Report on

Analytical survey on technical capacities of village animal health workers in Cambodia







Table of Contents

I. Introduction	5
II. Objectives	5
III. Materials and methods	6
III.1. Review data and consult with stakeholders	6
III.2. Survey on technical capacities of VAHWs	7
III.2.1. Size selection and sample size	7
III.2.2. Development of questionnaires and pre-test	8
III.2.3. Research team and training	8
III.2.4. Conduction of field work	9
III.2.5. Statistical analysis	9
III.3. Survey limitations	9
IV. Results and discussion	9
IV.1. Literature review	9
IV.1.1. Livestock production in Cambodia	9
IV.1.2. Livestock diseases and actions to control	10
IV.1.3. Establishment of VAHWs	11
IV.2. Survey of technical capacity of VAHWs	11
IV.2.1. General information	11
IV.2.1.1. Gender, education, income from serving animal health services and work	
experience of VAHWs	11
IV.2.1.2. Gender, education, income and work experiences of small-scale livestock	
farmers	12
IV.2.2. Reasons to motivate and institutions to select for VAHWs	13
IV.2.3. Animals keeping and its production system	14
IV.2.4. Training attended by VAHWs	16
IV.2.4.1 Number of courses attended and topics	16
IV.2.4.2. Institutions to provide courses and topics that learned best	18
IV.2.4.3. Refreshment training attended	18
IV.2.4.4. Understanding of the roles and responsibilities of VAHWs	19
IV.2.5. Animal health and production services provided	20
IV.2.5.1. Common problems faced by small-scale livestock farmers	20

IV.2.5.2. Type of service provided by VAHWs	20
IV.2.5.3. Type of vaccines used for animals	25
IV.2.5.4. Type of animals to receive services last month	28
IV.2.5.5. Provision of technical advises by VAHWs	30
IV.2.5.6. Farmers' practice after receiving advice	31
IV.2.5.7. VAHWs' s action for disease outbreak	32
IV.2.5.8. Self-rating of VAHWs on animal health and production services	32
IV.2.5.9. Technical constraint/challenge of VAHWs in providing services	33
IV.2.5.10. Sustainability of VAHWs	34
IV.2.6. Disease surveillance and reporting	35
IV.2.6.1. Disease reporting system and mechanism	35
IV.2.6.2. Sample collection	37
IV.2.6.3. VAHWs' contacts, communication and technical advises to small-scale	
livestock keepers	38
IV.2.6.4. Persons/institutions that farmers report disease incidents	40
IV.2.6.5. Information shared by VAHWs to livestock farmers	41
IV.2.7. Networking	42
IV.2.7.1. Institutions to support	42
IV.2.7.2. VAHWs' associations	42
IV.2.8. Effective animal health services and possible improvements	43
IV.2.8.1. Effective performance and requirement to deliver the service based on	
VAHWs' report	43
IV.2.8.2. Possible improvements	44
IV.2.9. SWOT analysis of VAHW	46
IV.2.9.1. Strengths	46
IV.2.9.2. Weaknesses	47
IV.2.9.3. Opportunities	47
IV.2.9.4. Threats	48
V. Conclusions and recommendations	48
VI. Acknowledgements	50
VII. References	50
Annex 1: List of stakeholders, VAHWs & small-scale livestock farmers	51

Annex 2. Guiding questions for stakeholder interview	.54
Annex 3. Questionnaire for village animal health workers	.54
Annex 4. Questionnaire for small-scale livestock farmers	.61

I. Introduction

Cambodia is one of the ASEAN member countries. While agriculture contributes a lower percentage to the country's GDP compared to industry, tourism, and services, it still plays a significant role in the rural economy and employs 37% of the Cambodian workforce (Eurocham 2020). Within the agriculture sector, livestock and poultry farming play a vital role for rural households in Cambodia. Farmers raise livestock, including cattle, pigs, and poultry, as a means of generating income and fulfilling their nutritional needs. Livestock also serve as an essential source of cash income through the sale of animals and their products. In addition, they remain important to the farming system by providing manure as fertilizer. Recent developments in livestock production have led to an increase in the number of commercial farms being established to meet the rising demand for meat and milk. Unfortunately, small-scale farms have gone bankrupt due to disease outbreaks, resulting in significant losses.

Disease and mortality are major constraints in livestock keeping in Cambodia, with common diseases and outbreaks of African Swine Fever since 2019 (FAO 2021) and bird flu since 2003 (WHO 2023) posing significant health threats to small-scale farmers. The government has made significant efforts to control these diseases, including implementing biosecurity measures, regulating animal movement, and banning pig imports from neighboring countries. Strategies to control and eradicate these diseases require strong biosecurity measures and trained personnel, particularly frontline veterinarians, to effectively tackle infections. Additionally, it is crucial for stakeholders to work together to provide support and interventions.

Village vets are community-based animal health workers who provide basic animal health care services to livestock farms in rural areas. In Cambodia, Village Animal Health Workers (VAHWs) are trained to support and advise on disease control and prevention. They have been officially recognized by law since 2001 and are required to register formally and undertake training with a curriculum approved by the General Directorate of Animal Health and Production (GDAHP), the government body responsible for animal health and production. The training focuses on technical assistance and animal health services such as vaccination and treatment. However, due to the limited duration of their training, they require additional technical updates through refreshing training (Sieng et al. 2021) from central and local governments, NGOs, and DPs to equip them with additional knowledge and expertise.

As a major link in the fight against, control, and prevention of livestock diseases, and with their role in working with local communities, *Agronomes et Vétérinaires sans Frontières (AVSF)* proposed an 'analytical survey on the technical capacities of VAHWs' to better understand the quality and capacity of VAHWs' activities carried out so far.

II. Objectives

- To assess the technical constraint, the sustainability, and the possibility of improvement for Village Animal Health Workers (VAHWs);
- To capture good practices, challenges, and constraints of the VAHWs and provide recommendations to improve their roles in terms of disease surveillance, reporting, and control; and
- To carry out a SWOT analysis of the status and situation of VAHWs in Cambodia.

III. Materials and methods

The survey consisted of two parts to collect information on: 1) desk review and stakeholder consultation and 2) survey on technical capacity of village animal health workers (VAHWs) for a duration of almost 6 months (March-September, 2023) with the following plan:

- March 2023 set-up research team, site selections, develop questionnaire & table of contents for approval
- April 2023 analytical study in-field conducted. Data entry, cleaning, and reporting
- May-September 2023 data analysis complete and final report submitted to AVSF

III.1. Review data and consult with stakeholders

We conducted a desk review of the Cambodia Animal Health and Production Law to strengthen disease control and prevention measures in livestock and enhance its production. In addition, we reviewed animal health and production law, sub-degree 26 and prakas 288, 289 and 368 for the functioning and selection of VAHWs, the surveillance and reporting template, and the training curriculum and manual for VAHWs' training courses.

We reviewed the 2020 Annual Report of the General Directorate for Animal Health and Production (GDAHP) of the Ministry of Agriculture, Forestry and Fisheries (MAFF), the government body responsible for animal production and health in Cambodia. The data was taken from the annexes of livestock production under small-scale farms, including the number of active and idle VAHWs, as well as vaccination data primarily performed by VAHWs on cattle and buffaloes.

The following stakeholders were interviewed to identify activities aimed at promoting livestock health and production in Cambodia (Figure 1 & 2; Annex 2 for guided questions):

- 1) Department of Animal Health and Veterinary Public Health and Department of Animal Production of GDAHP
- 2) National Committee for Sub-National Democratic (NCDD) focal point at GDAHP
- 3) Office of Animal Health and Production in Takeo and Svay Rieng
- 4) District Vets in Saang & Koh Thom in Kandal; Treang & Borei Chulsa in Takeo; and Svay Chrum in Svay Rieng
- 5) Village Chiefs and Commune Councils in selected districts and provinces
- 6) Agronomes et Vétérinaires sans Frontières (AVSF)
- 7) Emergency Centre for Transboundary Animal Diseases (ECTAD) of the Food and Agriculture Organization of the United Nations (FAO Cambodia)
- 8) Faculty of Veterinary Medicine of the Royal University of Agriculture (RUA)



Figure 1 - Meeting with OAHP in Takeo



Figure 2 - Meeting with OAHP in Svay Rieng

III.2. Survey on technical capacities of VAHWs III.2.1. Size selection and sample size

The survey focused on three provinces, namely Kandal, Takeo, and Svay Rieng, based on the following criteria: 1) Recent outbreak of diseases, particularly the African Swine Fever (ASF), to align with the objective of the 'Biosecurity of Pig Production Program-BIG' project, which aims to contribute to overall biosecurity strengthening in pig farming in Southeast Asia, with a specific focus on ASF; 2) provinces where AVSF works and intervenes; and 3) provinces with comparable small-scale livestock production. In each province, Saang & Koh Thom district in Kandal, Treang & Borei Chulsa district in Takeo, and Svay Chrum district in Svay Rieng were selected as they represented the provinces, as agreed during consultations with OAHPs. The descriptions of the provinces are as below:

- Kandal province is surrounded Phnom Penh Capital city. Main products of the province include palm oil, peanuts, rice, and pepper [Kandal (cambodiasite.nl)]. In addition to crop, livestock is also contributed to income of households. Kandal province comprises 11 districts, namely Kandal Stoeung, Kien Svay, Kscah Kandal, Koh Thom, Leuk Dek, Lvea Em, Mok Kampul, Ang Snoul, Pongnea Leu, Sa Ang, and Krong Takmao. The province was reported cases of ASF in 2019, affecting 224 animals in terms of mobility and 154 animals in terms of mortality (NAPHRI unpublished data). Kandal province has a total of 53,672 cattle and buffaloes, 8,476 pigs and 2,724,298 poultry under the smallscale farm production and 663 VAHWs to provide service in 2020 (GDAHP 2020).
- Takeo is one of 25 provinces in Cambodia where people are engaged in farming activities such as crop and livestock. The province consists of 1,119 villages, 100 communes, and 10 districts. In 2019, Takeo province experienced an outbreak of ASF with 122 reported cases of affected animals' mobility and 27 reported cases of mortality (NAPHRI unpublished data). As for livestock numbers, Takeo has a total of 371,054 cattle and buffaloes, 253,643 pigs, and 3,751,256 poultry. In addition, the province has 1,351 VAHWs with 68 are female.
- Svay Rieng locates in the southeast of Cambodia. Main farming in this province is crop and livestock production. Svay Rieng has 690 villages, 84 communes and 8 districts (Svay Rieng province Wikipedia). The province has reported cases of ASF in 2019 affecting 190 morbidity and 87 mortalities (NAPHRI unpublished data). Under smallscale production, the province consisted of

312,680 cattle and buffaloes, 84,634 pigs and 1,820,913 poultry. As of the total, there are 664 VAHWs in Svay Rieng, with 44 of them are female.

The selection of VAHWs participated in the survey was based on their willingness and availability. On the first day research team consulted with DVs to identify active & idle VAHWs. Upon receiving advise and consultation, there were mostly active VAHWs who could participate (65 active vs 10 idle VAHWs) providing total of 75 in Kandal, Takeo and Svay Rieng provinces (Table 1) (**Annex 2: list of stakeholders for consultations and interviewees**).

45 small-scale livestock farmers (15 in each province) were also selected for interview. The selection criteria for the farmers were: 1) being a permanent resident in the target district and keeping livestock throughout the year; 2) owning more than two cattle, three pigs, and 50 poultry; and having at least three years of experience in keeping livestock. The selection was based on a snowball sampling methodology. A first farmer, fitting the selectin criteria was identified by the DVs and, if willing, interviewed. She/he was then asked to propose a new farmer fitting the criteria as second interviewee and so on until the number of farmers interviewed in the district/ village was met.

Table 1. Sample size of survey on technical capacities of Village Animal Health Workers in Kandal,

 Takeo and Svay Rieng, Cambodia

No.	Provinces	Districts		Small-scale			
			Act	Active		2	livestock
			Sampled	Total	Sampled	Total	farmers
1	Takeo	Treang	20	111	1	43	10
2	1	Borei Chulsa	5	6	-	17	5
3	Svay Rieng	Svay Chrum	25	108	1	50	15
4	Kandal	Saang	9	11	2	na	10
5	7	Koh Thom	6	6	6	na	5
	Total		65	242	10	-	45

¹number of active & idle VAHWs estimated/provided by DVs

² completely stop providing animal healthcare services

III.2.2. Development of questionnaires and pre-test

Two sets of questionnaires were developed in English for the survey: one for VAHWs and another for small-scale livestock farms. The questionnaires were checked and approved by the AVSF technical team, then they were translated into Khmer and pre-tested in Kandal province before being used in the field mission. The VAHW questionnaire included the following key points: 1) general information about the respondents; 2) training received by the VAHWs; 3) services provided by the VAHWs; 4) surveillance and reporting; 4) networking; 5) effective animal health services and possible improvements (**see Annex 3**). On the other hand, the questionnaire for livestock farmers mainly focused on the performance and services provided by VAHWs (**Annex 4**).

III.2.3. Research team and training

Research team consisted of eight members including two senior researchers and six junior researchers. They were researchers from the Division of Research & Extension (DRE), RUA, and students at RUA, majoring in Animal Science & Veterinary Medicine. The junior researchers were trained on the tools and methodology, specifically on the questionnaires developed and approved, along with the pre-test to be conducted. This was done to ensure that they fully understood the research approach and methodology prior to conducting the actual data collection.

III.2.4. Conduction of field work

The research team was divided into two sub-teams, each consisting of four members (one team leader and three junior researchers/enumerators). Upon arrival in the selected provinces, each sub-team met with OAHPs, district vets, village chiefs, and VAHWs to receive their views and guidance on sample selection for the field work. On the first day of the field mission, enumerators worked in pairs to familiarize themselves with the questions before conducting individual interviews of 45-60 minutes. Team members met every afternoon, and the sub-team leader reviewed and checked the collected information in the questionnaires each day, providing clarifications or suggestions for any unclear questions or answers.

III.2.5. Statistical analysis

Data were coded and entered into an Excel spreadsheet. Descriptive statistics and compare means were used to analyze the data using the Statistical Package for Social Sciences (SPSS version 14.0). The results were presented as percentages, mean values by province, overall means, and standard errors (SE).

III.3. Survey limitations

- A lack of samples in Kandal was due to ineffective animal health care services, and some individuals had migrated to work outside of Cambodia or showed a lack of interest in participating. However, the team made effort to capture almost all of the samples that were targeted.
- Not all farmers were interviewed based on the initial criteria, especially for pig and poultry farms, as some have recently reduced the number of animals raised due to disease outbreaks and lower prices of live animals. Therefore, the research team focused on farms that have fewer animals than the minimum set in the criteria, which was at least two pigs and 20 poultry.

IV. Results and discussion

IV.1. Literature review IV.1.1. Livestock production in Cambodia

In Cambodia, livestock production is divided into small-scale and commercial farms based on the number of animals kept. This classification applies to cattle, pigs, and poultry. Small-scale chicken production is associated with the farms that raise mainly native breeds, while commercial farms keep exotic breeds of broilers and layers. Smallholder pig farms have fewer than 100 fattened pigs, whereas more than that numbers are considered commercial farms. Farms with less than 100 cattle are classified as smallholder farms.

Poultry keeping in Cambodia has increased double over a decade, while the population of large ruminants such as cattle and buffalo has decreased (GDAHP 2020; MAFF 2021). This decline can be attributed to the increasing mechanization in agriculture, which has reduced the need for draft animals to work in the crop fields. On the other hand, the number of pigs/swine increased from 2010-2017 (Table 2), due to the expansion of commercial farms aiming to meet the meat demand of the Cambodian population, especially for those who live in urban region.

 Table 2: Livestock population in Cambodia (x 1000 heads), 2010–2020

			,,,		
Year	Cattle	Buffalo	Pigs/swine	Poultry	

2010	3,484	702	2,057	20,834	
2011	3,607	693	2,099	22,036	
2012	3,376	657	2,208	23,098	
2013	3,431	619	2,437	27,473	
2014	3,060	542	2,736	31,584	
2015	2,917	506	2,776	34,519	
2016	2,920	524	2,971	35,734	
2017	2,972	509	3,074	36,245	
2018	2,920	501	2,740	38,100	
2019	2,770	447	2,180	40,400	
2020	2,848	424	2,576	48,062	

Source: adapted from MAFF (2021); GDAHP (2020)

IV.1.2. Livestock diseases and actions to control

Livestock disease outbreaks pose a major constraint on livestock productivity in Cambodia and have significant threats to human and animal health. The country has witnessed outbreaks of various diseases, including foot-and-mouth disease, lumpy skin disease, avian influenza, and African swine fever, which have caused tremendous damage to livestock farmers (Khmer Time 2022). Besides zoonotic diseases, there are also common diseases that occur annually, particularly in chickens, such as Newcastle disease.

Most disease outbreaks in Cambodia have occurred during the rainy season. However, outbreaks can also be observed in the early dry season. In 2012, FMD outbreaks were reported in 23 locations across 14 provinces of Cambodia, while in 2021, the outbreaks occurred in 8 provinces (Sorn San, 2021). Although FMD is not acute and fatal disease, but it carries a significant economic impact due to the costs associated with treatment and the recovery of affected animals.

The first outbreak of Al in Cambodia was declared in 2003, affecting 26 bird species (Desvaux, 2009). A recent outbreak of Al was reported in 2023, which infected two individuals with the H5N1 strain (Khmer Time 2023). ASF is also a significant threat to pig farmers. Outbreaks of ASF were reported in 2019, resulting in the death or culling of 3,575 pigs (FAO 2021). These disease outbreaks, both Al and ASF, have had significant impacts on the livestock farms in Cambodia and have posed risks to animal and public health.

Cambodia has made significant efforts to establish laws and regulations aimed at better controlling and preventing diseases and improving livestock productivity, while also ensuring food safety. The Animal Health and Production Law was enacted in 2016 with the objective of managing and developing the animal production and animal health sectors, as well as controlling, preventing, and eradicating the spread of animal diseases. Furthermore, the General Directorate of Animal Health and Production (GDAHP) under Ministry of Agriculture, Forestry, and Fisheries (MAFF) has developed Strategic Planning Framework for Livestock Development: 2016–2025 with the mission to promote good animal health and production practices through effective human resource development, research and extension, policy development and law enforcement, public-private partnerships and communication (GDAHP 2015).

To address disease control, the Cambodian government has implemented a vaccination program with biosecurity measures. In addition, personnel are employed at the community level to carry out disease control and surveillance and report disease outbreaks. This establishment aims to control and prevent diseases, particularly zoonoses, which require immediate response.

IV.1.3. Establishment of VAHWs

AVSF was a pioneer in establishing VAHWs in Cambodia, who have served as service providers for animal health in local communities since 1991. This organization provided training on technical skills related to animal health and production, including disease prevention and treatment for chickens, pigs, and cattle, as well as animal production techniques, epidemiology, and disease surveillance. As the sustainable approach, AVSF has been set up unofficial VAHWs' association and link them to DVs/OAHPs.

Recognizing the importance of local animal health workers, other institutions including AFSC, Heifer Cambodia, CelAgrid, LWS, Concern, PADEK have also adopted this model within their communities. Furthermore, National Legal Framework was developed in 2001 with the formulation of sub-decree 26 on the management and training of VAHWs to support of capacity building of basic animal health. In addition, MAFF has issued prakas 288, 289 and 368 for the selection and training of VAHWs, selection of trainers and ToT, and establishment of committee to provide certificate to operate animal production and health services.

As of 2020, out of a total of 14,384 villages in Cambodia, 11,747 VAHWs have been trained and recognized by GDAHP to provide services and advice on animal health and production to livestock farmers.

IV.2. Survey of technical capacity of VAHWs IV.2.1. General information

IV.2.1.1. Gender, education, income from serving animal health services and work experience of VAHWs

All VAHWs interviewed in Kandal, Takeo, and Svay Rieng provinces are males (Table 3a). In Cambodian context, males are more likely to work outside of the house, while females stay at home to take care of children and engage in the care, feeding, and management of livestock. In animal health work, the demand is based on the need to immediately treat livestock farms even at night, making males are the best fit for the job due to security reasons.

Age of respondents are similar in all interviewed provinces, with an average of 50.8 years old (ranged 34-69 years old). The average number of male household members is 2.51, while the average number of female household members is 2.85 and these are similar across the provinces that were interviewed.

On average, 60 percent of the interviewed VAHWs had completed secondary school, while 30.7 percent had completed high school. The remaining percentage (ranging from 1.3 percent to 3.5 percent) of VAHWs had no school, primary school, vocational/ college, or university or above. Highest percentage of VAHWs completing the secondary school and high school is found in Kandal, with 47.8 percent and 39.1 percent, respectively. Similarly, in Takeo, 50 percent of VAHWs had secondary school, while 34.6 percent completed high school. In Svay Rieng, about 80 percent of VAHWs received training in secondary school, but a few (3.8 percent) had no school.

Table 3a: Gender, educational level, income and experience of VAHWs in Kandal, Takeo and Svay Rieng provinces, Cambodia.

