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STOP Spillover

Viet Nam Zoonotic Disease Data Collection and Management Assessment

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ACRONYMS

STOP Spillover	Strategies to Prevent Spillover USAID Program
CDC	Center for Disease Control
DARD	Department of Agriculture and Rural Development
DOH	Department of Health
FGD	Focus Group Discussion
KII	Key Informant Interview
MARD	Ministry of Agriculture and Rural Development
MOH	Ministry of Health
OH	One Health
OHDWG	One Health-Design Research and Mentorship Working Groups
PPC	Provincial People's Committee
RAHO6	Regional Animal Health Organization 6
SBC	Social Behavior Change
TIP	Trial of Improved Practices
VAHIS	Vietnam Animal Health Information Management System
ZD	Zoonotic disease

STOP Spillover

Strategies to Prevent Spillover (or “STOP Spillover”) enhances global understanding of the complex causes of the spread of a selected group of zoonotic viruses from animals to humans. The project builds government and stakeholder capacity in priority Asian and African countries to identify, assess, and monitor risks associated with these viruses and develop and introduce proven and novel risk reduction measures. “Spillover” refers to an event in which an emerging zoonotic virus is transferred from a non-human animal host species (livestock or wildlife) to another, or to humans.

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EXECUTIVE SUMMARY

Strategies to Prevent Spillover (STOP Spillover) One Health-Design Research and Mentorship Working Groups (OHDWG) conducted a study to (1) assess the status of data collection, management, and sharing of zoonotic disease data in Dong Nai Province; and (2) propose a set of recommendations to improve the collection, management, and sharing of zoonotic disease data in animal and human populations in Dong Nai Province. Staff from the STOP Spillover Project in collaboration with implementing partners in Dong Nai Province, including the Department of Agriculture and Rural Development (DARD) and the Department of Health (DOH), conducted research in Bien Hoa city, Dinh Quan and Tan Phu districts of Dong Nai Province from July to September 2022. The study team used two main data collection techniques: key informant interviews (KIIs) and focus group discussions (FGDs) with representatives and staff of the health, veterinary, and forestry sub-sectors from provincial to commune levels.

KEY FINDINGS

In Dong Nai Province there is no specific guideline or regulation of the Provincial People's Committee (PPC) on incident reporting procedures for zoonotic diseases from the commune to the province level. Coordination occurs mainly at the provincial level between the DOH and DARD, according to Joint Circular No. 16/2013/TTLT-BYT-BNN&PTNT (MOH and MARD 2013). Local departments compile their own data for reporting purposes to their line ministries (MOH and MARD). Data on zoonotic disease have not historically been included in these reports.

Resources in terms of budget, laboratory facilities, equipment, and professional staff limit zoonotic disease detection and reporting. There is presently no budget allocation for the implementation of periodic and large-scale monitoring of zoonotic diseases in wildlife. At the same time, current laboratory equipment and facilities are only sufficient to analyze samples of some common zoonotic diseases. For in-depth analysis and emerging diseases, local departments must send disease samples to other specialized regional units (e.g., Pasteur Institute and Regional Animal Health Organisation No. 6 [RAHO6] in Ho Chi Minh city) for analysis. Capacity of professional staff, especially at the district and commune levels, to identify and report on zoonotic diseases is limited. Understanding of zoonotic and wildlife disease in general among veterinary staff is superficial. Wildlife farmers do not seek wildlife health assistance from the district and commune, as there is no capacity to provide such assistance. As a result, authorities are frequently unaware of disease outbreaks and events on farms. Likewise, the number of veterinary staff is small compared to current workload requirements; veterinary staff oversee both animal husbandry and veterinary medicine for many species of domestic animals.

According to the study conducted by STOP Spillover, some of the major difficulties and challenges in zoonotic disease data collection, management, and sharing are summarized below:

- There is limited coordination among relevant units in the province at all levels, especially at the commune and district levels.
- Local veterinarians do not have knowledge about zoonotic or wildlife disease in wild animals. In particular, officials at the district and commune levels do not have in-depth knowledge of zoonotic diseases in wildlife.
- There is no specific reporting guideline for zoonotic disease cases (incidents). In fact, farm owners rely solely on informal farmer networks to learn about treating wildlife diseases.
- There are significant barriers to the management and sharing of zoonotic disease data. Zoonotic disease data is mainly for longitudinal reporting to line ministries of each department. The number of people who have online data accounts and manage data at all levels is very limited (usually only one to two accounts per unit). Other departments can request data from each other in the form of Excel files extracted from their database. Zoonotic disease data is not yet integrated among related sectors in the province.
- Resources (human, financial, facilities) are limited.
- The existing, specialized data management systems used by local sub-sectors are limited and do not include capacity for reporting wildlife disease events (see Section 3.3).
- There is no common platform to update and manage zoonotic disease in wildlife and human populations.

The study identified several policy and technical recommendations for provincial and local government to support data sharing and integration that build on ongoing STOP Spillover project activities, to support overall operational coordination and integration between the sectors (Activity 2.1.1.1). STOP Spillover's contribution to data integration will focus on assuring the successful implementation of a comprehensive approach to coordination based on the Coordination Guideline adopted by DOH and DARD in Year 2 of the STOP Spillover Project, and future activities that facilitate the increased availability of wildlife health information.

RECOMMENDATIONS

Policy Recommendations

FOR PROVINCIAL GOVERNMENT AGENCIES

- Promote the zoonoses prevention and control Coordination Guideline approved by Dong Nai DOH and DARD in September 2022 (hereinafter referred to as the Provincial Coordination Mechanism Guideline), and share it locally with relevant stakeholders. This guideline should be disseminated throughout the province to personnel from relevant sectors. Periodic district- and community-level disease information sharing should be implemented through monthly meetings among members of either Sub-Steering Committee of Disease Prevention, or People's Health Care committees in each locality.
- The PPC should submit a request letter to MOH and MARD for approval to extract existing data from the two zoonotic disease database systems (health and animal health systems) for integration of data into a new One Health (OH) data platform for the province.
- Allocate a reasonable budget for research activities to assess major zoonotic disease risks in wildlife and for periodic surveillance activities throughout the province. Focus on high-risk wildlife species such as civets, bamboo rats, and porcupines for research and analysis.
- Improve the capacity of local laboratories to conduct in-depth analyses of zoonotic disease.
- Develop specific guidance for the regular collection and data entry of zoonotic disease in localities in line with Article 5 and Annexes 4, 5, 6, and 7 of the Coordination Mechanism Guideline (DOH and DARD 2022) to ensure regular periodical recording, reporting, and sharing of information across the same levels of health and veterinary units. Veterinary and medical staff should evaluate the information received to determine the appropriate level of OH integration in disease prevention and control activities.
- Extend the current functions and tasks of the animal health and forest protection sector to include monitoring and managing zoonotic diseases in wildlife.

