervention at scale.

In this project, we identified that the lowest level jurisdiction that has both human and animal health personnel with regular, ongoing connections to villages, would be the scalable unit. This means communes in Cambodia and districts in Lao PDR. Production of a scalable model then requires that we focus on developing a packaged intervention that can be implemented by joint teams of human and animal health workers at the district level and the processes by which such teams can be identified, trained, equipped, funded and supported to implement that packaged intervention. At the commune or district level the process need not engage every village but could start with a sample of villages followed by an opportunity for sharing learnings and experiences and shared planning across all villages.

In this project, we confirmed that a district-led team was able to complete the intervention with minimal input from people in higher jurisdictions.

We consider that the critical first step in any future implementation of this intervention will be this development of a district/commune model along with a training and support package and resources.

11.3 Application to One Health

One Health has been defined as

> *…the collaborative efforts of multiple disciplines working locally, nationally, and globally, to attain optimal health for people, animals, and our environment.(38)*

Much has been achieved at the conceptual and policy level and through training activities and activities to systematize and coordinate surveillance activities in ways which make them more proactive and capable of contributing to epidemic preparedness as well as enabling strategies to recognize and address endemic diseases (42, 52). None-the-less it has been recognized that the achievements have been limited in terms of the disciplinary foci included, the full integration of environmental and social health and implementation strategies at very local levels (53, 54). In this respect it is noteworthy that the Global Health Security Agenda does not have an action package related to engaging communities. A major meeting of scientists in 2005 recognized that there are “inherent difficulties, in understanding the social–ecological contexts in which infectious diseases occur and of using transdisciplinary approaches to deal with them” (54). A review in 2019 found that there are still major limitations to the successful implementations of transdisciplinary approaches and to the integration of a social ecological perspective.(53)

The methods developed and tested in this project provide a means of engaging local communities in ways that:

a) Help us to understand the ways in which people in rural communities, including minority language communities think about the key aspects of One Health not as abstractions but as issues that they deal with in daily life conversations and activities,
b) To identify the limitations in these understandings

c) Provide a pathway and strategy for engaging local communities to use the best knowledge resources available both within the community itself and in its relationships with veterinary, human health and other relevant services to improve the way people think and act in regards to animal, human, environmental and social health.

It does this without requiring local community members to think in abstracted and complex conceptual forms that are unfamiliar to them.

In short, the tools and processes developed in this project provide a vehicle for one health initiatives to engage communities in ways that recognize and respond to the ways people really think and act and the real dynamics of knowledge in the community rather than projecting expectations onto the community.

11.4 Application to other health issues

All of the issues about community-based knowledge that were applied to the issue of living with and raising animals in a way that is healthy for humans, animals and the environment in this project, apply equally to all health issues that are impacted upon by the circumstances and activities of daily, community and family life. As we discussed in Section 5.1, there have been extensive calls to find ways to marry thinking and action about health literacy with thinking and action about the social determinants of health. This project is certainly one of very few studies that have attempted to develop *HL intervention[s] regarding communities as complex systems of actors sharing a common space and dynamic…* and that embrace and implement a *new definition of HL…drawing attention to the research gap in addressing the upstream SDH through HL actions*. (16)

The need to find new ways to integrate and apply excellent understandings and practice about how people's cognitive world in relation to health (health literacy) relates to the SDH has been recognised as critical for addressing the SDH and the UN SDGs. The model and tools developed in this project can be applied to a wide range of health promotion, prevention and disease management needs. There has been considerable interest in applying the processes developed in this project to other health security threats; dengue; waterborne diseases such as cholera; quality use of medicines and the prevention of anti-microbial resistance; maternal and child health; promoting vaccination uptake; as well as to addressing widespread problems in the prevention and management of non-communicable diseases (NCDs). For all these issues we need to better engage knowledge dynamics in families, peer groups and communities.

The interview tool would need to be adapted for other health issues but the same general format of questions and of indicators of connected-and-live knowledge could be applied.