	Kandal	Takeo	Svay Rieng	Overall	
Gender, n (%)					
Male	23 (100)	26 (100)	26 (100)	75 (100)	

Female	-	-	-	-
Age, Ave.±SE	49.9±1.98	52.2±1.70	50.3±1.00	50.8±0.91
# household members, Ave.±SE				
# male members	2.13±0.20	2.77±0.19	2.58±0.19	2.51±0.11
# female members	2.91±0.35	2.81±0.30	2.85±0.24	2.85±0.17
Education level, n (%)				
Illiterate/no school	-	1 (3.80)	-	1 (1.30)
Primary school	2 (8.70)	2 (7.70)	-	4 (5.30)
Secondary school	11 (47.8)	13 (50.0)	21 (80.8)	45 (60.0)
High school	9 (39.1)	9 (34.6)	5 (19.2)	23 (30.7)
Vocational/college	1 (4.30)	-	-	1 (1.30)
University or above	-	1 (3.80)	-	1 (1.30)

IV.2.1.2. Gender, education, income and work experiences of small-scale livestock farmers

Unlike VAHWs, 44.4 percent of farmers interviewed in Kandal, Takeo and Svay Rieng are males and 55.6 percent are females (Table 3b). There is a higher percentage of females in Kandal and Takeo (60 percent each) of the farmers are females compared with 46.7 percent in Svay Rieng. This is perhaps females play a significant role in livestock farming activities in Kandal and Takeo than in Svay Rieng, reflecting by the local economic standpoints.

On average, the age of farmers is highest in Kandal (49.9 years old) and Takeo (51.1 years old) compared with Svay Rieng (44.3 years old). The surveyed farmers represent a stage in their farming system where they have reached their full potential to engage in activities such as rice cultivation and livestock keeping. Small-scale farmers typically rely on their family labor to work in their farming operations, unless they aim to expand their farms for increased income, which may require outside labor. On average, each interviewed farmer has 2.44 male members and 2.64 female members, respectively.

Sixty percent of farmers in Kandal had the education up to primary school, while in Takeo (46.7 percent), and Svay Rieng (40 percent) completed secondary school. Overall, a larger proportion of farmers (37.8 percent each) had education up to primary and secondary schools, while a smaller (11.1 percent, 11.1 percent, and 2.2 percent) had no formal schooling, completed high school, or obtained a university degree or higher.

A majority of farmers (51.1 percent) mentioned that shared income from livestock keeping contributes to less than 25 percent of total household income. A smaller percentage of farmers (26.7 percent) reported that shared income from livestock farming accounted for 25-50 percent of their household income, while 20 percent stated it accounted for 51-75 percent. A small portion of farmers (2.2 percent) either did not know or did not provide an answer regarding the contribution of livestock farming to their income. In rural communities, farmers engage in a variety of activities to support their families for daily living. These activities include farming, operating small grocery shops, working as motor taxi drivers, and even being employed in garment factories.

Cambodian rural communities gain experience in livestock keeping from a young age, as they live with their parents who are already engaged in this activity. Overall, number of year that farmers' experience in keeping livestock was almost 20 years (ranged 1-60 years). Of the 45 farmers interviewed, the average number of years since the farm establishment was about 14 years (ranged 1-60 years) across all provinces. In rural communities, it is common for a newly married couple to establish their own

households and start running their own farms. They receive the initial seed of livestock from their parents, which serves as a starting point for becoming livestock keepers.

	Kandal	Takeo	Svay Rieng	Overall
Gender, n (%)				
Male	6 (40.0)	6 (40.0)	8 (53.3)	20 (44.4)
Female	9 (60.0)	9 (60.0)	7 (46.7)	25 (55.6)
Age, Ave.±SE	49.9±3.40	51.1±3.53	44.3±2.52	48.4±1.85
# household members, Ave.±SE				
# male members	2.07±0.30	2.80±0.33	2.47±0.32	2.44±0.18
# female members	2.60±0.33	2.93±0.40	2.40±0.32	2.64±0.20
Education level, n (%)				
Illiterate/no school	1 (6.70)	3 (20.0)	1 (6.70)	5 (11.1)
Primary school	9 (60.0)	5 (33.3)	3 (20.0)	17 (37.8)
Secondary school	4 (26.7)	7 (46.7)	6 (40.0)	17 (37.8)
High school	1 (6.70)	-	4 (26.7)	5 (11.1)
Vocational/college	-	-	-	-
University or above	-	-	1 (6.70)	1 (2.20)
Share of animal keeping in total h	ousehold' s incor	ne, n (%)		
Under 25%	8 (53.3)	10 (66.7)	5 (33.3)	23 (51.1)
25-50%	2 (13.3)	2 (13.3)	8 (53.3)	12 (26.7)
51-75%	5 (33.3)	2 (13.3)	2 (13.3)	9 (20.0)
More than 75%	-	-	-	-
Do not know	-	1 (6.70)	-	1 (2.20)
# years of experience, Ave.±SE	17.3±3.48	20.9±4.28	18.1±2.94	18.7±2.05
# years of farm established,				
Ave.±SE	15.7±4.25	15.5±4.74	11.1±2.53	14.1±2.25

Table 3b: Gender, education level, income from livestock raising and experience of small-scale livestock farmers in Kandal, Takeo and Svay Rieng provinces, Cambodia.

IV.2.2. Reasons to motivate and institutions to select for VAHWs

• Based on VAHWs' report

A majority of VAHWs choose the profession due to their own interest and family income. About 48 percent of VAHWs in Kandal, 38.5 percent in Takeo and 30.8 percent in Svay Rieng choose to be a VAHWs for family income (Table 4). On the other hand, reason to be VAHWs by their own interest show a similar percentage across all study provinces that provided strong evidence with 95.7 percent, 100 percent and 92.3 percent in Kandal, Takeo and Svay Rieng, respectively. Other than the 2 main reasons described, VAHWs come into this profession by friend motivation displayed in Takeo (15.4 percent) and Svay Rieng (19.2 percent). Few (3.8 percent) of farmers in Svay Rieng reported that this is because of the family inheritance.

	Kandal, n (%)	Takeo, n (%)	Svay Rieng, n (%)	Overall, n (%)
Family income	11 (47.8)	10 (38.5)	8 (30.8)	29 (38.7)
Own interest	22 (95.7)	26 (100)	24 (92.3)	72 (96.0)
Family inheritance	-	-	1 (3.80)	1 (1.30)
Friend motivation	-	4 (15.4)	5 (19.2)	9 (12.0)

Majority of VAHWs have been selected/trained by District or Provincial Vets and NGOs. DVs/OAHPs, under the direction of GDAHP, selected following the criteria set in prakas No. 288 of MAFF with the agreement from villagers and local authorities and they were trained with a standard curriculum and manuals. These trained VAHWs were recognized by GDAHP to provide animal health services. However, VAHWs trained by some NGOs do not have enough capacity in animal healthcare due to limited budget and duration of the programme/project. These VAHWs are not recognized by GDAHP, unless they followed the standard curriculum and trained by the professional trainers (Stakeholders' report).

In Kandal, the highest percentage of VAHWs (60.9 percent) were selected by District or Provincial Vets, followed by 46.2 percent in Takeo and 30.8 percent in Svay Rieng (Table 5). Selection through NGOs accounted for the highest in Takeo (69.2 percent), followed by 50 percent in Svay Rieng and 21.7 percent in Kandal. Furthermore, VAHWs selected by the Village Chief/Commune Councils accounted for 30.4 percent in Kandal, 26.9 percent in Takeo, and 46.2 percent in Svay Rieng. About 15 percent in Takeo and 8 percent in Svay Rieng reported that GDAHP selected/trained them.

Table 5: Institutions to select to be VAHWs in Kandal, Takeo and Svay Rieng provinces, Camb	odia.
---	-------

	Kandal, n (%)	Takeo, n (%)	Svay Rieng, n (%)	Overall, n (%)
Village Chief/	7 (30.4)	7 (26.9)	12 (46.2)	26 (34.7)
Commune Councils				
District/Provincial	14 (60.9)	12 (46.2)	8 (30.8)	34 (45.4)
Vets				
GDAHP	-	4 (15.4)	2 (7.70)	6 (8.0)
NGOs	5 (21.7)	18 (69.2)	13 (50.0)	36 (48.0)

• Based on stakeholder's report

Government vets and NGO said that criteria are set along with Village Chiefs and Commune Councils to play a central role as stakeholders work together to coordinate and make suggestions. In addition to involving local authorities, NGOs asked community members to select VAHWs to work as focal points for animal health service providers.

Either VAHWs selected/trained by GDAHP or NGOs, criteria were set and the selection process involved villagers/community members and local authority. Thus, this provides consistency to the selection between the different actors/institutions to set up the VAHWs.

IV.2.3. Animals keeping and its production system

• Based on VAHWs' report

Out of 75 VAHWs surveyed, 69 of them kept livestock as an additional source of income. However, 4 out of 23 VAHWs in Kandal and 1 out of 25 VHAWs in Takeo do not raise livestock due to alternative income sources unrelated to livestock farming as vegetable cultivation plays a significant role in Kandal to supply Deum Kor market in Phnom Penh.

The main purpose of buffalo keeping is for draught power in land preparation and ploughing. Recently the number of this livestock species has been decreased due to farm mechanization. Only 2 VAHWs in Svay Rieng kept with 4 and 7 heads. Overall, each VAHW keeps cattle of 7.13 heads (ranged 1-28 heads). VAHWs in Takeo (8.33 heads) and Svay Rieng (7.31 heads) raise more cattle than in Kandal (4.25 heads) (Table 6). Cattle keeping requires available feed to supply, particularly in the dry season. Due to the available commercial feeds, VAHWs buy low body condition score (thin) or farmers that need immediate cash for fattening for a certain period of 3-4 months and sell out for meat for local

distribution, while fattening cattle in Svay Rieng sell to Vietnam. There is a high demand for red meat in Ho Chi Minh City to supply around 9 million population.

Moreover, each VAHW keeps on average of 12.2 heads (ranged 1-50 heads) of pigs. In Kandal, the village vet raise less than Takeo and Svay Rieng (8.72 heads in Kandal vs. 14.5 heads in Takeo and 12.6 heads in Svay Rieng). The lower numbers of pigs kept in Kandal due to the outbreak of African Swine Fever that occurred in the villages surveyed. Pigs still play a crucial role as family saving bank for rural communities.

Chickens can be seen lower in Svay Rieng (45.7 heads) compare to Kandal (89 heads) and Takeo (88.3 heads), while duck is highest in the 2 provinces of Takeo (64.8 heads) and Svay Rieng (62.9 heads) than in Kandal (29.9 heads).

Species	Kandal, Ave.+SE	Takeo, Ave.+SE	Svav Rieng, Ave.+SE	Overall, Ave.+SE
Cattle	4.25±1.17	8.06±1.98	7.50±1.18	7.13±0.92
Pigs	8.72±2.28	14.5±4.09	12.6±6.05	12.2±2.36
Chickens	89.0±18.9	88.3±30.6	45.7±8.65	74.6±12.1
Ducks	29.9±4.82	64.8±47.3	62.9±44.9	47.2±17.3

Table 6: Number of animals raised by VAHWs in Kandal, Takeo and Svay Rieng provinces, Cambodia.

• Based on farmers' report

Number of animals kept by farmers is less than VAHWs. Among 45 farmers in the provinces surveyed, each farm raised 4.8 (1-13) cattle, 11.8 (1-27) pigs and 37.4 (5-100) chickens (Table 7). Farmers in Takeo (5.71 heads and 46.7 heads) and Svay Rieng (5.85 heads and 39.1 heads) had highest number of cattle and chickens raised than in Kandal (3.54 heads and 27.5 heads). However, Kandal (13.5 heads) and Svay Rieng (12.5 heads) had highest number of pigs than in Takeo (9.62 heads), respectively. These difference between the provinces may lay in the diversification of the farms that choose one species of large animals for additional income as well as the capacity of family labor. However, chickens have been raised for subsistence with less care and management. Chickens are raised traditionally as additional income. Native breed is used widely for small-scale farmers due to their meat is tasty and the most preferable for consumers. Each kg of live native chicken is 16,000 riel (US\$ 4) compare to 6,000-8,000 riel (US\$ 1.5-2) for broiler.

Species	Kandal, Ave.±SE	Takeo, Ave.±SE	Svay Rieng, Ave.±SE	Overall, Ave.±SE
Cattle	3.54±0.53	5.71±1.67	5.85±1.33	4.80±0.65
Pigs	13.5±5.82	9.62±3.07	12.5±2.63	11.8±2.72
Chickens	27.5±4.66	46.7±8.94	39.1±8.61	37.4±4.46

There is high number of cattle, pigs and poultry raised by VAHWs than farmers (7 vs 4.8 cattle), (12.2 vs 11.8 pigs) and (74 vs 37 chickens). This result demonstrates the VAHWs are likely to consider livestock production is crucial as they can generate additional income along with income obtained from animal health care service. In addition, if best practice of care and management follow, the established farms can be a demonstration farm that stands as a learning center for farmers to learn and exchange knowledge and experience and later, they can adopt the good practice of animal keeping model.

• Based on VAHWs' report

Figure 3 shows the production system of VAHWs raise different species of livestock in the provinces surveyed. All of VAHWs interviewed used the confinement system for their pig production. With confinement system pigs perform better growth rate and easy to manage. However, traditional pig keeping is to allow them to roam around the house to find feed and this provokes a reputation among farmers as they destroy crop and disease infection. Other livestock species such as cattle, chickens and ducks use the semi-confinement system, allowing them to graze and scavenge during the day.

• Based on farmers' report

Similar to animal species raised by VAHWs, farmers use also confinement system for pig production, and semi-confinement for cattle & chickens the same as livestock/animals kept by VAHWs.

This result of improved production system may partly indicate the adoption of best practice that they have learned through the government intervention and development projects that has been carried out in those provinces for providing advice. However, the semi-scavenging system can reduce the investment cost of the production with less feed expense and labor.



Figure 3: Production system of livestock species by VAHWs in Kandal, Takeo and Svay Rieng provinces, Cambodia.

IV.2.4. Training attended by VAHWs

IV.2.4.1 Number of courses attended and topics

• Based on VAHWs' report

All VAHWs surveyed attended training courses before being a member of VAHWs. Nonetheless, number of courses attended before becoming VAHWs varied. Overall, we observed that more VAHWs attended at least 3 or more than 3 courses for their profession with 34.7 percent and 36 percent, while 12 percent and 17.3 percent gained 1 course and 2 courses, respectively (Table 8). Comparing active & idle VAHWs, it was found that active VAHWs attended more training courses than idle ones (4.75 courses attended by active VAHWs compared to 2.0 courses attended by idle VAHWs). The reason they attended less courses was due to provisional fund available and the courses were not mandatory.

In Takeo and Svay Rieng, more VAHWs attended more than 3 courses with 50 percent and 46.2 percent, but less in Kandal which accounts for only 8.7 percent. However, VAHWs attended 2 courses and 3 courses before becoming animal health service provider is the highest in Kandal (30.4 percent and 47.8 percent) compare to Takeo (15.4 percent and 30.8 percent) and Svay Rieng (7.7 percent and 26.9 percent), respectively. Fewer VAHWs (13 percent, 3.8 percent and 19.2 percent in Kandal, Takeo and Svay Rieng) attended only 1 training course.

 Table 8: Numbers of courses attended by VAHWs in Kandal, Takeo and Svay Rieng provinces, Cambodia.

	Kandal, n (%)	Takeo, n (%)	Svay Rieng, n (%)	Overall, n (%)
Only 1 course	3 (13.0)	1 (3.80)	5 (19.2)	9 (12.0)
Two courses	7 (30.4)	4 (15.4)	2 (7.70)	13 (17.3)
Three courses	11 (47.8)	8 (30.8)	7 (26.9)	26 (34.7)
More than 3 courses	2 (8.70)	13 (50.0)	12 (46.2)	27 (36.0)

Based on stakeholders' report

Government vet and NGO reported that GDAHP consistently provided the first training and followed up with refreshment training for VAHWs in consistent with standard curriculum. In contrast, some NGOs provided on-job training after the initial training, which may lead to VAHWs not reporting the additional training they received from NGOs.

To become a competent VAHWs, it is necessary to attend several training courses (basic VAHW curriculum and additional refresher/technical training courses) along with practical experiences. Having fewer courses participation can potentially impact their professional career as it leads to less effective service provision and results in idle VAHWs.

• Based on VAHWs' report

In a self-reporting, topics in the training course, the highest percentage is for treatments (100 percent), animal care, feeding, and management (94.7 percent), and vaccination (88 percent) than castration (62.7 percent) and disease surveillance and reporting (74.7 percent), respectively in the provinces surveyed (Table 9).

Kandal, n (%) Takeo, n (%) Svay Rieng, n (%) Overall, n (%) 23 (100) 26 (100) 26 (100) 75 (100) Treatments 20 (87.0) 23 (88.5) 23 (88.5) 66 (88.0) Vaccination 47 (62.7) Castration 15 (65.2) 18 (69.2) 14 (53.8) Animal care, 22 (95.7) 26 (100) 23 (88.5) 71 (94.7) feeding, and management Disease 17 (73.9) 24 (92.3) 15 (57.7) 56 (74.7) surveillance, and reporting

Table 9: Self-reporting topic of courses attended by VAHWs in Kandal, Takeo and Svay Rieng provinces, Cambodia (multiple choice).

The course topics that VAHWs excelled in the courses were related to the treatment of domestic animals, including cattle, pigs, and poultry, following the vaccinations of animals: cattle, pig & poultry; care, feeding, and management of animals along with animal anatomy and physiology (GDAHP's

training manual). VAHWs said that topics that they learnt best are treatments for domestic animals including cattle, pigs and poultry, following vaccinations and care, feeding & management of livestock.

IV.2.4.2. Institutions to provide courses and topics that learned best

• Based on VAHWs' report

We identified various actors engaged in providing capacity building training for VAHWs. Overall, 82.7 percent and 66.7 percent of VAHWs received training from NGOs and District & Provincial Vets, respectively, followed by a smaller percentage of VAHWs were trained by GDAHP (24 percent) and input suppliers (5.3 percent) (Table 10).

A higher percentage of VAHWs in Takeo (88.5 percent), Svay Rieng (88.5 percent), and Kandal (69.6 percent) attended courses organized by NGOs. Similarly, there was a higher response from VAHWs who attended courses conducted by DVs/OAHPs, with 60.9 percent, 69.2 percent, and 69.2 percent in Kandal, Takeo, and Svay Rieng. A smaller percentage of VAHWs (8.7 percent in Kandal and 7.7 percent in Svay Rieng) completed training organized by input suppliers, which focused on disseminating knowledge on the proper use of medicines and vaccines they sell. In Takeo, 26.9 percent of VAHWs attended the course arranged by GDAHP, while in Svay Rieng, it accounts for 42.3 percent.

• Based on stakeholders' report

Following the government vet report, development partner report, and NGO report, GDAHP through its OAHPs, is committed to build the capacity of local people that will then be the focal point for disease control and prevention, aiming to extend services to livestock farmers in their vicinity. While, some NGOs to some extend carry out training programs in collaboration with OAHPs and local authorities, with a strong emphasis on project-based initiatives.

Table 10: Institutions to provide training courses to VAHWs in Kandal, Takeo and Svay Rieng provinces,

 Cambodia (multiple choice).

	Kandal, n (%)	Takeo, n (%)	Svay Rieng, n (%)	Overall, n (%)
GDAHP	-	7 (26.9)	11 (42.3)	18 (24.0)
OAHPs/District Vets	14 (60.9)	18 (69.2)	18 (69.2)	50 (66.7)
NGOs	16 (69.6)	23 (88.5)	23 (88.5)	62 (82.7)
Input suppliers	2 (8.70)	-	2 (7.70)	4 (5.30)

VAHWs and stakeholders said that the topics they learnt in the training courses are aligned with the livestock treatment and vaccination program along with care & management that quite high demand for animal production and health, plus disease surveillance and reporting.

IV.2.4.3. Refreshment training attended

• Based on VAHWs' report

In a self-reporting, 30 VAHWs attended refreshment training in all surveyed provinces. Among them, Svay Rieng had the highest number of attendees (19), followed by Takeo (8) and Kandal (3).

Overall, 27, 27 and 21 VAHWs reported that the topics provided in the refreshment training are treatments, vaccination & livestock care, feeding & management, followed by 9 and 18 touched on castration & disease surveillance & reporting (Table 11). The refreshing training is designed to foster

discussions and find solutions to improve the services, focusing on the same topics covered during the initial training.

	Kandal, n (%)	Takeo, n (%)	Svay Rieng, n (%)	Overall, n (%)
Treatment	3 (100)	8 (100)	16 (84.2)	27 (90.0)
Vaccination	3 (100)	8 (100)	16 (84.2)	27 (90.0)
Castration	1 (33.3)	3 (37.5)	5 (26.3)	9 (30.0)
Animal care, feeding & management	1 (33.3)	8 (100)	12 (63.2)	21 (70.0)
Disease surveillance and reporting	3 (100)	8 (100)	7 (36.8)	18 (60.0)

Table 11: Self-reporting topic of refreshment training attended by VAHWs in Kandal, Takeo and Svay
 Rieng provinces, Cambodia (multiple choice).