FOR THE STOP SPILLOVER PROJECT

- Promote the interdisciplinary Provincial Coordination Mechanism Guideline for zoonotic disease data collection, management, and sharing. The project should support relevant stakeholders to develop detailed action plans to disseminate and implement the Provincial Coordination Mechanism Guideline at the district and commune levels to ensure data collection and sharing on zoonotic disease is consistent and systematic in Dong Nai Province. This will be implemented as part of STOP Spillover Activity 2.1.1.1.

Technical Solutions

FOR LOCAL AGENCIES

- Develop a common platform to integrate zoonotic disease data in animal and human populations in Dong Nai Province. At the same time, assign responsibility to a government agency to act as the focal point for general management and coordination of data updates and sharing as item b), Article 2, Section III in the Master Plan of Digital Transformation of Agriculture Industry and Rural Development by 2025, with orientation to 2030 approved by Dong Nai Provincial People Committee (Dong Nai PPC 2022).
- Develop a guideline for zoonotic disease data collection and management and develop procedures for reporting zoonotic disease incidents in wildlife and human populations.
- Conduct training and capacity building for professional staff (especially at the district and commune levels) in risk identification, disease assessment, and prevention and treatment of zoonotic diseases in animals and humans.

FOR STOP SPILLOVER PROJECT

- The project should not directly undertake any activity to build an integrated data sharing platform. It should instead address the current lack of wildlife disease data and intelligence that will flow into the platform.
- The project should provide technical support to local agencies on training and capacity building for professional staff in risk identification, disease recognition and assessment, and prevention and treatment of zoonotic diseases in animals and humans as part of its ongoing activities in risk reduction.
- STOP Spillover Activity 2.2.2.1 should build on the results of the behavior risk assessment and rapid biosafety assessment (Activity 1.2.6.1) to develop and implement interventions including trials of improved practices (TIPs) at wildlife farms. This activity includes conducting training of trainers (TOT) for key professional officers and rolling out best practices training to farmers or community facilitators to help wildlife households gain insight and improve their biosecurity and zoonosis prevention practices. As appropriate, improved practices will facilitate intersectoral collaboration and disease reporting.
- The project should use the results of the behavior risk assessment (Activity 1.2.6.1) to develop a social behavior change (SBC) strategy and participatory syndromic surveillance activity for actors along the wildlife farming value chain. The SBC strategy should promote zoonotic disease data collection and sharing from wildlife facilities to relevant governmental agencies to address the lack of wildlife health care and zoonotic disease reporting.

SECTION 1: INTRODUCTION

Dong Nai Province is in the Southern region of Viet Nam with relatively large forest areas. The total forest area is 200,000 ha, including 123,600 ha in natural forest area. Forests in Dong Nai have very high biodiversity with more than 1,729 species of forest animals. In addition to rich wildlife and biodiversity, Dong Nai is also the epicenter of wildlife farming in Vietnam.

In recent years, due to high market demand for wild animal meat, local farmers have increasingly invested in businesses to raise wild animals. From 2014 to 2019 in Dong Nai Province, the average number of wildlife farms was 1,100, with the number of different wildlife species farmed increasing from 39 to 71. However, in 2020 and 2021, the number of wildlife farms decreased. In 2020, there were 839 farms with 68 species and an estimated 425,374 individual animals. In 2021 there were 814 farms with 67 species and an estimated 390,308 animals farmed. Districts with large numbers of wildlife farms include Dinh Quan, Vinh Cuu, Tan Phu, Xuan Loc, and Thong Nhat.

Wildlife are reported to transmit zoonotic diseases; a 2013–2014 study by the Wildlife Conservation Society (WCS) in collaboration with the Sub-Department of Animal Husbandry and Veterinary Medicine and the Sub-Department of Forest Protection of Dong Nai Province discovered positive cases in captive wildlife species (including porcupines, primates, and bamboo rats) with three viruses, of which two were known Coronaviruses and one was an unknown Rhabdovirus (Rabaa et al 2015).

STOP Spillover, funded by the US Agency for International Development (USAID), is a five-year project implemented in Vietnam for the period of 2021–2025. STOP Spillover is implemented in several countries in Asia and Africa where there is a high risk of emergence and re-emergence of zoonotic viruses with pandemic potential. STOP Spillover assists target countries to improve their capacity to monitor, analyze, and identify the risks of zoonotic virus transmission; to develop, test, and implement interventions and policies to reduce the risk of transmission of these viruses; and to minimize the spillover and spread of emerging viruses in the community. During One Health meetings and previous USAID-funded project discussions, Dong Nai Province was identified as a high-risk interface for STOP Spillover interventions due to the high wildlife farm density and risk of zoonotic disease transmission from wildlife to humans ([PREDICT 2009-2020](#)). In consultative workshops with local stakeholders in Dong Nai Province in December 2021, stakeholders identified and prioritized improving zoonotic disease data collection, management and sharing as a key [STOP Spillover intervention](#).

SECTION 2: METHODOLOGY

2.1. RESEARCH DURATION AND LOCATIONS

Research period: July–September 2022.

Study site: Bien Hoa City, Dinh Quan District, and Tan Phu District in Dong Nai Province.

2.2. RESEARCH OBJECTIVES

This study focused on the following two main topics:

- Assessing the status of zoonotic disease data collection, management, and sharing in Dong Nai Province.
- Identifying challenges and ideas on solutions to improve the collection, management, and sharing of zoonotic disease data in wildlife and human populations in Dong Nai Province.

2.3. RESEARCH METHODOLOGY

Desktop study: Collect relevant documents from local government agencies to analyze the current zoonotic disease data collection, analysis, and sharing situation.