12 Conclusions

This project achieved the objective of developing an interview-based tool that provides useful indicators of connected-and-live knowledge about living around and raising animals in ways that are healthy for humans, animals and the environment at the village level. These indicators, together with a qualitative deep consultative process, contribute to understanding how local communities think and act in relation to the animal, human, environmental and social health issues that constitute a One Health approach. There were clear differences between the four villages involved in the development process on most indicators. Furthermore, the information was viewed as relevant, accurate and useful by village leaders and community members.

The final version of the process (Sanamxay V2 Village, Lao PDR) was shown to be implementable by a team led by district level personnel once that personnel had experience with the process.

The overall planning process needs further evaluation. In particular, follow-up of the extent to which planned actions are actually implemented to assess the extent to which families and community members talk more, help each other more, and draw on the knowledge and experience of the most knowledgeable people in the community. Follow up is also needed to assess the extent to which a village establishes relationships with district, subdistrict or commune personnel to foster continued knowledge inputs and collaboration. Additionally, it is important to know how gender and gender roles play out in both countries that are socially and culturally conservative societies, especially around the gender of the team composition, selection of household interviewees and villagers' involvement in the planned activities.

At national and provincial levels, the project was highly valued due to both the opportunity for personal interaction and on-the-ground collaboration between animal and human health personnel, and as a potential practical means of implementing a novel One Health intervention. National leaders in each country have been discussing how this approach could be scaled and applied to other health issues.

At an international level, this project is one of the first efforts to formally integrate health literacy with addressing social determinants of health by shifting the focus of the concept of health literacy from an individual focus to a focus on relationships and dynamics in families and communities.

13 References

1. Eagles D, Siregar ES, Dung DH, Weaver J, Wong F, Daniels P. H5N1 highly pathogenic avian influenza in Southeast Asia. Rev Sci Tech. 2009;28(1):341-8.

2. Looi LM, Chua KB. Lessons from the Nipah virus outbreak in Malaysia. Malays J Pathol. 2007;29(2):63-7.

3. Khean Jin G, Kum Thong W, Kamarulzaman A, Tan PSK, Ksiazek TG, Zaki SR, et al. Fatal encephalitis due to Nipah virus among pig-farmers in Malaysia. Lancet. 1999;354(9186):1257-9.

4. National Immunization Technical Advisory Group. Overview of Vaccine Derived PolioVirus (VDPV) and planned response in Lao PDR 2015.

5. United Nations, Department of Global Communications. Learning from the past: UN draws lessons from Ebola, other crises to fight COVID-19 2020 [Available from: https://www.un.org/en/coronavirus/learning-past-un-draws-lessons-ebola-other-crises-fight-covid-19.

6. Heymann DL, Chen L, Takemi K, Fidler DP, Tappero JW, Thomas MJ, et al. Global health security: the wider lessons from the west African Ebola virus disease epidemic. Lancet. 2015;385(9980):1884-901.

7. Chan M. Learning from Ebola: readiness for outbreaks and emergencies. Bull World Health Organ. 2015;93(12):818-A.

8. Fairhead J. Understanding Social Resistance to the Ebola Response in the Forest Region of the Republic of Guinea: An Anthropological Perspective. African Studies Review. 2016;59(3):7-31.

9. World Health Organization. Risk communication and community engagement preparedness and readiness framework: Ebola response in the Democratic Republic of Congo in North Kivu. . Geneva; 2018. Report No.: Licence: CCBY-NC-SA3.0IGO.

10. Li A, Kasai T. The Asia Pacific Strategy for Emerging Diseases - a strategy for regional health security. Western Pac Surveill Response J. 2011;2(1):6-9.

11. Tang K, Zhao Y, Li B, Zhang S, Lee SH. Health inequity on access to services in the ethnic minority regions of Northeastern Myanmar: a cross-sectional study. BMJ open. 2017;7.

12. McKinn S, Linh DT, Foster K, McCaffery K. Communication Between Health Workers and Ethnic Minorities in Vietnam. Health Lit Res Pract. 2017;1(4):e163-e72.

13. Simonds SK. Health Education as Social Policy. Health Education Monographs. 1974;2(1_suppl):1-10.

14. Sorensen K, Van den Broucke S, Fullam J, Doyle G, Pelikan J, Slonska Z, et al. Health literacy and public health: a systematic review and integration of definitions and models. BMC Public Health. 2012;12:80.