• Based on stakeholders' report

Government vet and NGO indicated that upon completing the initial training, VAHWs begin providing services along with follow-up/refreshment training. However, VAHWs established by some NGOs that do not adopt the GDAHP curriculum undergo different training. They receive their initial training and serve as community animal health workers. Their primary focus is to provide services to community members, although they can also assist outsiders to some extent. These VAHWs receive on-the-job training through discussions and finding solutions while they are working.

Not all VAHWs (30 out of 75) attended refresher trainings with similar topic, plus constraint and solution in the performance of the service as reported by VAHWs. However, as reported by stakeholders, there are different cases for VAHWs set up by the GDAHP and some NGOs as only onjob training provided. To some extent, different modalities of VAHWs establishment could stand as a reason of VAHWs that are not able to attend the refresher training.

IV.2.4.4. Understanding of the roles and responsibilities of VAHWs

- MAFF Prakas No. 368 stipulated that GDAHP issues the license/certificate of service of animal health and production for: 1) consultation, treatment & vaccination, 2) animal husbandry in an industrial fashion, 3) provide services in animal health and production, 4) setting up the groups of animal raisers, animal drug-feed sellers, animal drugs-feed producer/manufacturers and animal traders, and 5) other necessary activities which must be discussed with the DAHP. Thus, VAHWs, who's tasks and responsibilities complied with the criteria that has been set in the Prakas above, are officially registered on their/project requested.
- Based on the survey outcomes, the majority of VAHWs (78.7 percent, 52 percent and 90.7 percent) state that their main tasks are to perform animal vaccination; providing advice on animal raising and treat sick animals. Only 12% of the VAHWs considers surveillance as one of their important tasks, while 34.7% of them do consider the reporting of diseases outbreaks as one of their main tasks (Table 12). This indicates a lack of understanding of VAHWs regarding their responsibility in disease surveillance and control in the 3 provinces surveyed. The survey showed that all the provinces had similar disease surveillance systems.

Table 12: Self-reporting of VAHWs on their important tasks in Kandal, Takeo and Svay Rieng provinces, Cambodia (multiple choice).

	Kandal, n (%)	Takeo, n (%)	Svay Rieng, n (%)	Overall, n (%)
Vaccination	20 (87.0)	19 (73.1)	20 (76.9)	59 (78.7)

Advice on animal raising	12 (52.2)	15 (57.7)	12 (46.2)	39 (52.0)
Treatment	19 (82.6)	25 (96.2)	24 (92.3)	68 (90.7)
Diseases	3 (13.0)	2 (7.7)	4 (15.4)	9 (12.0)
surveillance				
Report the disease outbreak	11 (47.8)	12 (46.2)	3 (11.5)	26 (34.7)
Castration	-	-	3 (11.53)	3 (4.0)
Deworm	-	-	1 (3.9)	1 (1.3)
Breeding	-	-	1 (3.9)	1 (1.3)

IV.2.5. Animal health and production services provided

IV.2.5.1. Common problems faced by small-scale livestock farmers

• Based on farmers' report

From self-reporting data through livestock farmers survey, 45 farmers (15 each in Kandal, Takeo and Svay Rieng) have reported their common problem in livestock. Overall, diseases are observed to be the biggest challenge for livestock farmers across all the study area (Table 13). The most prevalence problem faced by well over 60 percent of farmers is the annual/common diseases occur on their livestock. Farmers in Svay Rieng province shown the highest number (80 percent) in facing this challenge compare to 66.7 percent in Kandal and 60 percent in Takeo. New disease outbreak is another major challenge where about 57.8 percent of farmer reported. Majority is reported by farmers in Kandal province (86.7 percent) compare to 66.7 percent and only 20 percent in Svay Rieng province. Some other challenges such as lack of technical support and feed accounted about 20 percent each.

 Table 13: Common problems in small-scale livestock farmers in Kandal, Takeo and Svay Rieng provinces, Cambodia (multiple choice).

	Kandal, n (%)	Takeo, n (%)	Svay Rieng, n (%)	Overall, n (%)
Annual/common	10 (66.7)	9 (60.0)	12 (80.0)	31 (68.9)
diseases				
New disease outbreak	13 (86.7)	10 (66.7)	3 (20.0)	26 (57.8)
Lack of technical	5 (33.3)	4 (26.7)	-	9 (20.0)
support				
Lack of feed	1 (6.67)	4 (26.7)	4 (26.7)	9 (20.0)

IV.2.5.2. Type of service provided by VAHWs

• Based on VAHWs' report

Idle VAHWs did not provide service of animal health care and advising. Overall, most (86.2 percent, 93.8 percent, 73.8 percent, and72.3 percent) reported that they provide services including: treatment, vaccination, and give advice on animal health and care, feeding & management of livestock, followed by around 50 percent perform castration (Table 14). Treatment & vaccination are highest in Takeo and Svay Rieng than in Kandal indicating farmers use more of VAHWs services compare to Kandal as they seek assistance from the private vets that can potentially impact to the established VAHWs due to quality of services and low fees.

Table 14: Type of service provided by VAHWs to farmers based on their requests in Kandal, Takeo andSvay Rieng provinces, Cambodia (multiple choice).

	Kandal, n (%)	Takeo, n (%)	Svay Rieng, n (%)	Overall, n (%)
Treatment	11 (73.3)	23 (92.0)	22 (88.5)	56 (86.2)
Vaccination	15 (100)	24 (96.0)	22 (88.0)	61 (93.8)
Castration	6 (40.0)	16 (64.0)	12 (48.0)	34 (52.3)
Advice on animal				
health	14 (93.3)	18 (72.0)	16 (64.0)	48 (73.8)
Advice on animal care,				
feeding, and				
management	12 (80.0)	19 (76.0)	16 (64.0)	47 72.3)

Among survey provinces, services given to cattle, pig and poultry are similar, except poultry are less in Kandal (54.5 percent) and Svay Rieng (66.7 percent) than in Takeo (72.7 percent) in receiving vaccination (Table 15). However, this differs for buffaloes among the provinces due to their availabilities in their communities as number of buffaloes kept reduced recently. VAHWs perform more service on large animals such as cattle and pigs due to farmers provide a better care compare to smaller one. Large animals can cause tremendous loss for farmers due to their high value/cost.

Table 15: Type of animals that VAHWs provide services in Kandal, Takeo and Svay Rieng provinces, Cambodia.

	Kandal	Takeo	Svay Rieng	Overall	
Do you provide treatments, n (%)					
Yes	15 (100)	23 (92.0)	25 (100)	63 (96.9)	
No	-	2 (8.00)	-	2 (3.1)	
If yes, what type of animals do you	ı provide treatme	ents? (multiple	choice), n (%)		
Cattle	15 (100)	20 (87.0)	24 (96.0)	59 (93.7)	
Buffaloes	5 (33.3)	11 (47.8)	18 (72.0)	34 (54.0)	
Pigs	14 (93.3)	23 (100)	22 (88.0)	59 (93.7)	
Poultry	8 (53.3)	16 (69.6)	14 (56.0)	38 (60.3)	
Dogs	4 (26.7)	7 (30.4)	1 (4.0)	12 (19.0)	
Do you provide vaccination?, n (%))				
Yes	11 (73.3)	22 (88.0)	21 (84.0)	54 (83.1)	
No	4 (26.7)	3 (12.0)	4 (16.0)	11 (16.9)	
If yes, what type of animals do you	ı provide the vac	cinations? (mu	ltiple choice), n (%)	
Cattle	11 (100)	18 (81.8)	21 (100)	50 (92.6)	
Buffaloes	3 (27.3)	9 (40.9)	11 (52.4)	23 (42.6)	
Pigs	10 (90.0)	19 (86.4)	20 (95.2)	49 (90.7)	
Poultry	6 (54.5)	16 (72.7)	14 (66.7)	36 (66.7)	
Dogs	-	4 (18.2)	-	4 (7.4)	
Do you provide castration?, n (%)					
Yes	9 (60.0)	16 (64.0)	15 (60.0)	40 (61.5)	
No	6 (40.0)	9 (36.0)	10 (40.0)	25 (38.5)	
If yes, what type of animals do you	ı provide the cas	trations? (mult	iple choice), n (%)		
Cattle	4 (44.4)	3 (18.8)	1(6.7)	8 (20.0)	
Buffaloes	2 (22.2)	-	1 (6.7)	3 (7.5)	
Pigs	7 (77.8)	14 (87.5)	12 (80.0)	33 (82.5)	
Poultry	-	-	-	-	
Dogs	1 (11.1)	3 (18.8)	1 (6.7)	5 (12.5)	
Do you provide de-worming?, n (%)				
Yes	13 (86.7)	21 (84.0)	12 (48.0)	46 (70.8)	
No	2 (13.3)	4 (16.0)	13 (52.0)	19 (29.2)	
If yes, what type of animals do you provide de-worming? (multiple choice), n (%)					

Cattle	12 (92.3)	17 (81.0)	12 (100)	41 (89.1)					
Buffaloes	1(7.7)	6 (28.6)	7 (58.3)	14 (30.4)					
Pigs	11 (84.6)	21 (100)	10 (83.3)	42 (91.3)					
Poultry	7 (53.8)	15 (71.4)	9 (75.0)	31 (67.4)					
Dogs	4 (30.8)	3 (14.3)	1 (8.3)	8 (17.4)					
Do you provide advice?, n (%)									
Yes	11 (73.3)	21 (84.0)	18 (72.0)	50 (76.9)					
No	4 (26.7)	4 (16.0)-	7 (28.0)	15 (23.1)					
If yes, what type of animals do you provide advice? (multiple choice), n (%)									
Cattle	11 (100)	18 (85.7)	17 (94.4)	46 (92.0)					
Buffaloes	1 (9.1)	6 (28.6)	8 (44.4)	15 (30.0)					
Pigs	11 (100)	21 (100.0)	15 (83.3)	47 (94.0)					
Poultry	8 (72.7)	15 (71.4)	7 (38.9)	30 (60.0)					
Dogs	4 (36.4)	4 (19.0)	4 (22.2)	12 (24.0)					

Majority of VAHWs (96.9 percent, 83.1 percent, 70.8 percent and 76.9 percent) provide services to the animal farmers such as treatment, vaccination, de-worming and advise on care, and management of the animals. However, there are a lower percentage (61.5 percent) for castration.

• Based on farmers' feedback

VAHWs is the actor who, most present (53.3 percent) when facing a challenge, besides farm animal owner themselves (Table 16). VAHWs in Kandal (80 percent) and Takeo (73.3 percent) are observed to have the highest service provision by farmers' report compare to 46.7 percent in Svay Rieng. Other actors such as private vet (13.3 percent), input suppliers (17.8 percent), GDAHP (2.2 percent in Takeo), NGOs/Farmer organization (2.2 percent in Svay Rieng), DVs/OAHP (2.2 percent in Takeo) and Traditional healer (2.2 percent in Takeo) hold a smaller percent of support provision. Animal owners have knowledge and skill in animal treatment and vaccination as they trained via several projects conducted by GDAHP/OAHP and NGOs. Input suppliers can be a trainer to supply medicine and give advices on its use.

· · · · · · · · · · · · · · · · · · ·	Kandal, n (%)	Takeo, n (%)	Svay Rieng, n (%)	Overall, n (%)
Animal owner	5 (33.3)	9 (60)	11 (73.3)	25 (55.6)
GDAHP	-	1(6.7)	-	1 (2.2)
District Vet/OAHP	-	1(6.7)	-	1 (2.2)
VAHWs	12 (80.0)	11 (73.3)	7 (46.7)	30 (66.7)
Private vet	1 (6.7)	3 (20.0)	2 (13.3)	6 (13.3)
Traditional Healer	-	1(6.7)	-	1 (2.2)
Input supplier	4 (26.7)	2 (13.3)	2 (13.3)	8 (17.8)
NGOs/Farmer	-	-	1(6.7)	1 (2.2)
Organization (FO)				

Table 16: Actors who help livestock farmer deal with problem in Kandal, Takeo and Svay Rieng provinces, Cambodia (multiple choice).

Similarly, VAHWs made up the highest proportion of health service provider to farmer (66.7 percent). This high percentage reported to be due to the close proximity or small range of their service locations which is a leverage to their timely services. On the other hand, animal owner takes a big part in providing health service to their animal (42.2 percent) (Table 17). In Cambodia, especially for small-scale farm, it is common for animal owner to take big part in taking care of activities on animal management to health related activities such as treatment, vaccination etc. Input supplier and private vets together made up of about 30 percent of health service provision to farmers. Input supplier and

private vet usually are located in close proximity to farmers. Input supplier could be viewed as health service provider as conducting their usual occupation as providing information on diseases and how to use medication.

Table 17: Animals health service	providers for	livestock fa	armers in	Kandal,	Takeo	and	Svay	Rieng
provinces, Cambodia (multiple ch	oice).							

	Kandal, n (%)	Takeo, n (%)	Svay Rieng, n (%)	Overall, n (%)
Animal owner	3 (20)	5 (33.3)	11 (73.3)	19 (42.2)
District Vet/OAHP	-	1(6.7)	-	1 (2.2)
VAHWs	12 (80.0)	11 (73.3)	7 (46.7)	30 (66.7)
Private vet	1(6.7)	4 (26.7)	2 (13.3)	7 (15.6)
Input supplier	4 (26.7)	3 (20.0)	1 (6.7)	8 (17.8)

When asked to rank the frequency of VAHWs showing up when contacted, well above 60 percent of farmers responded to be "all the time". The highest figure shows in Takeo province (91.7) percent. In Svay Rieng province, answer to be "all the time" and "most of the time" in the same rate (42.9 percent). About 7 percent choose "sometime". The lower rate of turning-up could be due to high number of villages in their service provision or long proximity between the service providers and farmers. Other 16.7 percent cannot track the frequency of VAHWs coming to their service (Table 18).

 Table 18: VAHWs visit upon request from farmers in Kandal, Takeo and Svay Rieng provinces,

 Cambodia (multiple choice).

	Kandal, n (%)	Takeo, n (%)	Svay Rieng, n (%)	Overall, n (%)
All the time	11 (91.7)	5 (45.5)	3 (42.9)	19 (63.3)
Most of the time	-	1 (9.1)	3 (42.9)	4 (13.3)
Sometimes	-	1 (9.1)	1 (14.3)	2 (6.7)
Other (no answer)	1 (8.3)	4 (36.4)	-	5 (16.7)

From farmers' report, VAHWs usually take a maximum of 12 hours (80 percent) to provide their service (Table 19). Rather a small percentage (3.3 percent) accounted to be about 2 to 3 days once contacted. The rest of 16.7 percent cannot take note of how long once contacted for them to receive the service. There is the lowest response in Takeo (54.5 percent) compare to Kandal (91.7 percent) and Svay Rieng (100 percent). This may reflect VAHWs occupy with other farmers who request them for services that could not provide timely services.

 Table 19: Response time of VAHWs after receiving a request for a visit in Kandal, Takeo and Svay

 Rieng, Cambodia

	Kandal, n (%)	Takeo, n (%)	Svay Rieng, n (%)	Overall, n (%)
12 hours	11 (91.7)	6 (54.5)	7 (100)	24 (80.0)
2 - 3 days	-	1 (9.1)	-	1 (3.3)
Other	1 (8.3)	4 (36.4)	-	5 (16.7)

There are high responses (about 50-90 percent) of VAHWs in serving communities including treatment, vaccination, advice and castration in the surveyed provinces. These reports are similar to farmers answer that VAHWs present in solving challenges, provide health service and perform on time for services, which demonstrate that the VAHWs are the primary actor responsible for providing services to livestock farmers in animal healthcare in the villages.

Followings are the farmers' report of service provided by 30 out 45 VAHWs across the provinces surveyed (Table 20):

- a) 13 VAHWs tell the name of disease they treat
- b) 8 VAHWs tell the cause of the diseases are transmitted
- c) 9 VAHWs give information on diseases prevention
- d) 15 VAHWs examine animals prior to treatments
- e) 11 VAHWs conduct follow up visit upon the treatments
- f) 2 VAHWs in Svay Rieng have treatment books to record
- g) 2 VAHWs in Svay Rieng write clinical notes in treatment books

Table 20: Farmers' rep	port on VAHWs' service in	Kandal, Takeo and S	Svay Rieng provinces	, Cambodia.
------------------------	---------------------------	---------------------	----------------------	-------------

	Kandal	Takeo	Svay Rieng	Overall					
Do VAHWs tell you the name of the disease they treat?									
Yes	2 (16.7)	4 (36.4)	7 (100)	13 (43.3)					
No	10 (83.3)	7 (63.6)	-	17 (56.7)					
Do the VAHWs tell y	ou the cause of the	disease?							
Yes		2 (18.2)	6 (85.7)	8 (26.7)					
No	12 (100)	9 (81.8)	1 (14.3)	22 (73.3)					
Do the VAHWs tell y	ou how the disease	is transmitted							
Yes	1 (8.3)	2 (18.2)	6 (85.7)	9 (30.0)					
No	11 (91.7)	9 (81.8)	1 (14.3)	21 (70.0)					
Do VAHWs give you	information on prev	vention?							
Yes	1 (8.3)	4 (36.4)	5 (71.4)	10 (33.3)					
No	11 (91.7)	7 (63.6)	2 (28.6)	20 (66.7)					
Do VAHWs examine	the animals before	treatment?							
Yes	7 (58.3)	3 (27.3)	5 (71.4)	15 (50.0)					
No	5 (41.7)	8 (72.7)	2 (28.6)	15 (50.0)					
Do VAHWs conduct	follow up visits afte	r treatment?							
Yes	2 (16.7)	4 (36.4)	5 (71.4)	11 (36.7)					
No	10 (83.3)	7 (63.6)	2 (28.6)	19 (63.3)					
Do VAHWs have treatment books?									
Yes	-	-	2 (28.6)	2 (6.6)					
No	12 (100)	11 (100)	5 (71.4)	28 (93.3)					
Do VAHWs write any clinical notes in the treatment book?									
Yes	-	-	2 (28.6)	2 (6.6)					
No	12 (100)	11 (100)	5 (71.4)	28 (93.3)					

Generally, farmers express their satisfaction as in "very satisfied" and "satisfied" (6.7 percent and 56.7 percent, respectively in regard to cost of treatment by VAHWs. 16.7 percent expressed to not be satisfied with the cost of treatment (Table 21). This is due to the treatment cost could be expensive for farmers and do not make timely recovery after treatment.

As for efficiency of the treatment, similarly, on average well above 50 percent of farmers express satisfaction. In viewpoint of timely service provision and recovery rate from the treatment, about 10 percent of farmers accounted to be not satisfied with the treatment performance (Table 22).

Table 21: Farmers' satisfaction with the efficiency of treatments performed by VAHWs in Kandal,	Takeo
and Svay Rieng provinces, Cambodia.	

Kandal, n (%)	Takeo, n (%)	Svay Rieng, n (%)	Overall, n (%)						
-	2 (18.2)	3 (42.9)	5 (16.7)						
9 (75.0)	4 (26.4)	3 (43.9)	16 (53.3)						
-	-	1 (14.3)	1 (3.3)						
2 (16.7)	1 (9.1)	-	3 (10.0)						
	Kandal, n (%) - 9 (75.0) - 2 (16.7)	Kandal, n (%) Takeo, n (%) - 2 (18.2) 9 (75.0) 4 (26.4) - - 2 (16.7) 1 (9.1)	Kandal, n (%) Takeo, n (%) Svay Rieng, n (%) - 2 (18.2) 3 (42.9) 9 (75.0) 4 (26.4) 3 (43.9) - - 1 (14.3) 2 (16.7) 1 (9.1) -						

|--|

• Based on stakeholders' report

All stakeholders (government vet, local authority, NGOs and research institution) expressed that livestock farmers are satisfied with the service provided by VAHWs in terms of disease control and prevention, as well as providing advice.

Table	22:	Farmers'	satisfaction	with	treatment	fees	in	Kandal,	Takeo	and	Svay	Rieng	provinces,
Camb	odia												

	Kandal, n (%)	Takeo, n (%)	Svay Rieng, n (%)	Overall, n (%)
Very satisfied	-	2 (18.18)	-	2 (6.7)
Satisfied	8 (66.7)	3 (27.3)	6 (85.7)	17 (56.7)
Not satisfied	3 (25.0)	2 (18.2)	-	5 (16.7)
No answer	1 (8.3)	4 (36.4)	1 (14.3)	6 (20.0)

IV.2.5.3. Type of vaccines used for animals

• Based on VAHWs' report

Among VAHWs interviewed, a highest proportion of cattle are vaccinated against foot and mouth disease (94.4 percent), subclinical hypercortisolism (90.7 percent) and lumpy skin disease (57.4 percent). A few VAHWs (3.7 percent in Kandal and 1.9 percent in Takeo) reported that they vaccinate cattle against measles and black legs, respectively (Table 23).