Field survey: A STOP Spillover One Health Design, Research and Mentoring Working Group (OHDWG) developed [in-depth interview questions](#) for key informant interviews (KII) and focus group discussions ([FGD](#)) using [guidance](#) adapted to Vietnam’s context from One Health Information Assessment Tool (OHIAT) ([OHIAT Maturity Model \(USAID – STOP Spillover\)](#)) through consultation with relevant stakeholders.

The following data collection and validation process was followed:

- OHDWG members and enumerators collected data in KII using questionnaires.
- Enumerators conducted FGD sessions to discuss and score current data collection, management and sharing capacity using 15 evaluation criteria from the OHIAT. Respondents gave detailed explanations for their score of each criterion.
- STOP Spillover staff and OHDWG members including DOH and DARD conducted a validation workshop to discuss and validate OHIAT scores. Scores ranged from 1 (lowest) to 5 (highest) according to levels of the One Health (OH) Information Maturity Stages in OHIAT Maturity Model (USAID – STOP Spillover 2022): Nascent (1), Emerging (2), Established (3), Institutionalized (4), Optimized (5).

Data collection activities and sample sizes are summarized in Table 1.

Table 1. Data Collection Methods and Contents

#	Method	Respondents	Focused content
1	KIIs	Key staff members of DOH and DARD: 9 people (provincial level). Representative leaders and staff of animal health stations; district forest protection division staff; district health center staff; community level health station staff and commune veterinary staff in Dinh Quan and Tan Phu districts (20 people/district) = 40 District level KIIs	Assessment of data collection, management, and sharing practices for zoonotic disease data in Dong Nai Province.
2	FGDs	FGD 1: 5 people at the provincial level, representing key sub-departments of DOH and DARD. FGD 2&3: Local human and animal health network and forest protection division staff in 2 districts, Dinh Quan, and Tan Phu (20 people/district)	Identifying challenges and collecting ideas on solutions to improve the collection, management and sharing of zoonotic disease data in animals and humans in Dong Nai Province.

2.4. LIMITATIONS OF THIS STUDY

The research team initially planned to conduct field surveys in three districts, including Vinh Cuu, Dinh Quan, and Tan Phu. However, survey activities in Vinh Cuu district could not be carried out because staff from the Forest Protection and Health sub-sectors had overlapping work schedules (vaccinations and interdisciplinary field investigations). Despite these challenges, key OH stakeholders in Vinh Cuu district were invited by DARD and DOH in Dong Nai to participate in a validation workshop to provide their input and feedback to these assessment findings and recommendations.

SECTION 3: RESULTS

3.1 ASSESSMENT OF ANIMAL AND HUMAN HEALTH DATA MANAGEMENT SYSTEMS

Results of FGDs with 39 relevant stakeholders in Dong Nai Province, Dinh Quan, and Tan Phu districts are presented in Table 2. Discussion focused on current difficulties and limitations as well as recommended solutions to improve different aspects of data management related to animal and human health in Dong Nai Province.

The evaluation of 15 pre-identified data management aspects used a scale of 1–5, from lowest (1) to highest performance level (5). Evaluation focused on the following data management aspects: policies and regulations related to the surveillance of zoonotic diseases; data management for zoonotic disease in wildlife; mechanisms for integrating zoonotic disease data from wildlife and human populations; data accessibility; frequency of data updates, and sharing of wildlife zoonotic disease data (Table 2).

Table 2 : Assessment of Animal and Human Health Data Management Systems in Dong Nai Province

#	Assessment aspect	Score	Reasons for this score	Solutions to improve score
1	Local governmental agencies' policies and guidelines for routine surveillance of zoonotic diseases in wildlife and human populations.	2.2	<p>There is no policy, regulation or guideline for zoonotic disease surveillance in wildlife.</p> <p>The two sub-sectors (the human health and veterinary departments) have specific guidelines for each disease, but only for the diseases listed in the circulars from MOH and MARD.</p>	<p>The central government should develop a guiding document describing which wildlife species should be monitored at what frequency.</p> <p>Conduct research to provide evidence of pathogens and/or viruses in wildlife that may transmit to humans.</p>

#	Assessment aspect	Score	Reasons for this score	Solutions to improve score
2	Level of coordination among government agencies from provincial to commune levels in zoonotic disease identification and spillover risk reduction.	3.1	<p>Few cases of zoonotic diseases have been reported in wildlife;</p> <p>There is intersectoral coordination at the provincial level only (not yet at the district and commune levels).</p> <p>Silos exist among local government agencies, who use data mainly for reporting to their line ministries.</p>	<p>Provide specific coordination guidelines for local OH stakeholders to follow.</p> <p>Strengthen the professional capacity of local staff/agencies for effective multidisciplinary coordination.</p>
3	Budget of local government for “large-scale zoonotic disease surveillance.”	3.5	<p>Budgets are available for the surveillance of priority diseases listed in the two MARD and MOH Circulars.</p> <p>However, the budget is still limited, and surveillance is not carried out regularly, depending on the direction of the central government, and when there is an unexpected pandemic.</p>	<p>Increase resources for the implementation of research and surveillance activities for zoonotic diseases in wildlife.</p> <p>Provide timely funding for regular zoonotic disease surveillance activities, instead of funding only when there is an outbreak.</p>
4	Zoonotic disease incident management systems for wildlife animals.	2.1	<p>Not yet available. When there are reported disease cases, local veterinary units update disease incidents using Excel files.</p>	<p>Allocate budget for research/surveillance to provide evidence for recommendations to establish a zoonotic disease incident</p>