15. Kickbusch IS. Health literacy: addressing the health and education divide. Health Promot Int. 2001;16(3):289-97.

16. Kendir C, Breton E. Health Literacy: From a Property of Individuals to One of Communities. Int J Environ Res Public Health. 2020;17(5).

17. Freedman DA, Bess KD, Tucker HA, Boyd DL, Tuchman AM, Wallston KA. Public health literacy defined. Am J Prev Med. 2009;36(5):446-51.

18. WHO Commission on Social Determinants of Health., World Health Organization. Closing the gap in a generation : health equity through action on the social determinants of health : Commission on Social Determinants of Health final report. Geneva,

Switzerland: World Health Organization, Commission on Social Determinants of Health; 2008. 246 p. p.

19. Zarcadoolas C, Pleasant A, Greer DS. Understanding health literacy: an expanded model. Health Promot Int. 2005;20(2):195-203.

20. Edwards M, Wood F, Davies M, Edwards A. 'Distributed health literacy': longitudinal qualitative analysis of the roles of health literacy mediators and social networks of people living with a long-term health condition. Health expectations : an international journal of public participation in health care and health policy. 2013;18(5):1180-93.

21. Sentell T, Zhang W, Davis J, Baker KK, Braun KL. The influence of community and individual health literacy on self-reported health status. J Gen Intern Med. 2014;29(2):298-304.

22. BeLue R. The role of family in non-communicable disease prevention in Sub-Saharan Africa. Global Health Promotion. 2017;24(3):71-4.

23. Sealy YM, Zarcadoolas C, Dresser M, Wedemeyer L, Short L, Silver L. Using public health detailing and a family-centered ecological approach to promote patient-provider-parent action for reducing childhood obesity. Childhood obesity. 2012;8(2):132-46.

24. Rapley T. . Distributed decision making: the anatomy of decisions-in-action. . Sociology of Health and Illness. 2008;30:429-44.

25. Malacova E, Li J, Blair E, Mattes E, de Klerk N, Stanley F. Neighbourhood socioeconomic status and maternal factors at birth as moderators of the association between birth characteristics and school attainment: a population study of children attending government schools in Western Australia. J Epidemiol Community Health. 2009;63(10):842-9.

26. Parashar S. Moving beyond the mother-child dyad: women's education, child immunization, and the importance of context in rural India. Social science & medicine. 2005;61(5):989-1000.

27. Pais SC, Rodrigues M, Menezes I. Community as locus for health formal and non-formal education: the significance of ecological and collaborative research for promoting health literacy. Frontiers in public health. 2014;2:283.

28. Abramson DB, Chalana M, Dixon M. Whole Community Resilience: An Asset-Based Approach to Enhancing Adaptive Capacity Before a Disruption. Journal of the American Planning Association. 2014;80(4):324-35.

29. Moore K, Smith BJ, Reilly K. Community understanding of the preventability of major health conditions as a measure of health literacy. The Australian journal of rural health. 2013;21(1):35-40.

30. Nissen ME. Knowledge management and global cultures: elucidation through an institutional knowledge-flow perspective. Knowledge & Process Management. 2007;14(3):211-25-25.

31. Ewen J. Asset based approaches - the new concept in health improvement. Perspectives in public health. 2012;132(4):150.

32. Tackling health inequalities through asset-based approaches, co-production and empowerment: ticking consultation boxes or meaningful engagement with diverse, disadvantaged communities? Journal of Poverty & Social Justice. 2016;24(2):127-41.

33. Burnet Institute - Laos. Community Event Based Surveillancs (CEBS): a qualitative evaluation of four pilot sites. Burnet Institute; 2009.

34. G Elsworth JG, K Stevens, P Robinson and C Rowe. Guidelines for the Development of Community Education, Awareness & Engagement Programs. Canberra: Australian Government: Attorney General's Department; 2009.

35. Elsworth G, Gilbert J, Rhodes A, Goodman H. Community safety programs for bushfire: What do they achieve, and how? The Australian Journal of Emergency Management. 2009;24(2):17-25.