A range of vaccines were used for small-scale pig production in the provinces surveyed. Majority (46.2 percent, 61.5 percent and 82.7 percent) of them are vaccinated against foot and mouth disease, septicemia hemorrhagic, and classical swine fever, while the rest are vaccinated against Aujeszky's disease (25.0 percent), PRRS (7.7 percent except in Svay Rieng), flu (1.9 percent in Kandal), diarrhea (5.8 percent), and measles and African swine fever (3.8 percent and 3.8 percent in Kandal), respectively.

The lowest response in vaccination against foot and mouth disease observed in Takeo (28.6 percent) compare to Kandal (50.0 percent) and Svay Rieng (76.5 percent). However, pigs vaccinate against subclinical hypercortisolism are the highest in Takeo (76.2 percent) and Svay Rieng (69.2 percent) than in Kandal (38.9 percent). This can explain that farmers buy weaned piglets for fattening with reliable supply sources that they are already vaccinated against common diseases in their communities. As of normal practice, fattened pig farmers raise about 4-5 months to sell out (finisher pigs).

About 78 percent, 89 percent and 44 percent of VAHWs provide vaccination services for small-scale poultry farmers against Newcastle disease, cholera and fowl pox, followed by each of 2.8 percent against chronic respiratory diseases, swollen eyes, seizure and fowl cholera and each of 5.6 percent against duck plague and avian influenza. There is a misconception about using vaccines to prevent African Swine Fever (ASF) in pigs and avian influenza in poultry. Outbreaks of these diseases can only be eliminated/controlled by proper culling and burning (Liu et al 2021; WOAH no date).

On the requirements for successful vaccination programs, VAHWs give answers as: i) should have enough materials to vaccinate including protection materials, ii) good vaccine storage and keep away from the sun light, iii) not use vaccine more than 48 hours after opening, and iv) strictly follow the vaccination program. In addition, VAHWs answer to the determination the dosage of the vaccines as

to: i) read and follow the manufacturer instruction on the bottle or leaflet provided, ii) follow the guidance for different animal size, age and species, and iii) follow the instruction from the input suppliers.

Tuble 20. Type of Vaccines used b	y VAIIWS III Rahu		May Meng province	s, camboula.
	Kandal	Takeo	Svay Rieng	Overall
If you vaccinate, what vaccine is	used for cattle $\overline{\&}$	buffaloes? (mu	Itiple choice), n $\overline{(\%)}$	5)
Foot and Mouth Disease	15 (83.3)	23 (100)	13 (100)	51 (94.4)
Subclinical hypercortisolism	17 (94.4)	19 (82.6)	13 (100)	49 (90.7)
Lumpy skin disease	8 (44.4)	14 (60.9)	9 (69.2)	31 (57.4)
Measles	2 (11.1)	-	-	2 (3.7)
Black legs	-	1 (4.3)	-	1 (1.9)
If you vaccinate, what vaccine is	used for pigs? (m	ultiple choice),	n (%)	
Foot and Mouth Disease	9 (50.0)	6 (28.6)	9 (69.2)	24 (46.2)
Septicemia hemorrhagic	7 (38.9)	16 (76.2)	9 (69.2)	32 (61.5)
Classical Swine Fever	14 (77.8)	19 (90.5)	10 (76.9)	43 (82.7)
Porcine reproductive and				
respiratory syndrome (PRRS)	2 (11.1)	2 (9.5)	-	4 (7.7)
Flu	1 (5.6)	-	-	1 (1.9)
Diarrhea	1 (5.6)	1 (4.8)	1(7.7)	3 (5.8)
Aujeszky's disease	3 (16.7)	8 (38.1)	2 (15.4)	13 (25.0)
Measles	2 (11.1)	-	-	2 (3.8)
African Swine Fever	2 (11.1)	-	-	2 (3.8)
If you vaccinate, what vaccine is	used for poultry?	(multiple choic	:e), n (%)	
Newcastle disease	10 (76.9)	12 (75.0)	6 (85.7)	28 (77.8)
Cholera	11 (84.6)	14 (87.5)	7 (100)	32 (88.9)
Chronic respiratory diseases	1(7.7)	-	-	1 (2.8)
Swollen eyes	1(7.7)	-	-	1 (2.8)
Seizures	1(7.7)	-	-	1 (2.8)
Fowl Pox	3 (23.1)	8 (50.0)	5 (71.4)	16 (44.4)
Fowl cholera	1(7.7)	-	-	1 (2.8)
Duck Plague	-	2 (12.5)	-	2 (5.6)
Avian Influenza	1(7.7)	1 (6.3)	-	2 (5.6)

Table 23: Type of vaccines used by VAHWs in Kandal, Takeo and Svay Rieng provinces, Cambodia.

• Based on farmers' report

Out of 30 small-scale livestock farmers used VAHWs' services in provinces surveyed, majority of them (60 percent and 66.7 percent) said that they never get information of benefit & advantage of vaccine and animal care in the post vaccination (Table 24). Fewer (26.7 percent and 16.7 percent) reported that VAHWs do sometimes.

 Table 24:
 VAHWs' services on animals' vaccination in Kandal, Takeo and Svay Rieng provinces, Cambodia.

	Kandal	Takeo	Svay Rieng	Overall				
VAHWs inform about benefits & advantage of vaccination, n (%)								
Regularly	1 (8.3)	1 (9.1)	-	2 (6.7)				
Sometimes	1 (8.3)	3 (27.3)	4 (57.1)	9 (26.7)				
Rarely	-	1 (9.1)	1 (14.3)	2 (6.7)				
Never	10 (83.3)	6 (54.5)	2 (28.6)	18 (60.0)				
VAHWs give advice on care of animals in post vaccination, n (%)								
Regularly	-	2 (18.2)	-	2 (6.7)				

Sometimes	1 (8.3)	1 (9.1)	3 (42.9)	5 (16.7)
Rarely	-	2 (18.2)	1 (14.3)	3 (10.0)
Never	11 (91.7)	6 (54.5)	3 (42.9)	20 (66.7)

• Based on farmers' report

About 25 farmers said that they do the vaccination for their animals (Table 25). In asking who do the vaccination? majority, both VAHWs and animal owner (50 percent each) responsible for doing vaccination on their livestock. This figure is confirmed for Kandal province, while in Takeo province, VAHWs take a higher account for doing vaccination (66.7 percent) compare to Svay Rieng province where animal owners (63.6 percent) do more on the job. Private vet takes a small margin on vaccination which accounted for about 11 percent.

Table 25: Persons vaccinated animals in Kanda	al, Takeo and Svay Rieng provinces, Cambo	odia.
---	---	-------

Kandal	Takeo	Svay Rieng	Overall					
Do you vaccinate your animals? n (%)								
6 (40.0)	9 (60.0)	11 (73.3)	26 (57.8)					
9 (60.0)	6 (40.0)	4 (26.7)	19 (42.2)					
If yes, who did the vaccination? (multiple choice), n (%)								
3 (50.0)	3 (33.3)	7 (63.6)	13 (50.0)					
3 (50.0)	6 (66.7)	4 (36.4)	13 (50.0)					
-	2 (22.2)	1 (9.09)	3 (11.5)					
	Kandal animals? n (%) 6 (40.0) 9 (60.0) cination? (multiple of 3 (50.0) -	Kandal Takeo animals? n (%) 6 (40.0) 9 (60.0) 9 (60.0) 6 (40.0) 9 (60.0) sination? (multiple choice), n (%) 3 (50.0) 3 (33.3) 3 (50.0) 6 (66.7) - - 2 (22.2) 2	KandalTakeoSvay Rienganimals? n (%)6 (40.0)9 (60.0)11 (73.3)9 (60.0)6 (40.0)4 (26.7)cination? (multiple choice), n (%)3 (50.0)3 (33.3)7 (63.6)3 (50.0)6 (66.7)4 (36.4)-2 (22.2)1 (9.09)					

Animal owner usually learnt about how-to in vaccination activities from private vet (46.2 percent). On the other hand, about 23 percent learn this from drug extensionist and about 30 percent from drug extensionist and NGOs. About 8 percent of farmers learn from social media channels, such as YouTube (Table 26).

Majority of vaccine were accessing by animal owner from drug store (84.6 percent) while about 23.1 percent is supplied from private vet.

 Table 26: Trainers of animal owner leaned for vaccination in Kandal, Takeo and Svay Rieng, Cambodia (multiple choice)

	Kandal, n (%)	Takeo, n (%)	Svay Rieng, n (%)	Overall, n (%)
Drug extensionist	-	1 (33.3)	2 (28.6)	3 (23.1)
VAHWs	-	-	2 (28.6)	2 (15.4)
Private Vet	3 (100)	1 (33.3)	2 (2.6)	6 (46.2)
NGO	-	1 (33.3)	1 (14.3)	2 (15.4)
YouTube			1 (14.3)	1(7.7)

Of all farmers interviewed, 10 percent have their animals receive vaccine through vaccination campaign in their community. This small percentage due to national vaccination campaign in Cambodia has been only targeted on cattle.

From farmers report, besides the vaccination activities, VAHWs are also responsible for other activities during occasion such as providing information to animal owners on the campaign (100 percent), keeping record and reporting (10.0 percent) and organizing & facilitate the event (10.0 percent) (Table 27).

 Table 27: Additional tasks of VAHWs in vaccination campaign in Kandal, Takeo and Svay Rieng province, Cambodia (multiple choice)

	Kandal, n (%)	Takeo, n (%)	Svay Rieng, n (%)	Overall, n (%)
Provide information on campaign	3 (100)	4 (100)	2 (66.7)	10 (100)
Record keeping and reporting	-	1 (20.0)	1 (33.3)	2 (10.0)
Organizing and facilitation	-		1 (33.3)	1 (10.0)

VAHWs provide vaccination service to livestock farmers that own cattle, pigs and poultry in the communities, and this reflects the result from farmers the local animal health workers to do so. However, most farms (about 60-70 percent) indicate that they never receive the information of benefit of vaccine and care of livestock in the post vaccination. The survey indicates that VAHWs do not provide knowledge on vaccination as farmers learnt from private vet, drug extensionist and NGOs.

Following the field observation, cattle vaccination is partly implemented due to the government program (stakeholder reporting) against common diseases in the villages. The effort of disease control and prevention has been taken into consideration by GDAHP/OAHPs. Among other actions, vaccination programs are the best application for disease prevention that the government takes action on large ruminant such as cattle and buffalo.

• Based on stakeholders' report

Government vet and local authority indicated that vaccination campaign launched by the Ministry of Agriculture, Forestry and Fisheries overseen by GDAHP with PDAFF, district vet and VAHWs. VAHWs has the main responsibility for conducting vaccination in the campaign which reflex in Table 28. Local authority such as village chief and commune councils were joint in order to promote the use and importance of vaccine in order to control and prevent disease in their community. This event organized 2 times a year.

Table 28: Cambodia	Vaccination	campaign for	livestock	farmers i	in	Kandal,	Takeo	and	Svay	Rieng	province,
		Kandal		Takeo		Sva	ay Rien	g		Overa	II
la thora a	ny vacainati	on compoidn ir	o vour ville	nda2 n /0/	<u> </u>						

	Kandal	Takeo	Svay Rieng	Overall			
Is there any vaccination campaign in your village?, n (%)							
Yes	3 (20.0)	4 (26.7)	3 (30.0)	10 (22.2)			
No	12 (80.0)	11 (73.3)	12 (80.0)	35 (77.8)			
if yes, who do the vaccir	nation? (multiple c	hoice), n (%)					
GDAHP	-	-	1 (33.3)	1 (10.0)			
District vet/OAHP	1 (33.3)	1 (25.0)	2 (66.7)	4 (40.0)			
VAHWs	3 (100)	4 (100)	3 (100)	10 (100)			

IV.2.5.4. Type of animals to receive services last month

• Based on VAHWs' report

56, 58, 28, 45, and 48 provided vaccination, treatment, castration, de-worming, and advise to animal raisers in their communities last month, respectively (Table 28). The findings indicates that there are the lowest percentage of VAHWs in Kandal (2) compare to Takeo (13) and Svay Rieng (13) in castration. In contrast, Takeo (19) and Kandal (18) is highest in giving advice compare to Svay Rieng (11). This could perhaps explain that Svay Rieng is more likely to use vaccines to prevent the diseases, while Kandal and Takeo are more concerning on prevention by the best practices of livestock farming.

On average, each VAHW vaccinated 134 cattle, 45.5 buffaloes, 50.8 pigs and 497 poultry (Table 31). VAHWs provided treatment service to animals on average of 40 cattle, 2.29buffaloes, 86 pigs and 53.6 poultry in the provinces surveyed.

VAHWs castrated 2.03 cattle in Kandal and Takeo last month, while on average 51.1 pigs were done so in all provinces interviewed. In the de-worming service last month, VAHWs were tasked on 18.8 cattle, 0.31 buffaloes, 46.8 pigs and 31.7 poultry, respectively. Last month each VAHW gave advice to farmers with these respective animal cases of 44.1 cattle, 2.69 buffaloes, 101 pigs and 1430 poultry.

	Kandal	Takeo	Svay Rieng	Overall
Do you vaccinate animal last mo	nth?, n (%)			
Yes	11 (73.3)	23 (92.0)	22 (88.0)	56 (86.2)
No	4 (26.7)	2 (8.0)	3 (12.0)	9 (13.8)
If yes, how many?, Ave.±SE				
Cattle	100±35.4	130±59.0	153±45.8	134±31.0
Buffaloes	2.87±2.47	87.0±57.1	22.0±10.8	45.5±24.2
Pigs	142±122	35.3±13.6	27.7±7.56	50.8±22.1
Poultry	10.0±10.0	1118±1050	80.5±28.5	497±433
Do you treat animal last month?,	n (%)			
Yes	13 (86.7)	21 (84.0)	24 (96.0)	58 (89.2)
No	2 (13.3)	4 (16.0)	1 (4.0)	7 (10.8)
If yes, how many?, Ave.±SE				
Cattle	33.4±15.6	39.1±9.14	44.7±11.5	40.1±6.67
Buffaloes	076±0.76	1.71±0.72	3.62±1.34	2.29±0.65
Pigs	255±228	41.7±11.5	33.3±13.0	86.0±51.6
Poultry	9.23±7.71	104±94.9	33.3±17.2	53.6±35.0
Do you provide castration?, n (%))			
Yes	2 (8.7)	13 (50.0)	13 (50.0)	28 (37.3)
No	21 (91.3)	13 (50.0)	13 (50.0)	47 (62.7)
If yes, how many?, Ave.±SE				
Cattle	2.50±2.50	4.00±3.83	-	2.03±1.78
Buffaloes	-	-	-	-
Pigs	235±215	30.0±6.67	44.0±16.1	51.1±16.8
Poultry	-	-	-	-
Do you provide de-worming?, n (%	%)			
Yes	11 (73.3)	17 (68.0)	17 (68.0)	45 (69.2)
No	4 (26.7)	8 (32.0)	8 (32.0)	20 (30.8)
If yes, how many?, Ave.±SE				
Cattle	9 36+2 89	28 8+5 78	18 9+5 82	18 8+3 00
Buffaloes	-	0 55+0 55	0 41+0 31	0 31+0 21
Pigs	33 5+20 6	53 9+26 9	22 2+6 22	36 8+11 6
Poultry	5 78+5 24	37 8+27 9	54 1+23 1	31 7+12 0
Do vou provide advice? n (%)	0.10±0.24	01.0121.0	04.1120.1	01.1 112.0
Yes	18 (73 3)	19 (73 1)	11 (42 3)	48 (64 0)
No	5 (21 7)	7 (26 9)	15 (57 7)	27 (36 0)
If ves, how many? Ave +SF	S (21.1)	. (20.0)	10 (0111)	21 (00.0)
Cattle	38.5+11.3	50.5+19.4	38.4+8.28	44,1+9.68
Buffaloes	1.67 ± 1.67	1.50 ± 1.09	6.00±2.26	2.69 ± 0.92

Table 28: Type of animals to receive services last month in Kandal, Takeo and Svay Rieng provinces,

 Cambodia.

Pigs	280±2.47	44.2±21.2	22.9±9.32	104±69.7
Poultry	19.2±8.63	3049±2061	26.7±16.9	1430±974

IV.2.5.5. Provision of technical advises by VAHWs

• Based on VAHWs' report

Majority of them (65.8 percent, 56 percent, 61.3 percent, 61.3 percent and 58.7 percent) reported that they tell farmers on the hygiene, housing, feed and diseases prevention (Table 29). For advising on animal species, VAHWs gave highest on cattle, pigs and poultry (49.0-100 percent) compare to the lowest for buffaloes which is about 25 percent for all advising categories across the provinces surveyed. This is due to reduction of buffalo keeping recently.

Table 29: VAHWs perceptions regarding their role in terms of technical advises to livestock farmers in

 Kandal, Takeo and Svay Rieng provinces, Cambodia.

	Kandal	Takeo	Svay Rieng	Overall			
Do you advise on hygiene?, n (%)							
Yes	11 (47.8)	21 (80.8)	17 (65.4)	49 (65.3)			
No	12 (52.2)	5 (19.2)	9 (34.6)	26 (34.7)			
If yes, on what species? (multiple	choice), n (%)						
Cattle	10 (90.9)	20 (95.2)	15 (88.2)	45 (91.8)			
Buffaloes	1 (9.1)	5 (23.8)	6 (35.3)	12 (24.5)			
Pigs	11 (100)	21 (100)	14 (82.4)	46 (93.9)			
Poultry	5 (45.5)	13 (61.9)	6 (35.3)	24 (49.0)			
Do you advise on housing?, n (%)							
Yes	11 (47.8	21 (80.8)	10 (38.5)	42 (56.0)			
No	12 (52.2)	5 (19.2)	10 (38.5)	33 (44.0)			
If yes, on what species? (multiple	choice), n (%)						
Cattle	11 (100)	20 (95.2)	8 (80.0)	39 (92.9)			
Buffaloes	1 (9.1)	5 (23.8)	5 (50.0)	11 (26.7)			
Pigs	11 (100)	21 (100)	8 (80.0)	40 (95.2)			
Poultry	5 (45.5)	14 (66.7)	4 (40.0)	23 (54.8)			
Do you advise on feed?, n (%)							
Yes	11 (47.8	21 (80.8)	14 (53.8)	46 (61.3)			
No	12 (52.2)	5 (19.2)	12 (46.2)	29 (38.7)			
If yes, on what species? (multiple	choice), n (%)						
Cattle	11 (100)	20 (95.2)	12 (85.7)	43 (93.5)			
Buffaloes	1 (9.1)	5 (23.8)	6 (42.9)	12 (26.1)			
Pigs	11 (100)	21 (100)	12 (85.7)	44 (95.7)			
Poultry	4 (36.7)	14 (66.7)	6 (42.9)	24 (52.2)			
Do you advise on diseases prever	ntion?, n (%)						
Yes	11 (47.8)	21 (80.8)	12 (46.2)	44 (58.7)			
No	12 (52.2)	5 (19.2)	14 (53.8)	31 (41.3)			
If yes, on what animal species? (r	If yes, on what animal species? (multiple choice), n (%)						
Cattle	11 (100)	20 (95.2)	10 (83.3)	41 (93.2)			
Buffaloes	1 (9.1)	5 (23.8)	5 (41.7)	11 (25.0)			
Pigs	11 (100)	21 (100)	9 (75.0)	41 (93.2)			
Poultry	5 (45.5)	13 (61.9)	5 (41.7)	23 (52.3)			

• Based on VAHWs' report

All VAHWs interviewed, 23 and 21 of them mentioned providing advice once a week and when asked only to the livestock farmers, while 5 and 16 give advice twice a week and twice a month, respectively (Table 30). More VAHWs in Kandal and Takeo provide advice once a week and when a request from farmers only, while in Svay Rieng, most of them give advice once a week and twice a month. This response indicates the differences among the provinces in the present survey that there is perhaps no monitoring or diseases surveillance, unless farmers request for treatment and at the same time they provide advice on care & management of the animals. VAHWs' work is self-supported so as to motivate, providing incentive should be a best intervention.

Table 30: Frequencies of VAHWs give advice to farmers in in Kandal, Takeo and Svay Rieng provinces,

 Cambodia.

	Kandal, n (%)	Takeo, n (%)	Svay Rieng, n (%)	Overall, n (%)
Once a week	5 (33.3)	10 (40.0)	8 (32.0)	23 (35.4)
Twice a week	1(6.7)	1 (4.0)	3 (12.0)	5 (7.7)
Twice a month	3 (20.0)	5 (20.0)	8 (32.0)	16 (24.6)
When asked only	6 (40.0)	9 (36.0)	6 (24.0)	21 (32.3)

• Based on farmers' report

In reflection of farmers response, only 10 percent reported to receive some forms of advice from VAHWs on alternative feeding practices. The practices and suitable choices of alternative feed is very important for farmers to maximize profit by enhancing animal health and minimizing the investment cost. Livestock farmers observed to be provided their animal other feeds besides scavenging or grazing. In Kandal province, about 60 percent of farmers provide their cattle alternative feeds besides grazing mainly supplement cut and carry natural grasses, rice straw and rice bran. This could be due to the fact that Kandal province lack of open-space such as rice field for grazing activity compare to other study area especially Svay Rieng province, as most of the land is under vegetables cultivation. This same reason could explain the lower percentage observed for farmers in Takeo and Svay Rieng provide alternative feed to their cattle. Nonetheless, similar to Kandal province, alternative feeds are mainly consisted of rice straw and rice bran. For chicken, alternative feed sprovided is observed in a highest percentage (62.2 percent). Under scavenging system, chicken feed with paddy rice and broken rice.