#	Assessment aspect	Score	Reasons for this score	Solutions to improve score
			No cases of zoonotic disease incidents have been reported yet; this could be due to a lack of in-depth research.	management system for wildlife.
5	Zoonotic disease incident management systems for human populations.	4.0	<p>Having specialized software for the health sector, local health facilities have accounts to access and report zoonotic disease incidents.</p> <p>However, the server is overloaded, leading to the system being slow or suspended. Also, local health facilities do not update the data in a timely manner (because there is no budget to support daily reporting and data entry).</p>	<p>Allocate resources to upgrade the server.</p> <p>Issue sanctions and develop policies to assign responsibilities for data entry at local health facilities (for timely updating of data).</p>
6	Capacity of local human resources (HR) in zoonotic disease surveillance, identification, and spillover risk reduction.	3.0	<p>Limited number of staff with a heavy workload, while local government agencies are facing pressures to streamline HR structures.</p> <p>The professional capacity of local staff is not deep enough to advise and carry out integrated wildlife and human</p>	<p>Train and strengthen local human resources.</p> <p>Provide evidence of the need to strengthen regular surveillance activities and resources (financial, human) deployed to have a basis for recommending to local authorities (i.e., the need for in-depth research to identify</p>




#	Assessment aspect	Score	Reasons for this score	Solutions to improve score
			<p>disease surveillance and identification.</p> <p>There are no programs offered or direction given from local government concerning periodic surveillance to capture the evolution of pathogens.</p>	<p>zoonotic disease evidence in wildlife that could transmit to humans).</p>
7	<p>Availability and/or ease of access to lab facilities and equipment for zoonotic disease sample testing.</p>	2.9	<p>Capacity in disease sample testing is relatively good. Additionally, there are specialized regional units that can assist with lab tests.</p> <p>Lab testing equipment could be purchased for sample tests.</p>	<p>Offer training on sample testing skills and mobilize resources for test kit purchase.</p>
8	<p>Mechanism to integrate zoonotic disease data in wildlife and human populations at the provincial government level.</p>	1.1	<p>Currently, there is no mechanism to integrate data between the two sectors.</p> <p>Platforms and parameters are different between the database systems. Thus, integration is not possible. Staff from one department request original data (in the form of Excel workbooks) from other departments and then enter data</p>	<p>Develop new, separate software to integrate zoonotic disease case data in animals and humans and increase accessibility to relevant OH agencies and individuals at localities.</p> <p>Obtain permission from the two line ministries to agree on extracting existing data and transferring data to the newly established OH</p>

#	Assessment aspect	Score	Reasons for this score	Solutions to improve score
			<p>manually into their database.</p> <p>Zoonotic disease data in wildlife is limited (due to lack of data collection); consider integrating zoonotic disease data in livestock in general (both domestic animals and wildlife) and in humans.</p>	platform instead of entering data manually.
9	Accessibility of local OH network members to data on wildlife zoonotic disease.	2.2	<p>Currently, no wildlife disease data is available for sharing within or across the OH platform. However, once wildlife zoonotic disease data is available, it can be recorded in Excel for archiving and reporting purposes.</p> <p>Parties wishing to share data need to request it in writing.</p>	<p>Conduct research and collect evidence on pathogens in wildlife that may transmit to humans.</p> <p>Implement regular surveillance activities to obtain data on zoonotic disease in wildlife.</p>
10	Accessibility of local OH network members to data on zoonotic disease in human populations.	2.5	As needed, local stakeholders can request Excel data and reports. A written request is required.	Develop an interdisciplinary coordination mechanism for prevention and control of zoonotic disease that has detailed guidance on data sharing among local stakeholders.

#	Assessment aspect	Score	Reasons for this score	Solutions to improve score
11	Frequency of database updates: zoonotic disease in wildlife animals.	2.1	<p>Currently, there are no recorded diseases in wildlife; this could be due to farmers not reporting disease incidents to local agencies.</p> <p>If there are reported cases of diseases from wildlife farms, the veterinary units can update data in Excel.</p>	Conduct research to identify pathogens and the risk of disease transmission from wildlife to humans.
12	Frequency of database updates: zoonotic disease in human populations.	4.7	<p>Local health facilities typically need to update disease incident data daily into their database. However, some facilities lack motivation or time to appropriately update it.</p> <p>The server sometimes overloads, so processing speed is slow.</p>	<p>Mobilize resources to upgrade the server.</p> <p>Develop sanctions and policies with responsibility for data entry at local health facilities.</p>
13	Level and frequency of data sharing: wildlife farms.	3.0	As needed, the Sub-Department of Forest Protection can provide data to relevant provincial agencies.	
14	Level and frequency of data sharing: zoonotic disease in wildlife animals.	1.5	There have been no records or studies on zoonotic pathogens in wildlife in Viet Nam.	Conduct research to identify pathogens and the risk of disease

#	Assessment aspect	Score	Reasons for this score	Solutions to improve score
				transmission from wildlife to humans. Implement specific regulations of the Provincial People’s Committee (PPC) in sharing zoonotic disease data between relevant agencies in the province.
15	Level and frequency of data sharing: zoonotic disease in human populations.	4.2	If requested by other agencies in Dong Nai Province, the Center for Disease Control (CDC) will share data as Excel files and reports.	

Note:

-  Required urgent action
-  Required action
-  N/A

3.2 POLICIES, REGULATIONS, AND GUIDELINES

In Dong Nai Province, there is no specific guideline or regulation from the PPC on reporting procedures for zoonotic disease incidents from the commune to provincial levels. Local government agencies compile reports on zoonotic disease incidents according to the circulars of their respective line ministries.

The Sub-Department of Animal Husbandry and Veterinary Medicine under DARD updates infectious disease incidents using the Viet Nam Animal Health Information System (VAHIS) software of MARD, using the required list of infectious diseases in Circular 07/2016/TT-BNNPTNT (MARD 2016). However, emerging diseases are not included in the database. Data on disease cases and outbreaks focus on domestic animals. The VAHIS system does not have the capacity to handle zoonotic diseases in wildlife.

Infectious diseases on the list that must be reported under Circular 07/2016 include:

- Avian influenza;
- Foot and mouth disease;
- Porcine reproductive and respiratory syndrome (PRRS);
- Anthrax;
- Classical swine fever;
- Leptospirosis;
- Rabies;
- Newcastle disease;
- Streptococcus suis (type 2);
- Trichinellosis;
- Bovine tuberculosis (bTB);
- Brucellosis; and
- Pasteurellosis.

For the Sub-Department of Forest Protection, there is wildlife farm management software monitoring the number of farms, composition and quantity of wildlife animals, and the distribution of wildlife farms across the province, designed for compliance with CITES requirements. The software does not integrate zoonotic disease data from farmed wildlife. According to forest rangers interviewed by STOP Spillover and OHDWG members, wildlife farm owners rely on experience sharing in farmer peer networks to treat wildlife diseases. During KIIs, local forest protection divisions reported that they have never received zoonotic disease case reports from wildlife farms.