36. de Wit L, Fenenga C, Giammarchi C, di Furia L, Hutter I, de Winter A, et al. Community-based initiatives improving critical health literacy: a systematic review and meta-synthesis of qualitative evidence. BMC Public Health. 2017;18(1):40.

37. Dugas LR, Forrester TE, Plange-Rhule J, Bovet P, Lambert EV, Durazo-Arvizu RA, et al. Cardiovascular risk status of Afro-origin populations across the spectrum of economic development: findings from the Modeling the Epidemiologic Transition Study. BMC Public Health. 2017;17(1):438.

38. American Veterinary Medical Association. One Health: A New Professional Imperative; One Health Initiative Task Force: Final Report. 2008.

39. Schurer JM, Mosites E, Li C, Meschke S, Rabinowitz P. Community-based surveillance of zoonotic parasites in a 'One Health' world: A systematic review. One Health. 2016;2:166-74.

40. Dickmann P, Kitua A, Apfel F, Lightfoot N. Kampala manifesto: Building community-based One Health approaches to disease surveillance and response-The Ebola Legacy-Lessons from a peer-led capacity-building initiative. PLoS Negl Trop Dis. 2018;12(4):e0006292.

41. Chandler C, Fairhead J, Kelly A, Leach M, Martineau F, Mokuwa E, et al. Ebola: limitations of correcting misinformation. Lancet. 2015;385(9975):1275-7.

42. Okello AL. Beyond Avian Influenza: Policy Considerations for the Implementation of a “One Health” Approach in Developing Countries University of Edinburgh; 2012.

43. Greenhalgh T, Jackson C, Shaw S, Janamian T. Achieving Research Impact Through Co-creation in Community-Based Health Services: Literature Review and Case Study. Milbank Q. 2016;94(2):392-429.

44. Davidson EM, Liu JJ, Bhopal R, White M, Johnson MR, Netto G, et al. Behavior change interventions to improve the health of racial and ethnic minority populations: a tool kit of adaptation approaches. Milbank Q. 2013;91(4):811-51.

45. World Health Organisation. Scaling up health service delivery: from pilot innovations to policies and programmes. Geneva: World Health Organisation; 2007.

46. Centre for Epidemiology and Evidence. Milat AJ NR, and King L. Increasing the scale of population health interventions: A guide. Sydney: NSW Ministry of Health, Population and Public Health Division.; 2014.

47. Milat AJ, Bauman A, Redman S. Narrative review of models and success factors for scaling up public health interventions. Implement Sci. 2015;10:113.

48. Milat AJ, Newson R, King L, Rissel C, Wolfenden L, Bauman A, et al. A guide to scaling up population health interventions. Public health research & practice. 2016;26(1).

49. Barker PM, Reid A, Schall MW. A framework for scaling up health interventions: lessons from large-scale improvement initiatives in Africa. Implement Sci. 2016;11(1):12.

50. Wejnert C. Social Network Analysis with Respondent-Driven Sampling Data: A Study of Racial Integration on Campus. Soc Networks. 2010;32(2):112-24.

51. Verdery AM, Entwisle B, Faust K, Rindfuss RR. Social and Spatial Networks: Kinship Distance and Dwelling Unit Proximity in Rural Thailand. Soc Networks. 2012;34(1):112-27.

52. Munyua PM, Njenga MK, Osoro EM, Onyango CO, Bitek AO, Mwatondo A, et al. Successes and challenges of the One Health approach in Kenya over the last decade. BMC Public Health. 2019;19(Suppl 3):465.

53. Assmuth T, Chen X, Degeling C, Haahtela T, Irvine KN, Keune H, et al. Integrative concepts and practices of health in transdisciplinary social ecology. Socio-Ecological Practice Research. 2019;2(1):71-90.

54. Parkes MW, Bienen L, Breilh J, Hsu L-N, McDonald M, Patz JA, et al. All Hands on Deck: Transdisciplinary Approaches to Emerging Infectious Disease. EcoHealth. 2005;2(4):258-72.

13.1 List of publications produced by project

Nil