IV.2.5.6. Farmers' practice after receiving advice

• Based on VAHWs' report

Overall, most of VAHWs (96.1 percent) said that farmers changed attitude in livestock production. Less VAHWs (19.6 percent, 39.2 percent, and 25.5 percent) indicated that farmers continued their farms as usual, concerned about the disease infection risk to their family, stopped selling and eating dead animals (Table 31).

Table 31: VAHWs reporting on attitude of farmers after receiving advice in Kandal, Takeo and Svay
 Rieng, Cambodia (multiple choice).

	Kandal, n (%)	Takeo, n (%)	Svay Rieng, n (%)	Overall, n (%)
Changed their attitudes	11 (100)	21 (95.5)	17 (94.4)	49 (96.1)
Continue as their usual practices	2 (18.2)	4 (18.2)	4 (22.2)	10 (19.6)
Concerned about diseases infection risk to family	6 (54.5)	10 (45.5)	4 (22.2)	20 (39.2)

Stopped selling and	3 (27.3)	6 (27.3)	4 (22.2)	13 (25.5)
eating dead animals				

Around (55-65 percent) of VAHWs demonstrated that they provide livestock farmers on the hygiene, housing, feed and diseases prevention. However, only 10 percent of farmers reported that local vets advised them on the feed and feeding. This is quite low that the activity should perform as it is in line with their tasks, thus more efforts of VAHWs in advising should be made.

IV.2.5.7. VAHWs' action for disease outbreak

• Based on VAHWs' report

VAHWs interviewed in all provinces responded similarly on their actions when the disease outbreaks happened. Overall, most of them (68 percent, 69.3 percent, and 44 percent) said that action to undertake for the diseases outbreak in the communities are: informing village chief/CC, informing DVs/OAHPs and treating infected animals immediately (Table 32). Few VAHWs (5.3 percent and 8 percent) stated that they wait for assistance from outsiders and collect the necessary information for laboratory at GDAHP.

In case of a new emerging diseases occur, VAHWS will face problem when they treat the animals immediately as it requires preventative measure, restrict the movement and access to the outbreak's site. Thus, as reported by VAHWs, the majority of them collect the necessary information to inform/report to local authority and DVs/OAHPs for further actions. This diseases surveillance and reporting is detail in **section IV.2.6** of the report.

Table 32: Actions to be conducted by VAHWs for diseases outbreak in Kandal, Takeo and Svay Rieng, Cambodia (multiple choice).

	Kandal, n (%)	Takeo, n (%)	Svay Rieng, n (%)	Overall, n (%)
Wait for assistance	1 (4.3)	1 (3.8)	2 (7.7)	4 (5.3)
from outsiders				
Inform local authority				
(CC or village chief)	17 (73.9)	16 (61.5)	18 (69.2)	51 (68.0)
Kill animals in the				
infected farms by				
themself	-	-	-	-
Inform district and				
provincial vets				
immediately	12 (52.2)	21 (80.8)	19 (73.1)	52 (69.3)
Treat infected animals				
immediately	11 (47.8)	13 (50.0)	9 (34.6)	33 (44.0)
Collect necessary				
information to inform				
lab at GDAHP	2 (8.7)	1 (3.8)	3 (11.5)	6 (8.0)

IV.2.5.8. Self-rating of VAHWs on animal health and production services

• Based on VAHWs' report

In a self-rating service (1-5; 1 is worst and 5 is best), 'active' VAHWs gave a similar score to their services in all provinces under this present survey. Overall, VAHWs score 3.83 (ranged 2-5) for their

animal health and production service in the communities. For scoring in each province, they rate 3.40 (ranged 2-5) in Kandal, 4.0 (ranged 2-5) in Takeo and 3.90 (3-5) in Svay Rieng (Figure 4).

The rating on VAHW's service reflects with stakeholders and farmers reporting as majority said that they are satisfied with the service and efficiency of animal treatment provided by the VAHWs as local animal healthcare workers in the villages. This also reflects by the stakeholders that said so. Thus, it highlights the impact of the long-time intervention they have received from GDAHP, NGOs and other development partners in placing animal health workers at the communities.





IV.2.5.9. Technical constraint/challenge of VAHWs in providing services

Majority of active VAHWs (53.8 percent) in all provinces surveyed indicated that knowledge is their main constraint. This constraint is more in Kandal (86.7 percent) than in Takeo (44 percent) and Svay Rieng (44 percent). However, there are less for accessibility of drugs & vaccines (13.8 percent) as available store to supply in the communities, quality of drugs & vaccines (16.9 percent), attitude of animal keepers in cooperation with VAHWs (32.3 percent), payment for the service (16.9 percent), lack of resources for operation (9.2 percent in Svay Rieng), cannot access/provide service at remote community (4.6 percent in Kandal) and no answer (7.7 percent) (Table 32).

Table 32: Constraints of VAHWs in service provision in Kandal, Takeo and Svay Rieng, Cambodia (multiple choice).

	Kandal, n (%)	Takeo, n (%)	Svay Rieng, n (%)	Overall, n (%)
Knowledge	13 (86.7)	11 (44.0)	11 (44.0)	35 (53.8)
Accessibility to drugs & vaccines	3 (20.0)	3 (12.0)	3 (12.0)	9 (13.8)
Quality of drugs & vaccines	2 (13.3)	4 (16.0)	5 (20.0)	11 (16.9)
Attitude of animal keepers	4 (26.7)	11 (44.0)	6 (24.0)	21 (32.3)
Payment for the service	3 (20.0)	1 (4.0)	7 (28.0)	11 (16.9)
operation	-	-	6 (24.0)	6 (9.2)

Can not access/	3 (20.0)	-	-	3 (4.6)
remote community				
No answer	1 (6.7)	3 (12.0)	1 (4.0)	5 (7.7)

IV.2.5.10. Sustainability of VAHWs

On average, a higher response of VAHWs (45.3 percent and 41.3 percent) received shared income from animal health services below 25 percent and between 25-50 percent, respectively (Table 33). The remaining VAHWs in Kandal, Takeo, and Svay Rieng received 51-75 percent, more than 75 percent, and do not know. In Kandal and Takeo, over 80 percent and 42.3 percent of VAHWs reported receiving shared income below 25 percent from animal health services. About 60 percent of VAHWs in Svay Rieng obtained the share income between 25-50 percent. When comparing active and idle VAHWs, less income (lower than 25%) shared in the total households' income by idle VAHWs (90%) is greater than active VAHWs (38.5%). This may be hard for them to sustain the animal health care work due to low returns. The work performed by VAHWs is self-supporting and relies on fees from their services. Therefore, if veterinary service providers do not receive a significant income, it may hinder the sustainability of their role in the community, unless they receive a larger portion of the income to support their families.

In VAHWs reporting, active VAHWs attended more training courses than idle ones. However, this observation may not be true, as idle VAHWs also reported with lacking of confidence in their service after completing their initial training. And religious believers were also identified as another factor contributing to VAHWs being idle in providing services for specific animal species.

The work experience of 75 VAHWs interviewed in Kandal, Takeo, and Svay Rieng provinces varied slightly. In Kandal and Svay Rieng, the average work experience was 15.9 years and 16.1 years, respectively, while Takeo had an average work experience of 17.7 years. It appears that Takeo province may have been the first province to establish VAHWs, as indicated by the fact that the training started there before the other two provinces in the current survey.

	Kandal	Takeo	Svay Rieng	Overall		
Share of service in total household's income, n (%)						
Under 25%	19 (82.6)	11 (42.3)	4 (15.4)	34 (45.3)		
25-50%	3 (13.0)	12 (46.2)	16 (61.5)	31 (41.3)		
51-75%	-	3 (11.5)	5 (19.2)	8 (10.7)		
More than 75%	1 (4.30)	-	-	1 (1.30)		
Do not know	-	-	1 (3.80)	1 (1.30)		
# years of work experience,	15.9±1.48	17.7±1.69	16.1±1.89	16.6±0.98		
Ave.±SE						

Table 33: Shared income from animal health service and number of years of work experience of VAHWs in Kandal, Takeo and Svay Rieng provinces, Cambodia.

Across all provinces surveyed, majority of VAHWs extend their service to more than three villages (3-13 villages). The highest percentage is in Svay Rieng (76.9 percent), followed by Kandal (60.9 percent) and Takeo (61.5 percent). VAHWs provide service in only one village, accounting for 26.1 percent in Kandal, 15.4 percent in Takeo, and 3.8 percent in Svay Rieng (Table 34). A small percentage of VAHWs (4.3 percent in Kandal, 7.7 percent in Takeo, and 3.8 percent in Svay Rieng, and 8.7 percent in Kandal, offer animal health services in three villages.

In the survey, it was found that all idle VAHWs serve 1.4 villages (ranged 0-4), with approximately 60% of them providing services only in their own village, while nearly 90% of active VAHWs serve more than 3 villages, acting as animal health and production service providers. More provision of VAHWs service perhaps lays on the number of villages served. When VAHWs offer services within their own villages, their support and impact are likely limited and thus provoking a lack of interest leading to become idle in the service deliverables.

 Table 34: Number of villages covered by a VAHW personnel in Kandal, Takeo and Svay Rieng provinces, Cambodia.

	Kandal, n (%)	Takeo, n (%)	Svay Rieng, n (%)	Overall, n (%)
One village	6 (26.1)	4 (15.4)	1 (3.80)	11 (14.7)
Two village	1 (4.30)	2 (7.70)	1 (3.80)	4 (5.30)
Three village	2 (8.70)	4 (15.4)	4 (15.4)	10 (13.3)
More than Three	14 (60.9)	16 (61.5)	20 (76.9)	50 (66.7)
village				

In the reflection with survey results, idle VAHWs have low level of income, less training participation, selection and less village coverage of the service compare to the active one. It is suggested that a key to sustain the functioning of the local animal health service providers could be the provision of additional/refreshing trainings, incentive support and monitoring and supervision from supervisors and DVs.

IV.2.6. Disease surveillance and reporting

IV.2.6.1. Disease reporting system and mechanism

• Based on stakeholders' report

Government vet officers answered that institutional mechanism in case of disease outbreak is as follow: VAHWs are required to report it to the village chiefs and district vets, along with the clinical signs observed. Upon receiving the report, the district vets and OAHPs inform GDAHP for action. In any suspected cases, samples are then collected to identify the diseases at NAHPRI's laboratory. While waiting for the laboratory's results, necessary measures such as restricting access to the farm, quarantining sick animals, and maintaining farm hygiene complying with biosecurity measures are to be implemented. After confirmation of the outbreak, emergency response team at GDAHP collaborates with local authority and DVs/OAHPs for proper actions.

• Based on VAHWs' report

Out of the 75 VAHWs surveyed, all in Svay Rieng and 84.6 percent in Takeo stated that disease reporting system exists in the community, followed by 56.6 percent in Kandal. The lower percentage of VAHWs in Kandal indicates a lack of understanding/awareness of the existing reporting system to effectively respond to disease outbreaks that require an immediate action.

When asked which diseases they are required to report, 70.5 percent, 62.3 percent, and 54.1 percent of VAHWs mentioned: foot and mouth disease, lumpy skin disease, and Septicemia Hemorrhagic, respectively, followed by African swine fever (19.7 percent), cholera (16.4 percent), classical swine fever (21.3 percent), avian influenza (14.8 percent), Newcastle disease (1.6 percent), Aujeszky's disease (1.6 percent), and anthrax (4.9 percent) (Figure 5).





In diseases outbreak report, majority (64 percent, 48 percent, 69.3 percent, and 58.7 percent) of VAHWs in all provinces interviewed stated that they include number of sick animals, number of dead animals, location, and type of diseases in reports (Table 35). Fewer VAHWs (26.7 percent, 13.3 percent, and 1.3 percent) indicated they include the number of animals treated, number of survivors, and information about disease infrastructure in their reports.

When comparing the responses from different provinces, it is found that Svay Rieng had a highest percentage of VAHWs (46.2 percent) to include the record of animals they have treated in their reports, compared with Kandal (17.4 percent) and Takeo (15.4 percent). This is likely due to the record of animal's treatment in the bookkeeping during the service they provide to animal keepers. Meanwhile, Takeo had the highest response (92.3 percent) compare to other two provinces (56.5 percent in Kandal and 57.7 percent in Svay Rieng) with the inclusion of locations. VAHWs use social media's application including Telegram and Facebook Messenger to report the animal disease's incidents to village chiefs and vet officers in the district and province which account for 26.7 percent and 84 percent. Reasons to report to DVs and OAHPs are to inform and at the same time to request their interventions and supports.

Table 35: Information to include in reports by VAHWs in Kandal, Takeo and Svay Rieng, Cambodia (multiple choice).

	Kandal, n (%)	Takeo, n (%)	Svay Rieng, n (%)	Overall, n (%)
Number of animals	4 (17.4)	4 (15.4)	12 (46.2)	20 (26.7)
treated				
Number of animals sick	14 (60.9)	15 (57.7)	19 (73.1)	48 (64.0)
Number of animals dead	10 (43.5)	14 (53.8)	12 (46.2)	36 (48.0)

Location	13 (56.5)	24 (92.3)	15 (57.7)	52 (69.3)
Number of survived	2 (8.7)	4 (15.4)	4 (15.4)	10 (13.3)
Type of Disease	11 (47.8)	17 (65.4)	16 (61.5)	44 (58.7)
Disease infrastructure	-	-	1 (3.8)	1 (1.3)

More VAHWs (77.3 percent, 56 percent, 49.3 percent, 18.7 percent, 13.3 percent, and 21.3 percent) reported that they know certain diseases, including foot and mouth disease, septicemia hemorrhagic, lumpy skin disease, classical swine fever, cholera, and African swine fever. While fewer (1.3 percent in Svay Rieng; 5.3 percent except Kandal; 1.3 percent in Svay Rieng; 5.3 percent except Kandal; 1.3 percent in Svay Rieng; 5.3 percent except Kandal, and 6.7 percent and 1.3 percent in Takeo) claimed to know of other diseases: chronic respiratory disease, salmonellosis, fowl pox, avian influenza, Newcastle disease, and Aujeszky's disease (Figure 6).

VAHWs' response is varied indicating a lack of clinical knowledge to conclude the diseases to be treated. Therefore, additional training and supervision are required to ensure the quality of services provided to farmers in the communities.



Figure 6: Diseases that VAHWs know in Kandal, Takeo and Svay Rieng, Cambodia (multiple choice).

A range of diseases that VAHWs mentioned they have to report. Annual diseases outbreak could be simply treated and provide monthly report to DVs; however, emerging and zoonotic diseases they must make report as it requires to tackle immediately. And from this result, it may indicate a lack of understanding or awareness of the diseases that they need to report. As practice, when an outbreak of a disease occurs, the villagers or village chief inform the village vets. They then visit the farms to observe the situation firsthand and conduct a technical report back to the village chief and DVs. Stakeholders reported that once the outbreak happens VAHWs have to report and follow the mechanism as mentioned.

IV.2.6.2. Sample collection

Based on stakeholders' report

Government vet officers indicated that there is a strict protocol during sample collection to ensure that the collected samples do not get contaminated. The individuals responsible for sample collection require proper training. Role of VAHWs is to provide coordination and support, while trained technicians collect samples at the farms for disease surveillance purposes or in case of outbreaks.

In disease surveillance and reporting disease outbreaks, particularly zoonotic diseases, the GDAHP have made strong efforts to tackle this threat so far. NAHPRI has designated laboratories for disease surveillance and antimicrobial resistance detection. GDAHP's personnel from designated institute collect samples for laboratory testing to monitor diseases occurrence. In the event of a disease outbreak, NAPHRI sends staff to collect samples in coordination with OAHP/DVs, local authorities and VAHWs.

• Based on VAHWs' report

Out of 75 VAHWs in the surveyed provinces, 22.7 percent reported that they participated in sample collection for laboratory analysis (Table 36). This response was almost similar across the provinces, with 26.1 percent in Kandal, 26.9 percent in Takeo, and 15.4 percent in Svay Rieng, respectively. Regarding the types of sample they collected, almost all VAHWs (94.1 percent) stated that they collect blood sample, while the rest (23.5 percent, except in Svay Rieng and 29.4 percent) mentioned that they involved in collection of fecal and mucous samples.

Table 36: Participation of VAHWs in the sample collection in Kandal, Takeo and Svay Rieng provinces,

 Cambodia.

	Kandal	Takeo	Svay Rieng	Overall		
Participations in sample collections, n (%)						
Yes	6 (26.1)	7 (26.9)	4 (15.4)	17 (22.7)		
No	17 (73.9)	19 (73.1)	22 (84.6)	58 (77.3)		
If yes, type of sample	s to collect (multip	le choice), n (%)				
Faeces sample	1 (16.7)	3 (42.9)	-	4 (23.5)		
Blood sample	6 (100)	7 (100)	3 (75.0)	16 (94.1)		
Macus sample	1 (16.7)	3 (42.9)	1 (25.0)	5 (29.4)		

As reported by stakeholders, sample collection is to perform by the professional; however, few (17 out of 75) VAHWs said that they attend the sample collection.

IV.2.6.3. VAHWs' contacts, communication and technical advises to small-scale livestock keepers

• Based on VAHWs' report

Almost 85 percent of VAHWs in surveyed provinces reported that they provided feedback to livestock keepers. In asking what information they provide, most of them (54.9 percent, 42.3 percent, and 33.8 percent) stated that they informed them about disease outbreak information, if any; hygienic practice for animal pens, disinfection & management; and separating sick animals. A few (1.4 percent in Svay Rieng, 14.1 percent and 4.2 percent in Svay Rieng) mentioned they advise livestock keepers to provide enough water and feed, treat the animals and no answer (Table 37). The low response for advising on clean animal pens, disinfection, and management in Kandal and Takeo likely indicates a lack of understanding and awareness about disease control and prevention.

, j	Kandal	Takeo	Svay Rieng	Overall		
Feedback of disease outbreak to livestock farmers, n (%)						
Yes	15 (65.2)	24 (92.3)	23 (88.5)	62 (82.7)		
No	8 (34.8)	2 (7.7)	3 (11.5)	13 (17.3)		
If yes, what information	do you provide? (mu	ltiple choice), n ((%)			
Inform the disease	14 (63.6)	19 (76.0)	6 (25.0)	39 (54.9)		
outbreak						
Clean animal pen,	6 (27.3)	7 (28.0)	17 (70.8)	30 (42.3)		
disinfection, and						
animal management						
Provide enough feed &	-	-	1 (4.2)	1(1.4)		
water to the animals						
Treat the animals	5 (22.7)	3 (12.0)	2 (8.3)	10 (14.1)		
Separate sick animals	8 (36.4)	11 (44.0)	5 (20.8)	24 (33.8)		
No answer	-	-	3 (12.5)	3 (4.2)		

Table 37: Feedback to livestock keepers of diseases outbreak by VAHWs in the sample collection in Kandal, Takeo and Svay Rieng provinces, Cambodia.

• Based on farmers' report

In reflection from farmers, majority (86.7 percent) reported that VAHWs never organize meetings with them (Table 38). However, a few farmers (6.7 percent, except in Kandal and 6.7 percent in Svay Rieng) mentioned that VAHWs conduct meetings with farmers sometimes and rarely. Without support, VAHWs rarely visit or organize meetings with farmers, unless there is a request from the local authority, DVs, or OAHPs for their assistance. They visit the farms/carry out meetings upon the request of livestock owners in case of disease outbreaks or when animals get sick that require the treatments.

Overall, almost 85 percent of farmers stated that key disease's event in the village is delivered in the meeting with VAHWs, followed by 33.3 percent, 33.3 percent and 16.7 percent said that disease events in the neighboring village, planned activities and report of completed activities are the key messages to meet and discuss with them.