For units under the DOH, there is a surveillance system for infectious diseases listed in Circular 54/2015/TT-BYT of the MOH. The MOH Circular includes many types of zoonotic diseases such as influenza A (H5N1, H7N9), rabies, leptospirosis, anthrax, Ebola, Lassa, Marburg, West Nile fever, Middle East Respiratory Syndrome (MERS-CoV), dangerous emerging infectious diseases, newly arising diseases, etc. Local clinics, health centers, and public hospitals regularly update disease cases in the system (MOH 2015).

Currently, zoonotic disease data held by DOH and DARD is used internally, serving the reporting purposes of disease cases and outbreaks to their line ministries. **The local government does not have official guidelines and/or regulations on zoonotic disease data sharing**, which is required to develop a shared understanding of risk and spillover risk reduction planning among local OH stakeholders.

Regarding inter-sectoral coordination mechanisms, Dong Nai PPC issued a document directing inter-sectoral coordination between DOH and DARD in Joint Circular No. 16/2013/TTLT-BYT-BNN&PTNT of MOH and MARD (MOH and MARD 2013). This is a guiding document for general coordination at the provincial level. With support from the STOP Spillover project, on September 30, 2022, the DOH and DARD issued Regulation No. 6552/QCPH-SYT-SNNPTNT on Cooperation in the Prevention of Zoonotic Diseases in Dong Nai Province, which guides the content and responsibility for coordination between two sectors from provincial to grassroots levels (DOH and DARD 2022). This regulation is aimed at strengthening multi-sectoral coordination of the DOH and DARD to effectively manage, investigate, control, share information, and conduct scientific research on the prevention of infectious zoonotic diseases. The purpose of this regulation is to clarify the roles and responsibilities of each party, emphasizing information sharing and reporting mechanisms at all levels as stated in Item 4, Articles 5 and 9 of Circular 16 issued by MOH and MARD. In addition, a list of Sub-Steering Committees of Zoonotic Diseases members (local level focal points of contact) has been approved for the human health sector by the DOH in order to facilitate the implementation of this coordination regulation (DOH 2022).

In November 2022, the PPC launched The Master Plan of Digital Transformation of Agriculture focusing on developing digital technologies to automate agricultural production and business processes and monitor the origin and supply chain of agricultural products to ensure fast, transparent, safe processes and food hygiene. The Master Plan of Digital Transformation of Agriculture does not address wildlife products or value chains in wildlife farming (Dong Nai PPC 2022).

In the Master Plan Point B, Clause 2, Part III, the document mentions a group of proposed potential solutions for building a shared database for animal husbandry, veterinary medicine, and forestry. The forestry sector has the task of building a database on traceability of forest plant varieties—a management database of wood and forest product processing enterprises. The animal husbandry and veterinary medicine sectors are responsible for building a data system serving the management and sharing of information on livestock and veterinary medicine. The purpose of this animal husbandry and veterinary medicine data system is to orient and develop mechanisms and policies to support sector development and animal breeding, and to assist in aligning production plans with market needs. Currently, wildlife farming is legal and contributes to household incomes in rural areas. If the government treats wildlife farming as part of the agricultural sector, it is possible to integrate the wildlife value chain in the digital transformation master plan.

3.3 RESOURCES AND CAPACITY IN ZOOBOTIC DISEASE SURVEILLANCE AND SPILLOVER RISK REDUCTION

In general, the **government budget** allocated for surveillance and management of zoonotic disease outbreaks mainly focuses on infectious diseases listed in Circular 07/2016/TT-BNNPTNT of MARD (MARD 2016) and Circular 54/2015/ TT-BYT of MOH (MOH 2015). These resources are directed from the central government through line ministries. The national budget contribution of Dong Nai Province is allocated according to programs directed from the central government. However, the province has not yet allocated its own budget or developed a separate plan for zoonotic disease surveillance and transmission risk management in the province.

Equipment for lab testing of diagnostic samples is currently quite limited, especially under the DOH. For the veterinary sub-sector, laboratory equipment meets the current need for assessment of common infectious diseases. For some diseases (e.g., leptospirosis and rabies), the local Sub-Department of Animal Husbandry and Veterinary Medicine must transfer diagnostic samples to the Veterinary Department in Ho Chi Minh City. Currently, there is no in-depth analytical equipment for wildlife diseases.

In terms of **human resources**, in general, professional staff at the provincial level of the Sub-Department of Animal Husbandry and Veterinary Medicine and at the DOH have the basic capacity to meet current work requirements. However, officials at the district and commune levels still have limited professional knowledge and skills. At the commune level, health workers must deal with a broad array of tasks, so there is no staff with specialized competence in infectious diseases. Furthermore, there have been few intensive training courses on zoonotic disease surveillance and management at district and commune levels. For staff of the animal health service, the situation is

like that of the DOH service. There is a wide range of diseases in domestic livestock that local animal health staff need to take care of. Neither animal health nor forest protection staff have specific knowledge related to zoonotic diseases in wildlife.

Results from the assessment of policies, guidelines, and multidisciplinary coordination among local government agencies in zoonotic disease spillover risk identification and reduction are summarized in Figure 1.