All farmers in Kandal and nearly 85 percent of farmers in Takeo and Svay Rieng stated that if they are not invited, VAHWs never visit their farms. Only fewer farmers (11.1 percent and 6.7 percent, except in Kandal) mentioned that VAHWs sometimes and rarely visit them. During the visits, VAHWs performed the following tasks: i) gathering information on diseases (87.5 percent), ii) giving advice on disease control (25 percent), iii) delivering news of disease outbreaks in the village (12.5 percent in Takeo), and iv) providing advice on animal husbandry (12.5 percent in Svay Rieng).

able 38: Visit of VAHWS to investock keepers in Kandal, Takeo and Svay Rieng provinces, Cambodia.					
	Kandal	Takeo	Svay Rieng	Overall	
VAHWs perform farmers'	meetings, n (%)				
Regularly	-	-	-	-	
Sometimes	-	1 (6.7)	2 (13.3)	3 (6.7)	
Rarely	-	-	3 (20.0)	3 (6.7)	
Never	15 (100)	14 (93.3)	10 (66.7)	39 (86.7)	
If they do, what type of in	formation delivered	in meetings? (mu	ltiple choice), n (%))	
Key disease events in the	-	1 (100)	4 (80.0)	5 (83.3)	
village					
Diseases events in	-	1 (100)	1 (20.0)	2 (33.3)	
neighboring village					

Table 38: Visit of VAHWs to livestock keepers in Kandal, Takeo and Svay Rieng provinces, Cambodia.

Planned activities Reports of completed activities	-	1 (100)	1 (20.0) 1 (20.0)	2 (33.3) 1 (16.7)
VAHWs' s visit farms althou	igh not invited, n (%))		
Regularly	-	-	-	-
Sometimes	-	2 (13.3)	3 (20.0)	5 (11.1)
Rarely	-	1(6.7)	2 (13.3)	3 (6.7)
Never	15 (100)	12 (80.0)	10 (66.7)	37 (82.2)
VAHWs' activities to be carr	ried out in the visits	(multiple choice),	n (%)	
Gather information on	-	2 (66.7)	5 (100)	7 (87.5)
diseases				
Give advice on disease	-	1 (33.3)	1 (20.0)	2 (25.0)
control		4 (00.0)		
Deliver news of disease	-	1 (33.3)	-	1 (12.5)
events in village			4 (00.0)	
Give advice on animal	-	-	1 (20.0)	1 (12.5)
raising				

VAHWs reporting demonstrated that they provide feedback to livestock keepers with most on disease outbreaks at the intervened sites and occasionally after the treating their animals. This is, somehow, not so different with answered by majority of farmers that VAHWs never organize meetings to meet with them as it is likely performed case by case in extend with their coverage capacity/area. Farmers should be well informed, particularly if the case of disease outbreak happens that the necessary measures including separating sick animals, cleaning and disinfecting the pens, providing enough water and feed, and avoiding the consumption of meat are to be undertaken.

IV.2.6.4. Persons/institutions that farmers report disease incidents

• Based on farmers' report

In asking do you report disease incidence in your farms? Almost 55 percent, 40 percent and 33.3 percent of farmers in Takeo, Svay Rieng and Kandal, respectively reported it (Table 39). The reason they do not report due to: i) they do not know who should report to and ii) there is no action after the report. These indicate that farmers lack of awareness to reach the information, thus campaigns to raise the understanding and awareness should be the best interventions.

Among those who reported the disease incidence, 73.7 percent directed to VAHWs, while 15.8 percent in Svay Rieng; 5.3 percent and 15.8 percent in Takeo; and 5.3 percent in Kandal reported to animal owners in the villages, DVs/OAHPs, private vets and input suppliers. Farmers reported the disease incidence to VAHWs because they live nearby the community and rely on their services for treatment. Reporting to animal owners is done to seek their previous experience and advice, while input suppliers provide consultations when farmers visit them to buy medicine.

Table 39: Person/institutions that farmers report on disease incidence in Kandal, Takeo and Svay Rieng provinces, Cambodia.

	Kandal	Takeo	Svay Rieng	Overall		
Do you report disease incidence, n (%)						
Yes	5 (33.3)	8 (53.3)	6 (40.0)	19 (42.2)		
No	10 (66.7)	7 (46.7)	9 (60.0)	26 (57.8)		
If yes, who do you report to? (multiple choice), n (%)						
Animal owner	-	-	3 (50.0)	3 (15.8)		

GDAHP	-	-	-	-
District Vet/OAHP	-	1 (12.5)	-	1 (5.3)
VAHWs	4 (80.0)	6 (75.0)	4 (66.7)	14 (73.7)
Private vet	-	3 (37.5)	-	3 (15.8)
Traditional healer	-	-	-	-
Local authority	-	-	-	-
Input supplier	1 (20.0)	-	-	1 (5.3)

IV.2.6.5. Information shared by VAHWs to livestock farmers

• Based on farmers' report

All farmers interviewed in Kandal reported that VAHWs never share any information with them on: i) disease outbreaks in other villages, ii) contagious disease in the district, and iii) analysis results after samples were taken from your farm; while these answers are slightly similar in Takeo (60 percent, 73.3 percent and 100 percent) and in Svay Rieng (60 percent, 73.3 percent and 73.3 percent). These responses perhaps indicate the limited services provided by VAHWs in disease surveillance & reporting in their communities, particularly in Kandal province (Table 40).

Few of them (44.4 percent, 8.9 percent and 13.3 percent) stated that VAHWs regularly, sometimes and rarely inform the disease outbreak in other villages and these low responses are similar to the information shared by VAHWs about contagious disease in the district and analysis results after samples were taken from farm. The role of the VAHWs in diseases surveillance and reporting is to control & prevent diseases in their respective communities with support and coordination of DVs and OAHPs. This structure is to ensure the quality of work that will then be benefitted the farmers in the communities.

Regarding with the livestock health challenges face by farmer, the main stakeholders that they contact/seek assistance are VAHWs and DVs/OAHPs was because they provide treatment and medicine. Others seek support from input suppliers due to they sell the medicine and other supply as well as give advice on its use.

· ,	Kandal	Takeo	Svay Rieng	Overall	
VAHWs inform disease out	breaks in other villa	ges, n (%)			
Regularly	-	1(6.7)	1(6.7)	2 (4.4)	
Sometimes	-	1(6.7)	3 (20.0)	4 (8.9)	
Rarely	-	4 (26.7)	2 (13.3)	6 (13.3)	
Never	15 (100)	9 (60.0)	9 (60.0)	33 (73.3)	
VAHWs inform about conta	gious disease in dis	strict, n (%)			
Regularly	-	1(6.7)	1(6.7)	2 (4.4)	
Sometimes	-	1(6.7)	1(6.7)	2 (4.4)	
Rarely	-	2 (13.3)	2 (13.3)	4 (8.9)	
Never	15 (100)	11 (73.3)	11 (73.3)	37 (82.2)	
VAHWs inform about analysis results after samples were taken from your farm, n (%)					
Regularly	-	-	-	-	
Sometimes	-	-	1(6.7)	1 (2.2)	
Rarely	-	-	3 (20.0)	3 (6.7)	
Never	15 (100)	15 (100)	11 (73.3)	41 (91.1)	

Table 40: Information shared by VAHWs to livestock farmers in Kandal, Takeo and Svay Rieng provinces, Cambodia.

In the farmers reporting, most of them said that they report of disease incident to VAHWs and few report to DVs/OAHPs, private vets and input suppliers to help. This indicates the functioning and service of VAHWs who serve for animal health care as to some extent, they respond with the treatments on the ground once livestock get ill. However, they mentioned that there's a lack of information on disease outbreak in other villages, contagious disease in the district, and the results from laboratory analysis after samples were taken from the farms. A few VAHWs confirmed that their task is also to perform disease surveillance and reporting, while this demonstrates the lack of support from VAHWs to well informed and actions of such disease threats to local communities and therefore, raising awareness and campaign could be options.

IV.2.7. Networking

IV.2.7.1. Institutions to support

• Based on VAHWs' report

Most VAHWs (86.5 percent) said that DVs/OAHPs is the institution to support them, followed by 17.3 percent, 34.7 percent, 38.7 percent and 29.3 percent stated that GDAHP, local authority, NGOs and input suppliers do so (Table 41). VAHWs reported: i) GDAHP & OAHPs/DVs is to supervise, provide medicine & vaccine, organize/provide training and take samples for disease surveillance & reporting; ii) local authority is to facilitate & coordinate with farmers for vaccination campaigns, collect information on animals that fall ills; iii) NGO is to form association, provide training & vet equipment; and iv) input suppliers to supply vaccine & medicine & consult on its use.

Table 41: Institutions to support VAHWs in Kandal, Takeo and Sv	/ay Rieng	, Cambodia	(multiple choice).
---	-----------	------------	--------------------

	Kandal, n (%)	Takeo, n (%)	Svay Rieng, n (%)	Overall, n (%)
GDAHP	2 (8.7)	5 (19.2)	6 (23.1)	13 (17.3)
OAHP/District Vet	20 (87.0)	24 (92.3)	20 (80.0)	64 (86.5)
Local authority	3 (13.0)	9 (34.6)	14 (53.8)	26 (34.7)
NGOs	5 (21.7)	15 (57.7)	9 (34.6)	29 (38.7)
Input suppliers	3 (13.0)	10 (38.5)	9 (36.6)	22 (29.3)

IV.2.7.2. VAHWs' associations

• Based on VAHWs' report

Among 75 VAHWs surveyed, 41 reported that there is VAHWs' association in the provinces (Table 42). These associations are primarily formed by NGOs such as AVSF, Life Dignity, LDC (formerly CelAgrid), and Heifer International-Cambodia. The purpose of forming these associations is to strengthen VAHW's support and capacity with focus on disease control and prevention for farmers in the communities.

Of the VAHWs mentioned associations exist in the province, nearly half belong to the associations across the 3 provinces. In the association, they obtain the support such as input of livestock, capacity building through various trainings, vet materials and equipment, able to work together to share knowledge and experience, and loan in the saving.

Majority of VAHWs (86.7 percent) reported that the association should form, while a few (1.3 percent in Svay Rieng and 12 percent) said that there is no need to form such association and they do not know about this (Table 44).

In asking, any informal network established, 13 percent in Kandal, 15.4 percent in Takeo and 26.9 percent in Svay Rieng reported that there is informal network formed though sharing information and working together between VAHWs in the same cohort or regions. The informal group use social media applications for communication.

Table 42: VAHWs' associations and its benefit in Kandal, Takeo and Svay Rieng provinces, Cambodia.					
	Kandal	Takeo	Svay Rieng	Overall	
VAHWs' association exists	s in the province,	n (%)			
Yes	10 (43.5)	16 (61.5)	15 (57.7)	41 (54.7)	
No	13 (56.5)	10 (38.5)	11 (42.3)	34 (45.3)	
If yes, do you belong to any association?, n (%)					
Yes	2 (20.0)	9 (56.3)	9 (60.0)	20 (48.8)	
No	8 (80.0)	7 (43.8)	6 (40.0)	21 (51.2)	
Do you think association	should be formed	?, n (%)			
Yes	19 (82.6)	24 (92.3)	22 (84.6)	65 (86.7)	
No need	-	-	1 (3.8)	1 (1.3)	
Do not know	4 (17.4)	2 (7.7)	3 (11.5)	9 (12.0)	
Do informal networks of VAHWs operate in provinces (multiple choice), n (%)					
Yes	3 (13.0)	4 (15.4)	7 (26.9)	14 (18.7)	
No	20 (87.0)	22 (84.6)	19 (73.1)	61 (81.3)	

More VAHWs demonstrated that DVs/OAHPs is the institution to support, while the rest are GDAHP, local authority and NGOs to do so. DVs/OAHPs under GDAHP is institution to train, support and supervise following the legal framework that have been set in order to control and prevent of diseases and enhance the animal production. In addition, they also indicate the important of VAHWs' association and this should be formed to allow them to work together and share the knowledge and experiences in animal healthcare and production, although there is only informal association indicated by a few respondents. Thus, formal association with clear role/task along with legal framework should set up as they will have a strong voice and gain strong support from the government and development partners.

IV.2.8. Effective animal health services and possible improvements

IV.2.8.1. Effective performance and requirement to deliver the service based on VAHWs' report

All VAHWs interviewed are satisfied with their work. "To be a successful VAHW in delivering animal health services, what should you do?", nearly 70 percent of VAHWs answered that more trainings are required to build/strengthen their capacities, particularly in handling new emerging diseases. This is followed by: i) encouraging farmers to raise more animals (answered by 8 percent), ii) providing proper vaccination (answered by 1.3 percent in Svay Rieng), iii) providing timely treatments (answered by 13.3 percent), iv) giving advice on animal care & management (answered by 10.7 percent), v) requiring support from NGOs (answered by 2.7 percent in Svay Rieng), vi) using good quality medicine (answered by 2.7 percent except in Kandal), vii) charging reasonable fees (answered by 5.3 percent except in Kandal), and viii) no answer (answered by 6.7 percent) (Table 43).

Table 43: VAHWs opinion for a successful of delivering animal health service, they should do in Kandal,Takeo and Svay Rieng, Cambodia (multiple choice).

	Kandal, n (%)	Takeo, n (%)	Svay Rieng, n (%)	Overall, n (%)
Encourage farmers to	1 (4.3)	2 (7.7)	3 (11.5)	6 (8.0)
raise more animals				

Provide proper	-	-	1 (3.8)	1 (1.3)
Provide timely treatment	2 (8.7)	7 (26.9)	1 (3.8)	10 (13.3)
Give advice on animal care & management	1 (4.3)	4 (15.4)	3 (11.5)	8 (10.7)
Require support from NGOs	-	-	2 (7.7)	2 (2.7)
Participate more trainings	19 (82.6)	16 (61.5)	15 (57.7)	50 (66.7)
Good quality medicine	-	1 (3.8)	1 (3.8)	2 (2.7)
Charge a reasonable fee	-	2 (7.7)	2 (7.7)	4 (5.3)
No answer	1 (4.3)	2 (7.7)	2 (7.7)	5 (6.7)

An opinion of VAHWs regarding the "requirement for their works" are as follow: i) support of vets' materials & equipment (answered by 30.7 percent); ii) build their capacity through refreshment training (answered by 42.7 percent), pay attention on treatment (answered by 9.3 percent in Svay Rieng); iii) support transportation means (answered by 12 percent); iv) establish lab at OAHPs (answered by 1.3 percent in Svay Rieng); v) build good relations with farmers (answered by 2.6 percent in Svay Rieng); vi) provide incentive for the operation of VAHWs (answered by 32 percent); vii) use of good medicine & vaccine (answered by 16 percent); and viii) not answer at all (answered by 10.7 percent) (Table 44).

 Table 44: Requirement of VAHWs in relation to works in Kandal, Takeo and Svay Rieng, Cambodia (multiple choice).

	Kandal, n (%)	Takeo, n (%)	Svay Rieng, n (%)	Overall, n (%)
Provide vets' materials & equipment	12 (52.2)	4 (15.4)	7 (26.9)	23 (30.7)
Build the capacity through the refreshment training	6 (26.1)	15 (57.7)	11 (42.3)	32 (42.7)
Pay attention to treatment	-	-	7 (26.9)	7 (9.3)
Support transportation mean	6 (26.1)	2 (7.7)	1 (3.8)	9 (12.0)
Establish lab at the OAHPs	-	-	1 (3.8)	1 (1.3)
Build good relation with livestock farmers	-	-	2 (7.7)	2 (2.6)
Get incentive for VAHWs	9 (39.1)	13 (50.0)	2 (7.7)	24 (32.0)
Use of good quality medicine & vaccines	3 (13.0)	8 (30.0)	1 (3.8)	12 (16.0)
No answer	4 (17.4)	2 (7.7)	2 (7.7)	8 (10.7)

IV.2.8.2. Possible improvements

• Based on VAHWs' report

VAHWs gave answers on the possible improvement of their works as the community animal health workers: i) build good relations between VAHWs and farmers (answered by 41.3 percent); ii) organize monthly meetings among VAHWs (answered by 20 percent); iii) VAHWs work together in vaccination campaigns (answered by 10.7 percent); iv) attend more training to build knowledge & expertise (answered by 10.7 percent); v) require support from the government (answered by 1.3 percent in Svay Rieng); vi) farmers should increase number of animals with good care & feeding (answered by 5.4 percent in Svay Rieng); vii) provide better fees in vaccination campaigns (answered by 1.3 percent in Svay Rieng); viii) require energize VAHWs (answered by 1.3 percent in Svay Rieng); ix) good market for animals (answered by 10.7 percent); x) provide timely service (answered by 13.3 percent) and xi) no answer at all (answered by 28 percent) (Table 45).

	Kandal, n (%)	Takeo, n (%)	Svay Rieng, n (%)	Overall, n (%)
Build good cooperation between VAHWs & farmers	10 (43.5)	11 (42.3)	10 (38.5)	31 (41.3)
Organise monthly meeting	8 (34.8)	5 (19.2)	2 (7.7)	15 (20.0)
Work together in vaccination campaigns	2 (8.7)	5 (19.2)	1 (3.8)	8 (10.7)
Attend training to build knowledge and expertise	1 (4.3)	4 (15.4)	3 (11.5)	8 (10.7)
Require support from the government	-	-	1 (3.8)	1 (1.3)
Farmers should raise more animals with good care & feeding	-	-	4 (15.4)	4 (5.3)
Provide better fee in vaccination campaigns	-	-	1 (3.8)	1 (1.3)
Require energize VAHWs	-	-	1 (3.8)	1 (1.3)
Good market for the animals	1 (4.3)	-	7 (26.9)	8 (10.7)
Provide timely services	-	9 (34.6)	1 (3.8)	10 (13.3)
No answer	11 (47.8)	7 (26.9)	3 (11.5)	21 (28.0)

Table 45: VAHWs' list of possible improvement for work of VAHWs in Kandal, Takeo and Svay Rieng, Cambodia (VAHWs' report; multiple choice).

• Based on farmers' report

Of the total farmers interviewed, 18 do not provide answers for the enhancing VAHWs' work (Table 46), while the rest (8, 2, 8, 11, 11, and 2) demonstrate as i) GAHP/MAFF to provide medicines and vaccines, ii) provide incentive for village vet, iii) VAHWs are to provide training to farmers, iv) VAHWs are to be active in animal health monitoring & disease surveillance, v) VAHWs are to be active in delivering the services & advise, and vi) should have one village one VAHW for timely service provision.

Table 46: Possible improvement for work of VAHWs in Kandal, Takeo and Svay Rieng, Cambodia (farmers' report; multiple choice).

Kandal, n (%)	Takeo, n (%)	Svay Rieng, n (%)	Overall, n (%)	
				2

2 (13.3)	3 (20.0)	3 (20.0)	8 (17.8)
	1 (6.7)	1 (6.7)	2 (4.4)
3 (20.0)	2 (13.3)	3 (20.0)	8 (17.8)
3 (20.0)	2 (13.3)	6 (40.0)	11 (24.4)
4 (26.7)	3 (20.0)	4 (26.7)	11 (24.4)
9 (60 0)	- 7 (46 7)	2 (13.3) 2 (13.3)	2 (4.4) 18 (40 0)
- 3	(20.0) (20.0) (26.7) (60.0)	$\begin{array}{c} 1 (13.3) \\ (20.0) \\ (20$	$\begin{array}{cccccccccccccccccccccccccccccccccccc$

Based on stakeholders' report

All stakeholders have indicated that in order to improve the services provided by VAHWs, additional training is required. Government vet and local authority have also suggested the need to provide incentives, veterinary tools, and equipment to support their work. Furthermore, NGOs have emphasized the importance of establishing official VAHWs' association.

In comparison, most VAHWs expressed that building good relation between them and farmers should be improved and the rest, monthly meeting should be organized and more training required to enhance animal health care service and this is similar to the stakeholders' suggestion as to provide training, incentive and establish official VAHWs' association. However, 18/45 famers are not able to provide answer on possible improvement of the local animal health workers. It is likely that, as reported by farmers to enhance the village vet service as follows: GAHP/MAFF to provide medicines and vaccines, VAHWs are to provide training to farmers, VAHWs are to be active in animal health monitoring & disease surveillance and VAHWs are to be active in delivering the services & advices would be required for quality service deliverables.

IV.2.9. SWOT analysis of VAHWs

IV.2.9.1. Strengths

VAHWs were established in Cambodia for more than 10 years and have been providing animal health services to livestock farmers. The establishment of a well-functioning for providing animal health services can have a positive impact on animal health and production.

Involving local authorities such as village chief and commune council in the selection of VAHWs, along with the selecting criteria, is a great start for establishing local animal health service providers as they have good knowledge of them and gain recognition.

All VAHWs that trained in the standard curriculum recognized and provided training certificate by GDAHP. With recognition & training certificates, VAHWs are to be better equipped to provide quality livestock health services for their communities.

VAHWs gain strong support and satisfaction from the government, non-governmental organizations (NGOs), Development Partners (DPs), and other stakeholders in the animal health sector. This support

plays a crucial role in ensuring the sustainability and effectiveness of VAHWs over the long term in providing animal health services for rural communities.

VAHWs collaborate/work with local authorities and DVs for various activities such as large ruminant vaccination campaigns, diseases surveillance & reporting. Their collaboration is to ensure the success and efficiency of the activities that benefit both livestock production and overall animal health care in their communities.

VAHWs began communicating with each other and exchanging information using Telegram/Facebook Messenger groups at the district level. This chatting mechanism have been enable efficient and real-time communication among VAHWs in exchanging knowledge, and experiences.

VAHWs have additional sources of income to sustain their family's economy, such as crop and livestock farms and eventually they raise livestock better than farmers in term of productivity and disease control. This variety of income could potentially incentivize them to continue serving in community animal health profession meanwhile the farm establishment portrayed as demonstration for other farmers to learn and followed the practices.

IV.2.9.2. Weaknesses

Inadequate/inequal trainings delivered by different institutions could restrict the quality of service as limited knowledge and skills, resulting in idle animal health service providers.

Inadequate representation of VAHWs interests at the national level. Establishing a formal network/association can be beneficial for them, as it gives common voice to advocate for their needs, concerns, and work development.

Little attention of VAHWs to advice on disease control, animal management, and feeding practices as they focus on providing animal health care services to generate income.

Weak commitment of VAHWs in sharing information about disease outbreaks, informing about contagious diseases, and providing analysis results of samples taken from farms to livestock farmers.

Limited effort of VAHWs in animal disease surveillance and monitoring of animal health and production for livestock farmers.

New emerging disease outbreaks can be a challenge for VAHWs limited knowledge and capacities to deal with new diseases outbreaks (emerging disease)

IV.2.9.3. Opportunities

GDAHP & MAFF's policy and strategic plan set livestock production as the priority along with an increasing demand for animal products such as meat, milk and eggs as the main income source of rural communities, thus **an increase in demand for animal health and prevention services at local communities**.

NGOs and other organizations play an important role in providing fund, supporting and training for VAHWs. With their support and assistance, it may be possible to expand the work of VAHWs and quality animal health care services.

Expanding services provided by VAHWs to include more preventive measures such as vaccinations and livestock health management can be beneficial for animal's producers/farmers at the community level.

Expanding VAHWs' work to reach more rural communities is a positive step towards improving animal health in these areas as well as increased their income.

Recent development of commercial farms vs small-scale farms as well as gaining government support that may require high standards of animal health professionals, thus this is an opportunity for VAHWs to build the capacity and knowledge to meet recent demand.

Cambodia is adopting the technologies of Industrial Revolution 4.0: digitalization. Smartphone usage and internet connectivity can be beneficial for VAHWs to learn and share knowledge among their teams as well as professional veterinarians.

Increased level of satisfaction among livestock farmers can serve as a driving force for sustainable animal health service providers at the communities.

IV.2.9.4. Threats

Government policies and regulations can have a significant impact on animal health systems. If, in the future, Cambodian government does not support VAHWs or if livestock is not a top priority for farmers, or if this demands high standards of veterinary professionals.

Lack of resources to support their work, which can impact their ability to sustain their services. VAHWs rely on the fees from the services they provided to farmers for the treatment and vaccination. Although the task mentioned that VAHWs have role of reporting of the diseases outbreak but they do not receive support/incentive for the operation.

Input supply companies providing animal health services to clients lead to a decrease in demand the services of VAHWs.

Farmers is reluctant to vaccinate the animals due to a perceived low efficacy of vaccine quality and thus do not request VAHWs to provide vaccination service.

Competition from private veterinarians (petsart pip pob) who also offer animal health services could be another threat as this affects VAHWs in providing services to local communities. This is due to private veterinarians may attract livestock owners with their lower treatment fees and effective services, leading to a loss of business for VAHWs.

Ongoing COVID-19 pandemic could potentially affect the ability of the VAHWs to provide services and reach communities. The pandemic has disrupted many aspects of daily life and has had a significant impact on the delivery of animal health services.

V. Conclusions and recommendations

Livestock production and business are vital for farming families and in country food supply. However, there are still concerns regarding food safety and disease outbreaks, which can lead to significant losses and pose a threat to human health. Necessary measures have been taken to address these specific threats and risks, which include the establishment of VAHWs on the ground. This enables local farmers to seek support and assistance when needed.

- VAWHs could play a vital role in providing animal health and production services to small-scale farmers and contribute to disease surveillance and reporting. However, the quality of their works is affected by the variation in training and duration provided by different institutions. Therefore, it is important to adopt the standardized training curriculum developed by GDAHP to equip them with sufficient knowledge to deliver high-quality services.
- Idle VAHWs attended less courses and less than half of the VAHWs participated in the refresher trainings to acquire knowledge and expertise. The lack of sufficient knowledge could worsen the delivery services provided to farmers in the communities. Additional trainings are required, particularly in Kandal and Takeo. The training curriculum should design to include more discussions on common diseases, the constraints they face, and emerging diseases.
- VAHWs' services provided mainly focus on vaccination and treatments, while there is a low¹ response to reporting of disease outbreaks, which is crucial for disease control and prevention. Therefore, the Terms of Reference should be clearly stated and implemented to ensure that all tasks are carried out, along with providing incentives for the operations.
- A low number of farmers reported meeting with VAHWs. This is likely due to the recent COVID-19 outbreak, which has restricted physical meetings. If this is the case, it highlights the need to establish a connection between "active" and "passive" services for animal health. One option to address this is to organize digital meetings using platforms they are familiar with such as Messenger and Telegram that would facilitate the linkages between farmers and VAHWs. This communication means can facilitate the meeting between DVs/OAHPs and VAHWs to provide advice, find out the solution, and report the works.
- VAHWs reported that their current practice during outbreaks is to wait for assistance from outsiders and treat cases immediately. However, this approach is not recommended. Instead, VAHWs should inform the local authority and DVs/OAHPs about the situation, provide the necessary information, and wait for further action. To address this issue, it is suggested that further training or raising awareness among VAHWs is required. This will help to equip them with additional knowledge and expertise in disease control and prevention.
- VAHWs pay less attention to disease surveillance, reporting, information sharing, and monitoring. There is a risk if these actions are not taken seriously. Therefore, raising awareness and implementing campaigns are necessary to make a strong effort towards disease control and prevention.
- There is a misconception regarding vaccines for controlling specific diseases and the need to report specific diseases during outbreaks. Campaign or raising awareness should be considered as an intervention among VAHWs and livestock farmers.

Overall, the establishment of VAHWs is varied in training and duration that leads to different level of knowledge and skill to deliver the service and reporting, particularly the idle ones. VAHWs perform mainly on the treatment and vaccination that they can generate income to sustain the service delivered to the livestock farmers with less effort in disease surveillance and reporting. Therefore, the established village vets should be provided/refreshed with continual additional trainings, set clear task and responsibility and provide incentive support, monitoring and supervision along with regular meetings in order to sustain their services as well as other tasks at their communities. Furthermore,

¹ Less than 50 percent of responses considered to be low

formal VAHWs association should be established to allow them to work together as part of learning and sharing knowledge and experiences.

VI. Acknowledgements

AVSF Cambodia would like to acknowledge French Ministry of Foreign Affairs for financial support of the survey. Thanks are given to village animal health workers and livestock farmers in Kandal, Takeo and Svay Rieng for spending their valuable time allowing us to interview. Special thanks vet at DVs and OAHP for their guidance and assistance. Thanks to GDAHP, FAO and Royal University of Agriculture for spending time with us to carry out stakeholder interviews.

VII. References

Desvaux S, Marx N, Ong S, Gaidet N, Hunt M, Manuguerra JC, Sorn S, Peiris M, Van der Werf S, Reynes JM. 2009. Highly pathogenic avian influenza virus (H5N1) outbreak in captive wild birds and cats, Cambodia. Emerg Infect Dis. 2009 Mar;15(3):475-8. doi: 10.3201/eid1503.071410.

Eurocham 2020. Agriculture. Agriculture Sector in Cambodia | investincambodia-eu.org

FAO 2021. FAO strengthens field capacities of Cambodia's officials to fight African swine fever (ASF). FAO press released, FAO strengthens field capacities of Cambodia's officials to fight African swine fever (ASF) | FAO in Cambodia | Food and Agriculture Organization of the United Nations

GDAHP 2015. Strategic Planning Framework for Livestock Development: 2016 – 2025. Ministry of Agriculture, Forestry and Fisheries (MAFF), Cambodia

GDAHP 2020. Annual report in 2020 and plan for 2021. Ministry of Agriculture, Forestry and Fisheries.

Khmer time 2022. Ministry tackling cattle diseases head on - Khmer Times. Ministry tackling cattle diseases head on - Khmer Times (khmertimeskh.com)

Khmer Time 2023. Viruses in Cambodian bird flu cases identified as endemic clade. Viruses in Cambodian bird flu cases identified as endemic clade | Reuters

Liu Y, Zhang X, Qi W, Yang Y, Liu Z, An T, Wu X, Chen J. 2021. Prevention and Control Strategies of African Swine Fever and Progress on Pig Farm Repopulation in China. Viruses.13(12):2552. 10.3390/v13122552.

MAFF 2021. Pig value chain in Cambodia: Unleashing the potential of selected agricultural value chains. Department of Planning and Statistics, Ministry of Agriculture, Forestry and Fisheries.

Mukherjee S. 2017. Emerging Infectious Diseases: Epidemiological Perspective. Indian J Dermatol. 62(5):459-467. 10.4103/ijd.IJD_379_17. PMID: 28979007; PMCID: PMC5618832.

Sorn San 2021. FMD situation and its prevention and control. PowerPoint Presentation (woah.org)

Sieng S., Patrick, I. W, Windsor, P. A, Walkden-Brown, S. W., Kerr, J., Sen S., Sar, C., Robert Geoffrey Beaumount Smith, R. G. B., and Kong, R. 2021. Contributions of village animal health workers to foot-and-mouth disease control in Cambodia. Transboundary and Emerging Diseases (69) 4.

WHO 2023. Avian Influenza A (H5N1) - Cambodia. Avian Influenza A (H5N1) - Cambodia (who.int)

WOAH, no date. Avian Influenza. Avian Influenza - WOAH - World Organisation for Animal Health

Annex 1: List of stakeholders, VAHWs & small-scale livestock farmers

No	Name	Sex	Role	District, Province	Telephone
Stake	holders consulted		•	•	
1	Song Soklim	М	Director of Dept of	Phnom Penh	012 062 //8
-	Joing Jokinn	IVI	Animal Production.		012 302 440
			GDAHP		
2	Pich Peda	М	Deputy Director of	Phnom Penh	012 286 568
			Animal Health and		
			Veterinary Public Health,		
			GDAHP		
3	Chim Vutha	Μ	Head of Office of	Phnom Penh	012 829 223
			Epidemiology and		
			Information Analysist,		
4	Thong Kouch	NA	Vice Deep of Faculty of	Bhnom Bonh	007 7 770 201
4	meng Kouch	IVI	Veterinary Medicine		0911119301
			RUA		
5	Deth Sideth	Μ	Technical Associate.	Phnom Penh	012 226 206
-			ECTAD-FAO		
6	Min Sophoan	М	Country Coordinator,	Phnom Penh	012 987 613
			AVSF		
	Sear Borin	М	Livestock Coordinator	Phnom Penh	012 300 024
7	Choun Bunthoeun	М	OAHP	Takeo	012 272 427
8	Norn Sam	M	-		015 382 600
9	Soun Botum	M	-		017 840 876
10	Horn Oudom	M			061 363 738
11	Chit Korn	M	Chi Kma Chief of	Treang, Takeo	0978150018
10	So Sokkorn	NA	District Vot	Troang Takoo	010 708 3/1
13	Hok Sou	M	District Vet	Borei Chulsa Takeo	012 728 341
14	Prak Sorn	M	Angkrouch Village Chief	Borei Chulsa, Takeo	097 8 023 495
<u> </u>					
15	Sorn Samart	М	District Vet	Saang, Kandal	012 703 578
16	Ouk Mean	М	Krang Yov Member of	Saang, Kandal	017 303 740
			Commune Council		
17	Yon Song	М	Chek Vice Chief of	Saang, Kandal	096 3 566 672
			Village		
18	Chan Thy	М	OAHP	Svay Rieng	097 7 515 281
19	Seng	М	District Vet	Svay Chrum, Svay	071 3 330 456
	•			Rieng	
Interv	lewees				
1	Sar Sam Oul	Μ	VAHW	Kandal	N/A
2	Khin Khan	М	VAHW	Kandal	092 282 226
3	Tho Pheng	М	VAHW	Kandal	015 549 296
4	Ai Thorn	М	VAHW	Kandal	N/A
5	Phat Pheap	M	VAHW	Kandal	N/A
6	Kheoun Sokhon	M	VAHW	Kandal	N/A
/	Seng Hornn	M	VAHW	Kandal	N/A
8	Sath Sokhom	M	VAHW	Kandal	0/12323783
9	Unneing Unnay			Kandal	012 469 921
11	Soa Nim	M		Kandal	097 202 507
12	Chork Cheat	M		Kandal	032 203 037
<u> </u>	Short Offeat	141	V/311VV	Nanual	000 240 020

13	Seam Kruy	М	VAHW	Kandal	092 791 876
14	Vong Van Sreiy	М	VAHW	Kandal	097 6 698 677
15	Thorn Thach	М	VAHW	Kandal	012 808 477
16	Sor San	М	VAHW	Kandal	088 8 807 297
17	Tang Toch	М	VAHW	Kandal	081 247 086
18	Leuk Sambo	М	VAHW	Kandal	078 681 618
19	Jeng Yi	М	VAHW	Kandal	071 2 266 956
20	Nea Davy	М	VAHW	Kandal	N/A
21	Sroun Srean	М	VAHW	Kandal	092 639 409
22	Sorn Heng	М	VAHW	Kandal	088 7 391 877
23	Hak Vuth	М	VAHW	Kandal	077 446 263
24	Mao Yeun	М	VAHW	Svay Rieng	088 2 104 392
25	Lam Sopheap	М	VAHW	Svay Rieng	097 2 030 519
26	Sao Sabol	М	VAHW	Svay Rieng	097 2 920 145
27	Thou Kearist	М	VAHW	Svay Rieng	097 2 899 237
28	Chea Sean	М	VAHW	Svay Rieng	097 6 085 626
29	Rath Sarorn	М	VAHW	Svay Rieng	097 2 897 848
30	Eim Canthorn	М	VAHW	Svay Rieng	097 2 031 137
31	Thoun Ran	М	VAHW	Svay Rieng	097 3 344 567
32	Srey Sophal	М	VAHW	Svay Rieng	097 9 758 727
33	Chum Chhun	М	VAHW	Svay Rieng	088 9 853 700
34	Mai Saroeun	М	VAHW	Svay Rieng	N/A
35	Chhoun Vuthy	М	VAHW	Svay Rieng	088 6 707 174
36	Pach Joy	М	VAHW	Svay Rieng	088 3 584 555
37	Leuk Vutha	М	VAHW	Svay Rieng	097 9 984 166
38	Oung Sarin	М	VAHW	Svay Rieng	031 4 448 460
39	Va Sam Ean	М	VAHW	Svay Rieng	097 9 889 186
40	Ein Phon	М	VAHW	Svay Rieng	088 2 151 451
41	Som Romphoun	М	VAHW	Svay Rieng	097 8 692 469
42	Phat Phalla	М	VAHW	Svay Rieng	088 5 663 995
43	Bun Saron	М	VAHW	Svay Rieng	096 8 789 992
44	Pork Sam Orn	М	VAHW	Svay Rieng	096 7 976 907
45	Sam Sarath	М	VAHW	Svay Rieng	096 8 246 515
46	Yu Sokea	Μ	VAHW	Svay Rieng	088 3 308 063
47	Hean Savet	M	VAHW	Svay Rieng	088 7 661 992
48	Horng Lo	М	VAHW	Svay Rieng	097 369 951
49	Preap Samorn	Μ	VAHW	Svay Rieng	097 9 543 646
50	Pich Khon	М	VAHW	Takeo	N/A
51	Kheng Chhorn	M	VAHW	Takeo	092 841 457
52	Som Kimsan	M	VAHW	Takeo	N/A
53	Noun Samy	M	VAHW	Takeo	N/A
54	Knem Bun Chnoeun	IVI	VAHW	Такео	N/A
55	Ouk Sotny			Такео	N/A
50	Ngen Hoeun			Takeo	070 01 525
57	Arm Sarat	IVI M		Takeo	070041020
50	Tom Dun			Takeo	006 5 961 422
60				Takeo	007 0 001 400
61	Song Borin	M		Takeo	0972220800
62	Sou Chan	M	VAHW	Takeo	097 2 922 223
63	Nev Phal	M	VAHW	Takeo	081 264 375
64	Se Eim	M	VAHW	Takeo	017 891 927
65	Matt Yot	M	VAHW	Takeo	097 4 678 450
66	Mak Nev	M	VAHW	Takeo	097 6 314 404
	. /		1		

67	Tuy Bo	М	VAHW	Takeo	092 142 331
68	Seim Rithy	М	VAHW	Takeo	088 7 640 864
69	Ein Chantrea	М	VAHW	Takeo	099 477 731
70	Be Chantha	М	VAHW	Takeo	071 2 304 897
71	Lam Sambath	М	VAHW	Takeo	097 7 577 955
72	Louy Lern	М	VAHW	Takeo	086 954 986
73	Va Deap	М	VAHW	Takeo	097 7 190 528
74	Nhem Nhep	М	VAHW	Takeo	097 2 446 222
75	Yoeun Sambatj	М	VAHW	Takeo	012 808 476
76	Chheng Sarath	М	Livestock Farmers	Kandal	090 462 096
77	Doeun Srey Pov	F	Livestock Farmers	Kandal	096 2399004
78	Sderng Sorin	М	Livestock Farmers	Kandal	096 23 99004
79	Sea Kheang	М	Livestock Farmers	Kandal	0962399004
80	Tey Puy Leng	М	Livestock Farmers	Kandal	N/A
81	Houng Kim Heung	F	Livestock Farmers	Kandal	096 8 219 795
82	Khon Hong	F	Livestock Farmers	Kandal	N/A
83	Yum Khim	F	Livestock Farmers	Kandal	N/A
84	Khorn Kheng	F	Livestock Farmers	Kandal	N/A
85	Mun Vorn	F	Livestock Farmers	Kandal	N/A
86	Kuy Pheap	F	Livestock Farmers	Kandal	015 480 528
87	Hong Chan Sok	F	Livestock Farmers	Kandal	096 2 399 004
88	Khun Nget	М	Livestock Farmers	Kandal	096 8 972 353
89	chhorn Phally	F	Livestock Farmers	Kandal	096 2 918 439
90	Kea Thoah	Μ	Livestock Farmers	Kandal	N/A
91	Pov Thiday	F	Livestock Farmers	Svay Rieng	N/A
92	Pov Panha	М	Livestock Farmers	Svay Rieng	090 989 871
93	Prum Mach	М	Livestock Farmers	Svay Rieng	096 7 961 119
94	Run Naret	F	Livestock Farmers	Svay Rieng	096 5 479 346
95	Prum Nhor	М	Livestock Farmers	Svay Rieng	096 8 778 763
96	Orn Chhen	М	Livestock Farmers	Svay Rieng	097 8 663 136
97	Iv Sam Oun	F	Livestock Farmers	Svay Rieng	096 2 003 591
98	Keo Sourn	F	Livestock Farmers	Svay Rieng	N/A
99	Tep Phalla	F	Livestock Farmers	Svay Rieng	088 2 924 268
100	Eum Sour	F	Livestock Farmers	Svay Rieng	092 263 983
101	Korng Saroun	F	Livestock Farmers	Svay Rieng	010 890 213
102	Sok Thea	М	Livestock Farmers	Svay Rieng	087 354 003
103	Bun Sarann	М	Livestock Farmers	Svay Rieng	097 9 114 607
104	Sann Thol	М	Livestock Farmers	Svay Rieng	096 3 749 898
105	Suy Neang	М	Livestock Farmers	Svay Rieng	097 8 605 701
106	Prak Chanry	F	Livestock Farmers	Takeo	N/A
107	Oun Oeun	М	Livestock Farmers	Takeo	017 255 276
108	Pakk Nhor	F	Livestock Farmers	Takeo	N/A
109	Ouch Cheouk	M	Livestock Farmers	Takeo	011 709 493
110	Prak Sina	F	Livestock Farmers	Takeo	0977371508
111	Houy Chanthou	F	Livestock Farmers	Takeo	089 230 786
112	Khy Khav	M	Livestock Farmers	Takeo	067 453 482
113	Nhem Sam Oul	F	Livestock Farmers	Takeo	N/A
114	Nnem Sam Art	M	Livestock Farmers	Takeo	N/A
115	Chan Thorn	M	Livestock Farmers	Takeo	N/A
110			Livestock Farmers	Takeo	N/A
110	Chour Chhoour		Livestock Farmers	Takeo	N/A
110			Livestock Farmers	Takeo	090702009
120	Tour Chark		Livestock Farmers	Takeo	N/A
120		Г	Liveslock Farmers	Takeo	091 8 121 102

Annex 2. Guiding questions for stakeholder interview

- 1. MAFF/GDAHP policy/strategy and plan for veterinary service in the community
- 2. Who are stakeholders in supporting veterinary service in the community? And their role?
- 3. Importance of VAHWs in implementing the veterinary services in term of surveillance, reporting and advice on livestock care, feeding and management
- 4. In your opinion, what should VAHWs do to provide effective services in the community?
- 5. Do you think training courses that you provided are sufficient for VAHWs to deliver effective service? Why? And what to improve?
- 6. What are strengths of VAHWs network to provide services?
- 7. What is the level of community's satisfaction with the services provided by VAHWs?
- 8. Any potential partnerships/collaborate that VAHWs to expand their services or strengthen their capacities?
- 9. Are there any economic or political factors that can impact VAHWs' network?
- 10. Are there any regulatory changes that can affect VAHWs' network?
- 11. Any possible improvement for effective services provided by VAHWs?