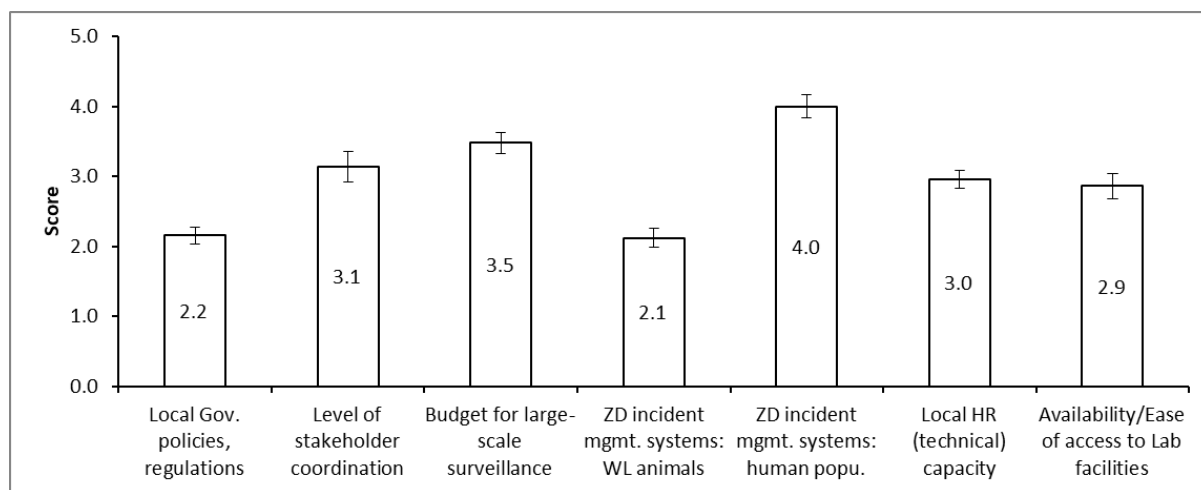


Figure 1. Current situation of local government policies and resources in zoonotic disease management in Dong Nai Province. Scored on a scale of 1-5, with 5 being the highest score. Elements with scores of 1 – 2.5 require urgent action, scores of 3 – 4 require action and scores of 4 or above indicate that no action is required.

Regarding existing zoonotic disease incident management systems, the health sector was assessed to have a fairly good management system (4.0 points out of 5) due to requirements for regular updates from the central government. However, there are certain limitations described in Section 3.4.

The animal disease management system was rated as requiring urgent action (2.1 points out of 5) (Figure 1) —the primary reason being that current VAHIS software of the veterinary sub-sector only updates common infectious disease cases. Wildlife diseases have not been included in the database.

The professional capacity of staff involved in the local OH network was assessed as requiring action (3.0 points out of 5) (Figure 1). The capacity of staff at the district and commune levels is limited

and needs to be improved, especially in relation to wildlife disease and zoonotic diseases in wildlife.

Laboratory equipment for analysis of disease samples was rated as requiring action (2.9). For in-depth analyses and for emerging diseases, local agencies need to send disease samples to other specialized units in HCMC for diagnostic testing.

3.4 CURRENT SITUATION OF ZOOBOTIC DISEASE DATA COLLECTION AND MANAGEMENT

For the health sector, data on zoonotic disease cases is collected from local health facilities (health centers, public and private clinics, and hospitals) from district to provincial levels. The reported diseases are within the list of Circular 54/2015/TT-BYT of the MOH (MOH 2015) and other diseases at the request of the Central Government. Reporting frequency depends on the types of disease, including urgent reports (daily) and monthly, quarterly, semi-annual, and annual reports. Data is reported and stored in software and in hard copy documents (MOH 2015).

Vertical management from the regional level: Each commune has an account where they can log in and input data. There are a total of 170 communes in the province. Staff in charge of each commune can only view data from their own commune. Each district has one account (11 districts/province). Each health facility (health center, clinic, and hospital) has one account except for the provincial hospital and CDC, who have a total of approximately 20 accounts for general management of the entire province's data. Data flows from the commune to the provincial level to the Pasteur Institute.

For the animal health sub-sector, the Sub-Department of Animal Husbandry and Veterinary Medicine collects infectious disease data in the form of electronic files from District Animal Health Stations. The District Animal Health Stations collect data and information from communes and collaborators. Types of infectious diseases to be reported are listed in Circular 07/2016/TT-BNNPTNT (MARD 2016). Data is stored in the form of soft copies, electronic systems (e-office and email), and hard copies. The Sub-Department of Animal Husbandry and Veterinary Medicine is the focal point for aggregating data on the VAHIS software system to report to DARD and the Regional Animal Health Organisation No. 6 (RAHO6). Frequency of reporting depends on disease types and requirements from high-level authorities and may be ad hoc, monthly, quarterly, and/or yearly.

Table 3: Zoonotic Disease Data Collection and Management in Animal and Human Populations

#	Aspects	Human health sub-sector	Animal health sub-sector
1	Form of data collection	From local health facilities (clinics, hospitals, and health centers).	From local animal health collaborators, commune PPCs report to district animal health stations, the Sub-Department of Animal Husbandry and Veterinary Medicine, DARD, and provincial PPC; RAHO6.
2	Types of zoonotic disease	Diseases in the list of Circular No. 54/2015/TT-BYT of MOH (MOH 2015).	Diseases in the list of Circular No. 07/2016/TT-BNNPTNT of MARD (MARD 2016).
3	Scale of zoonotic disease surveillance	No regular surveillance across the province. When cases and/or outbreaks occur in the area, MOH officials coordinate with the Sub-Department of Animal Husbandry and Veterinary Medicine to carry out surveillance and collect disease samples.	There is no regular ZD surveillance on a provincial scale. Only when new cases occur will they coordinate with the health sector to conduct surveillance or with the Forest Protection Sub-Department in the case of wildlife deaths.
4	Types of data collected	Number of deaths; endemic disease (diseases regularly present) outbreaks; emerging diseases that have not been recorded; diseases by location; investigation reports on the origin of diseases.	Locations and causes of diseases; number of cases; number of deaths; total herd size; mortality rate. There have been no reported zoonotic disease incidents in wildlife (perhaps because local farmers have not reported them).
5	Frequency of disease incident	Daily (for dangerous diseases), ad hoc, monthly, quarterly, biannually,	Daily (for dangerous diseases), ad hoc, monthly, quarterly, biannually, annually (depending on type of disease).

#	Aspects	Human health sub-sector	Animal health sub-sector
	reporting or updates	annually (depending on the type of disease).	
6	Data storage methods	Software, paper based.	Commune and district levels: soft copies/electronic files; e-office. Provincial level: MARD VAHIS software; paper based.
7	Data storage places	All health facilities use professional software from the commune to provincial levels. CDC and provincial-level hospitals have nearly 20 accounts for general data management.	The Sub-Department of Animal Husbandry and Veterinary Medicine, with two accounts for the leader and staff in charge of data entry and reporting.
8	Accessibility	Internal management only within the health sector; authorized access by different levels. Health facilities (units) at the commune and district level have only one account.	Internal use by the animal health sub-sector; only the Sub-Department of Animal Husbandry and Veterinary Medicine of DARD has an account to log in and manage VAHIS software.
9	Ability of the software to record data while offline and sync data when the internet is available	None. Internet access is required.	None. Internet access is required.
10	Zoonotic disease data verification procedures	No validation process; at the discretion of the individual physician based on clinical and laboratory test evidence.	In the case of abnormal or unreasonable data, staff at the Sub-Department of Animal Husbandry and Veterinary Medicine will call

#	Aspects	Human health sub-sector	Animal health sub-sector
		There has been no objective verification from a third party.	<p>the locality to request data to be re-checked.</p> <p>The Sub-Department combines reports and test results (if necessary) to get accurate conclusions about a disease.</p> <p>For unknown diseases or unusual mortalities, the Sub-Department of Animal Husbandry and Veterinary Medicine will launch or direct an investigation and take samples for testing.</p>

The **Forest Protection Sub-sector** has no function related to infectious disease data management. Its specialized software only stores data on the number of deaths by species (from the diaries of farm owners), number of wildlife farms, herd size by species, and the distribution of farms in the province. Currently, the Forest Protection Sub-Department has two independent software systems. The two systems have not been integrated with each other:

- Software provided by CITES (wildlife farm management software) that is updated once a year. Data focuses on the number of farms, herd size changes and history. Each unit has 1-2 accounts (depending on the number of wildlife). Commune level staff do not have an account.
- Software recently developed for the Forest Protection Sub-Department (under the management and funding of the People's Committee of Dong Nai Province) where data is updated quarterly. This software is similar to CITES software. Key functionalities include the management of the number of wildlife farms and current operation status of local farms. Each unit within the Forest Protection sub-sector has one to two accounts (depending on the number of wildlife animals in each locality). There is no account at the commune level.

In case there is a report of dead wildlife, the Forest Protection Sub-Department will notify a representative of the Veterinary Department to conduct on farm inspections.

The wildlife farm management software of the Forest Protection Sub-Department (managed by Dong Nai People's Committee) does not include zoonotic disease data. However, there is an information page that includes a manual on zoonotic diseases on wildlife for reference.

3.4.1 Current Shortcomings

For the health sector, most respondents said that because disease data needs to be updated daily from local health facilities, the server is often overloaded. At the same time, the interface lacks functionalities and must be manually updated to include their reports. For example, there is no function to update disease outbreaks. The database cannot handle epidemic situations or their evolution. In addition, data shared from other departments is not in a consistent format, so the data cannot be electronically integrated into the database but must be entered manually. Another barrier is the integration of data from another sector (veterinary sub-sector), which requires approval by the MOH.

For the veterinary sub-sector, currently the VAHIS software only stores some basic data and only focuses on infectious diseases according to MARD Circular 07/2016/TT-BNNPTNT (MARD 2016). Data on other emerging diseases and wildlife diseases is not included. The Sub-Department of Animal Husbandry and Vet Medicine manages both animal husbandry and veterinary medicine. Important information and data are not included: risks in livestock production (biosecurity level of farms; number of animals; age, etc. to estimate the number of vaccine doses needed in each location); types of cages (open, closed); waste management methods of farms; and herd structure (breeding or meat production purposes) to have information upon which to base the allocation of animals for herd development after a pandemic (for example, swine cholera).

For the Forest Protection sub-sector, the current database software only manages wildlife farm census data and does not have a wildlife disease management function. Moreover, forest rangers do not have expertise to understand and manage infectious disease information.

3.5 CURRENT SITUATION OF ZOOONOTIC DISEASE DATA USAGE, COORDINATION, AND SHARING

For diseases in the list of the two circulars mentioned above, local government staff contended that data collected is adequate to serve their planning needs and consultation with leaders for decision making. However, emerging disease data is not included. Moreover, some data must be entered manually.

Regarding existing coordination mechanism, local government agencies typically meet once every six months or once a year to discuss and share relevant information and data and make recommendations to the PPC through semi-annual and annual reports. During these meetings, they make decisions and develop the epidemic prevention and control plan for the following year. If a dangerous disease incident or outbreak arises, the PPC will direct the two departments (DARD and DOH) to hold urgent meetings to jointly implement a response.

Form of information sharing: Zoonotic disease data from the two sectors (human and animal health) are for internal use, and each unit only has one or two accounts to log into their databases. DARD and DOH can share data with each other through official request letters on the basis of the cooperation document between the two departments in Dong Nai Province -- Joint Circular No. 16/2013/TTLT-BYT-BNN&PTNT of MOH and MARD (MOH and MARD 2013). Officials of the two departments can request data of other units in the form of Excel files via email or Zalo (instant messaging service similar to Viber). For example, the CDC may ask for veterinary data for their vaccination plan against rabies.

Figure 2 summarizes the assessment results of local stakeholders on the status of zoonotic disease data accessibility and level of sharing in Dong Nai Province. In general, the human health sector has a high frequency of data updates, and the level of zoonotic disease data sharing is rated at a high level (4.2–4.7 points).

There is currently no mechanism to integrate data on zoonotic disease in wildlife, livestock, and human populations. This is considered as one of the main barriers in cross-sectoral planning for zoonotic disease spillover risk reduction in Dong Nai Province.

Zoonotic disease data accessibility and the frequency of data updates on wildlife were both rated below average. According to veterinary officials, there is currently no reporting of disease cases in wildlife. If there is a report of disease incidents in wildlife, the Veterinary Sub-Department will update disease data as they would for common domestic animals. In addition, the level and frequency of sharing disease data in wild animals was assessed at a very low level (1.5 points). Officials from the health and veterinary sectors said that there has been no reporting of wildlife disease incidents. However, staff from the Forest Protection Sub-Department replied that they did share information in case of wildlife mortalities. There is not yet a formal reporting process between relevant local professional units.