Annex 3. Questionnaire for village animal health workers

We are part of a research team with the Division of Research and Extension, Royal University of Agriculture (RUA). We are conducting research/survey on 'Technical Capacities of Village Animal Health Workers in Kandal, Takeo, and Svay Rieng'. We are interested in collecting information about the performance of the VAHWs in providing support to livestock health care and management at the local level along with exploring the technical constraints and challenges that face for future improvement. There are no 'right' or 'wrong' answers, and the information you provide will be of great contribution to improving the livestock sub-sector and disease control, prevention, and management, leading to reduce public health threats in the selected provinces. The interview will take approximately 45-60 minutes. Your participation is based on consensus. Please do not hesitate to skip any question that you do not want to answer, by saying 'skip'. Your personal information will be treated as confidential, used for research purposes only, and will never be disclosed.

SURVEY INFORMATION

T1. Questionnaire code:	_/VAHWs	
T2. Date://2023,	T2. Time beginning:	T4 .Finish:
T5. Village:	T6. District:	T7. Province:
T8. Tel/Telegram:		

T9. Full name of interviewer:.....Signature:....

A. GENERAL INFORMATION:

RRespondent's name:

GGender of respondent: Male Female AAge: (years)

EEducation:

[] Illiterate/no school[] Primary school

[] Secondary school

[] High School[] Vocational/college[] University or above

How much of your total household income is generated through providing animal health care services?

- 1. [] Under 25%
- 2. [] From 25%-50%
- 3. [] From 51% 75%
- 4. [] Above 75%
- 5. [] Do not know/do not answer

A6. How long have you become village animal health workers?Years

A7. Please provide reason for becoming village animal health workers? Tick all that applies

- 1. [] Family income
- 2. [] Your own interest
- 3. [] Family inheritance
- 4. [] Friend motivation
- 5. [] Other (specify).....

AO8. Which institutions have selected you to be village animal health workers? Tick all that applies

- 1. [] Village Chief/Commune Councils
- 2. [] District/Provincial Vets
- 3. [] GDAHP
- 4.[]NGOs
- 5. [] Other (specify).....

A08. How many villages do you provide the service of animal health care and management?

- 1. [] One village
- 2. [] Two villages
- 3. [] Three villages
- 4. [] More than three villages
- 5. [] Other (specify).....

A09. Do you keep animals at home?

- 1. [] Yes
- 0.[]No

A09.1. If yes, what type of animals do you keep, and their production system? Tick all that applies

Types of animals	Number of animals kept, heads	Scavenging/ grazing	Full confinement	Semi confinement
1. [] Pigs		[]	[]	[]
2. [] Chicken		[]	[]	[]
3. [] Duck		[]	[]	[]
4. [] Cattle		[]	[]	[]
5. [] Buffalo		[]	[]	[]
6. [] Other		[]	[]	[]
(Specify)				

A10. Please mention 3 important responsibilities that you have to do as a VAHW?

1..... 2...... 3.....

B. Training Attended:

B01. Have you ever been attending training course?

- 1. [] Yes
- 0.[]No

B01.1. If yes, how many training courses have you received to become VAHWs?.....

B02. On what topics have you attended the courses? Tick all that applies

- 1. [] Treatment
- 2. [] Vaccination
- 3. [] Castration
- 4. [] Animal care, feeding, and management
- 5. [] Disease surveillance, and reporting
- 6. [] Other (specify).....

BO3. Who provided training courses to you? Tick all that applies

- 1. [] GDAHP
- 2. [] OAHPs/District Vets
- 3.[]NGOs
- 4. [] Input suppliers
- 5. [] Other (specify).....

B04. Please mention 3 topics you learned best during the training courses

Topics	Give 3 reasons for the 3 topics

B05. Have you every received any refreshment training recently?

1. [] Yes

0. [] No

B05.1. On what topics have you attended the refreshment training? Tick all that applies

- 1. [] Treatment
- 2. [] Vaccination
- 3. [] Castration
- 4. [] Animal care, feeding, and management
- 5. [] Disease surveillance, and reporting
- 6. [] Other (specify).....

C. Services Provided:

CO1. What services do you provide to animal raisers? Tick all that applies

- 1. [] Vaccination
- 2. [] Treatment
- 3. [] Castration
- 4. [] Advice on animal health
- 5. [] Advice on animal care, feeding, and management
- 6. [] Other (specify).....

CO2. What types of animals do you provide services? Tick all that applies

Services	Cattle	Buffalos	Pigs	Poultry	Others
1. [] Vaccination	[]	[]	[]	[]	[]
2. [] Treatment	[]	[]	[]	[]	[]
3. [] Castration	[]	[]	[]	[]	[]
4. [] De-worming	[]	[]	[]	[]	[]
5. [] Advice	[]	[]	[]	[]	[]
6. [] Other	[]	[]	[]	[]	[]
(specify)					

C02.1. If you provide vaccination, please mention 3 diseases of each livestock species that can be prevented by vaccination

Animal Species	Diseases
Cattle	
Buffalos	
Pig	
Poultry	
Others	

CO2.2. If you provide vaccination, please list 5 requirements for a successful vaccination exercise

CO2.3. If you provide vaccination, how do you determine the dosage for vaccination?

.....

CO3. What types of animals did you provide services to last month and estimate the number?

Services	Cattle	Buffalos	Pigs	Poultry
1. [] Vaccination	heads	heads	heads	heads
2. [] Treatment	heads	heads	heads	heads
3. [] Castration	heads	heads	heads	heads
4. [] De-worming	heads	heads	heads	heads
5. [] Advice	heads	heads	heads	heads
6. [] Other (specify)	heads	heads	heads	heads

CO4. What kind of advice do you give to animal keepers? Tick all that applies

Advice	Cattle	Buffalos	Pigs	Poultry	What is your advice?
1. [] Hygiene	[]	[]	[]	[]	
2. [] Housing	[]	[]	[]	[]	
3. [] Feeding	[]	[]	[]	[]	
4. [] Water	[]	[]	[]	[]	
5. [] Disease	[]	[]	[]	[]	
Prevention					
6. [] Other	[]	[]	[]	[]	
(specify)					

C05. How frequently have you provided advice to animal raisers?

- 1. [] twice a week
- 2. [] once a week
- 3. [] twice a month
- 4. [] when asked only
- 5. [] other (specify.....)

CO6. What did farmers do after obtaining your advice? Tick all that applies

- 1. [] changed their attitudes toward animal keeping practice
- 2. [] continue as their usual practices
- 3. [] farmers became concerned about diseases infection risk to their family
- 4. [] stopped selling and eating dead animals
- 5. [] other (specify.....)

CO7. What should you do when you suspect of disease outbreak? Tick all that applies

- 1. [] wait for assistance from outsiders
- 2. [] inform local authority (CC or village chief)
- 3. [] kill animals in the infected farms by yourself
- 4. [] inform district and provincial vets immediately
- 5. [] treat them immediately
- 6. [] collect necessary information to inform lab at GDAHP
- 7. [] other (specify.....)

CO8. How would you rate your services? Rate 1-5; 1=worst and 5=best

CO8. 1. Please provide reasons for the rating

CO8. What constraints/challenges do you face in providing your services? **Tick all that applies**

- 1. [] Knowledge, please give reasons.....
- 2. [] Accessibility to drugs & vaccines, please give reasons.....
- 3. [] Quality of drugs & vaccines, please give reasons.....
- 4. [] Attitude of animal keepers, please give reasons.....
- 5. [] Payment for the service, please give reasons.....
- 6. [] Lack of resources for operation, please give reason.....
- 7. [] Can not access/provide service at remote community, please give reason
- 8. [] Other (specify).....please give reasons.....

CO8. 1. In your opinion, how to improve your service?.....

D. Disease Surveillance and Reporting

D01. Is there any disease reporting system exist or you know in the community / village?

1. [] Yes

0.[]No

D02. Please list the diseases commonly reported in your village/area?

1	 	 	 	
2	 	 	 	
3	 	 	 	

D03. Please list 3 diseases that you know

L	
)	
>	•

D04. Do you participate in sample collection?

- 1. [] Yes
- 0.[]No

D04. 1. If yes, what type of samples do you collect? Multiple choice

- 1. [] Feacal sample
- 2. [] Blood sample
- 3. [] Other (specify).....

D05. Please list 3 main diseases that you have to report?

1	
2	
3	
4	

D06. What is the mechanism of reporting? Please list down below:

.....

D07. What type of information do you include in the report? Tick all that applies

1. [] Number of animal treated

2. [] Number of animals sick

 3. [] Number of animals dead 4. [] Location 5. [] Number of survived 6. [] Type of disease 7. [] Disease infrastructure 8. [] Other (specify)
D08. Who do you report to?1. [] GDAHP, role2. [] OAHPs/District Vets, role3. [] Local authority, role3. [] NGOs, role4. [] Input suppliers, role5. [] Farmer organization (FO), role6. [] Other (specify)
D09. Do you provide feedback to the animal raisers? 1. [] Yes 0. [] No
D09. 1. If yes, what feedback/information that you provide to them?
D09. 2. If yes, please provide the methods you use to provide feedback/information to the
D10. What is constraint/challenges in disease surveillance?

D10.1. In your opinion, how to improve it?.....

D11. What is constraint/challenge in reporting?

D11.1. In your opinion, how to improve it?.....

F. VAHWs' Networking

F01. Who always support and works with you and what are their roles? Tick all that applies

1. [] GDAHP, role.....

- 2. [] OAHPs/District Vets, role.....
- 3. [] Local authority, role.....
- 3. [] NGOs, role.....
- 4. [] Input suppliers, role.....
- 5. [] Farmer organization (FO), role.....
- 6. [] Other (specify).....

F02. Do any VAHW organizations/associations exist in the provinces or Cambodia?

- 1. [] Yes
- 0.[]No

FO2. 1. If yes, please name the organization/association:

F02. 2. If yes, do you belong to any of organization/association?

- 1.[]Yes
- 0.[]No

FO2. 3. If yes, do you think VAHWs will benefits from the organizations/association?

- 1. [] Yes
- 0.[]No

F02. 3. 1. Please describe.....

F03. Do you think VAHW organization/association should be formed?

- 1.[]Yes
- 2. [] No need
- 3. [] Do not know

F03. 1. If yes, from your point of view, who is the appropriate person to start forming the VAHW organization/association?

F04. Please give your opinions, how to run the VAHW's organizations/associations smoothly.....

F05. Do informal networks of VAHWs operate in the provinces/Cambodia?

- 1.[]Yes
- 0.[]No

F05. 1. If yes, please explain:

G. General

GO1. Do you satisfy with your work?

- 1.[]Yes
- 0. [] No

G01.1. If no, please explain:

GO2. To be successful VAHWs, what should you do?

.....

GO3. What requirement do you need in relation to your work?

.....

.....

G04. Is there any possible improvement for VAHWs to deliver the service?

.....

Thanks a lot!

Annex 4. Questionnaire for small-scale livestock farmers

We are part of a research team with the Division of Research and Extension, Royal University of Agriculture (RUA). We are conducting research/survey on 'Technical Capacities of Village Animal Health

Workers in Kandal, Takeo, and Svay Rieng'. We are interested in collecting information about the performance of the VAHWs in providing support to livestock health care and management at the local level along with exploring the technical constraints and challenges that face for future improvement. There are no 'right' or 'wrong' answers, and the information you provide will be of great contribution to improving the livestock sub-sector and disease control, prevention, and management, leading to reduce public health threats in the selected provinces. The interview will take approximately 45-60 minutes. Your participation is based on consensus. Please do not hesitate to skip any question that you do not want to answer, by saying 'skip'. Your personal information will be treated as confidential, used for research purposes only, and will never be disclosed.

SURVEY INFORMATION

T1. Questionnaire code:	/Farmers	
T2. Date:/2023,	T2. Time beginning:	T4 .Finish:
T5. Village:	T6. District:	T7. Province:
T8. Tel/Telegram:		
T9. Full name of interviewer:	Sign	ature:

A. GENERAL INFORMATION:

Respondent's name:

Gender of respondent:
Male
Female
Age: (years)

Education:

] Illiterate/no school	[] High School
] Primary school	[] Vocational/college
] Secondary school	[] University or above

Number of family member:.....male:.....; female:.....;

How much of your total household income is generated through raising livestock? 1. [] Under 25%

2. [] From 25%-50%

- 3. [] From 51% 75%
- 4. [] Above 75%
- 5. [] Do not know/do not answer

A8. How long has this farm been established? Years

A9. How many cycles do you raise per year?

For pig farmers:.....cycles For poultry farmers:.....cycles

A10. Number of livestock that you raise?

For cattle farmers:.....

For pig farmers:..... For poultry farmers:....

A11. What is production system for your livestock?

- 1. [] Free range/fully grazing
- 2. [] Fully confinement
- 3. [] Semi-confinement

A11. What are your common problems in your livestock keeping?

- 1. [] Annual/common diseases
- 2. [] New disease outbreak
- 3. [] Lack of technical support
- 4. [] lack of feed
- 5. [] Other (specify.....)

A12. Who help you to deal with those problems?

- 1. [] Animal owners
- 2. [] GDAHP
- 3. [] District vet/OAHP
- 4. [] VAHWs
- 5. [] Private vet
- 6. [] Traditional healer
- 7. [] Local authority
- 8. [] Input supplier
- 9. [] NGOs/Farmer Organization (FO)
- 10. [] Other (specify.....)

B: Treatments

B01. Who are the animal health service providers? Tick all that applies

- 1. [] Animal owners
- 2. [] GDAHP
- 3. [] District vet/OAHP
- 4. [] VHAWs
- 5. [] Private vet
- 6. [] Traditional healer
- 7. [] Local authority
- 8. [] Input supplier
- 9. [] NGOs/Farmer Organization (FO)
- 10. [] Other (specify.....)

B02. Who are the most available and why? Tick 1 most relevance answer

- 1. [] Animal owners, why.....
- 2. [] GDAHP, why.....
- 3. [] District vet/OAHP, why.....
- 4. [] VAHWs, why.....
- 5. [] Private vet, why.....
- 6. [] Traditional healer, why.....
- 7. [] Local authority, why.....

- 8. [] Input supplier, why.....
- 9. [] NGOs/Farmer Organization (FO), why.....
- 10. [] Other (specify.....), why.....)

BO3. Do VAHWs visit you when you ask?

- 1. [] All the time
- 2. [] Most of the time
- 3. [] Sometimes
- 4. [] Rarely
- 5. [] Never

BO4. How long does it take VAHWs to visit you when you ask?

- 1. [] 12 hours
- 2. [] 24 hours
- 3. [] 2 3 days
- 4.[] 1 week
- 5. [] Over 1 week

B05. Do VAHWs tell you the name of the disease they treat?

1.[] Yes 0.[] No

B06. Do the VAHWs tell you the cause of the disease?

1. [] Yes 0. [] No

B07. Do the VAHWs tell you how the disease is transmitted?

1. [] Yes 0. [] No

BO8. Do VAHWs give you information on prevention?

1. [] Yes 0. [] No

B09. Do VAHWs examine the animals before treatment?

1. [] Yes 0. [] No

B09. Do VAHWs conduct follow up visits after treatment?

1. [] Yes 0. [] No

B10. Do VAHWs have treatment books?

1. [] Yes 0. [] No

B11. Do VAHWs write any clinical notes in the treatment book?

1.[] Yes 0.[] No

B12. Are you satisfied with the cost of treatment performed by the VAHWs?

- 1. [] Very satisfied
- 2. [] Satisfied
- 3. [] Somehow satisfied
- 4. [] Not satisfied

B12. 1. If you do not satisfy, please provide reasons.....

B13. Are you satisfied with the efficiency of treatments performed by VAHWs

- 1. [] Very satisfied
- 2. [] Satisfied
- 3. [] Somehow satisfied
- 4. [] Not satisfied

B13. 1. If you do not satisfy, please provide reasons.....

C: Disease surveillance and reporting

CO1. Do VAHWs perform the farmer meeting?

- 1. [] Regularly
- 2. [] Sometimes
- 3. [] Rarely
- 4. [] Never

CO2. Please identify type of information delivered in the meetings. Tick all that applies

- 1. [] Key disease events in the village/areas
- 2. [] Diseases events in neighboring village/areas
- 3. [] Planned activities
- 4. [] Reports of completed activities
- 5. [] Other (specify.....)

CO3. Do VAHWs visit you when not invited?

- 1. [] Regularly
- 2. [] Sometimes
- 3. [] Rarely
- 4. [] Never

CO4. Please identify activities done by VAHWs on their visit

- 1. [] Gather information on diseases
- 2. [] Collect samples
- 3. [] Give advice on disease control
- 4. [] Deliver news of disease events in village/area
- 5. [] Deliver reports of activities
- 6. [] Other (specify.....)

- C05. To whom do you report disease incidence in your animals?
- 1. [] Animal owners, why.....
- 2. [] GDAHP, why.....
- 3. [] District vet/OAHP, why.....
- 4. [] VAHWs, why.....
- 5. [] Private vet, why.....
- 6. [] Traditional healer, why.....
- 7. [] Local authority, why.....
- 8. [] Input supplier, why.....
- 9. [] NGOs/Farmer Organization (FO), why.....
- 10. [] Other (specify.....), why.....)
- CO6. Do VAHWs inform you of disease outbreaks in other villages/areas?
- 1. [] Regularly
- 2. [] Sometimes
- 3. [] Rarely
- 4. [] Never

C06.1. If they do, what is their role?

CO7. Do VAHWs inform you about contagious disease in the district?

- 1. [] Regularly
- 2. [] Sometimes
- 3. [] Rarely
- 4. [] Never

C07.1. If they do, what is their role?

CO8. Do VAHWs inform you about the analysis results after samples were taken from your farm?

- 1. [] Regularly
- 2. [] Sometimes
- 3. [] Rarely
- 4. [] Never

CO8.1. If they do, what is their role?

CO9. When faced with livestock health challenges who do you call? Tick all that applies

- 1. [] Animal owners, why.....
- 2. [] GDAHP, why.....
- 3. [] District vet/OAHP, why.....
- 4. [] VAHWs, why.....
- 5. [] Private vet, why.....
- 6. [] Traditional healer, why.....
- 7. [] Local authority, why.....
- 8. [] Input supplier, why.....
- 9. [] NGOs/Farmer Organization (FO), why.....
- 10. [] Other (specify.....), why.....)

D: Vaccination

D01. Does the VAHW inform you about the benefits and advantages of vaccination?

- 1. [] Regularly
- 2. [] Sometimes

- 3. [] Rarely
- 4. [] Never

D02. Does VAHW give advice on the care of animals post vaccination?

- 1. [] Regularly
- 2. [] Sometimes
- 3. [] Rarely
- 4. [] Never

D03. Who vaccinate your livestock?

- 1. [] Animal owners
- 2. [] VAHWs
- 3. [] Private vet.
- 4.[] Other (specify).....

D03. 1. If from the animal owner, how do you learn the vaccinate technique?

- 1. [] Drug extentionist
- 2. [] VAHWs
- 3. [] Private Vet
- 4. [] NGO
- 5. [] Other (specify).....

D03. 2. If from animal owners, where do you get vaccines?

- 1. [] Drug store
- 2. [] Drug extensionist
- 3.[] VAHWs
- 4. [] Private vet
- 5. [] Other (specify).....

D06. Is there any vaccination campaign in your village?

1.[] Yes 0.[] No

D06. 1. If yes, who do the vaccination?

- 1. [] Animal owners
- 2. [] GDAHP
- 3. [] District vet/OAHP
- 4.[] VAHWs
- 5. [] Private vet
- 6. [] Traditional healer
- 7. [] Local authority
- 8. [] Input supplier
- 9. [] NGOs/Farmer Organization (FO)
- 10. [] Other (specify.....)

D06. 1. If VAHWs do, what is their additional tasks in vaccination campaign?

- 1. [] Provide information on campaign
- 2. [] Record keeping and reporting
- 3. [] Organizing and facilitation
- 4. [] Other (specify.....)

E: Advice on animal production

E01. Do your VAHW give you advice about livestock care, feeding and management?

- 1. [] Regularly
- 2. [] Sometimes
- 3. [] Rarely
- 4. [] Never

E01. 1. If they do, what is their role?

.....

E02. Besides scavenging or grazing what else do your animals feed? Cattle:...... Pigs:...... Chickens:.....

E03. Do your VAHW advise you on alternative feeding?

1.[] Yes 0.[] No

F: General

F01. Do you have suggestions to improve the VAHWs' services?

.....

Thanks a lot!