Regulation 6552, Cooperation in the Prevention of Zoonotic Diseases, is expected to create a unified reporting mechanism and form on information sharing among relevant stakeholders. Article 4 stated that coordination will be carried out in the following ways: exchange through paper and

electronic documents; a unified software system between the two branches; meetings, briefings, seminars, conferences, etc. to exchange information directly by phone or text; and social networking applications or other means of communication (DOH and DARD 2022). However, it is necessary to disseminate and provide training on this regulation to officials from the provincial to district and commune levels to ensure synchronization efforts are done promptly and continuously.

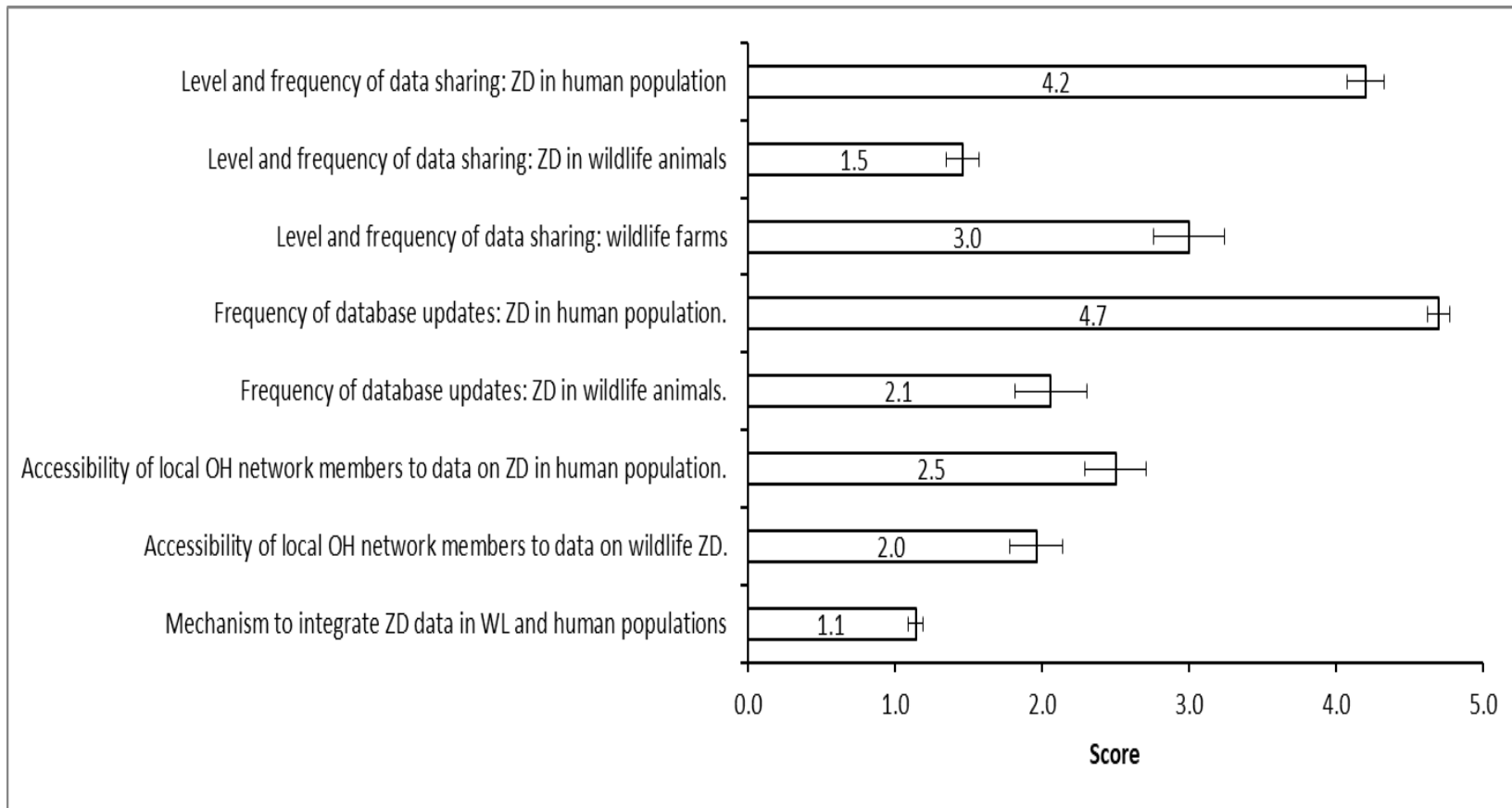


Figure 2. Current situation of zoonotic disease data accessibility and level of sharing among local OH stakeholders. Vertical bars represent standard errors of means. Scores: 1->5 (n = 35). Scored on a 1-5 scale with 5 being the best.

3.6 DIFFICULTIES AND CHALLENGES IN ZOOBOTIC DISEASE DATA COLLECTION, MANAGEMENT, AND SHARING

Results of the KII and FGDs in Dong Nai Province revealed some key difficulties and challenges in zoonotic disease data collection, management, and sharing:

- There is no close coordination among relevant units in the province at any level, especially at commune and district levels.
- There is no specific reporting guideline for zoonotic disease cases (incidents). In fact, farm owners rely solely on their informal farmer networks to learn from experience in treating wildlife diseases. Local veterinarians do not have knowledge about zoonotic disease in wild animals.
- There are significant barriers in management and sharing of zoonotic disease data. The zoonotic disease data is mainly for longitudinal reporting (to the line ministries of each department). The number of people who have accounts to log in and manage data at all levels is still very limited (usually only one to two accounts/unit). Other departments can request data from each other in the form of Excel files extracted from their database. Zoonotic disease data is not yet integrated among related sectors in the province.
- Resources (human, financial, facilities) are limited. Particularly, officials at the district and commune levels do not have in-depth knowledge of zoonotic diseases in wildlife.
- The specialized data management systems of local sub-sectors are limited in many aspects (see Section 3.3).
- There is no common platform to update and manage zoonotic disease data in wildlife and human populations.

SECTION 4: CONCLUSIONS AND RECOMMENDATIONS

4.1 CONCLUSIONS

This study has elucidated the current situation of zoonotic disease data collection and management in Dong Nai Province. The main findings are summarized below.

Currently, in Dong Nai Province, there is no specific guideline or regulation from the PPC on incident reporting procedures for zoonotic diseases at all levels (from commune to province). The level of coordination is mainly at the provincial level between DOH and DARD according to a Joint Circular No. 16/2013/TTLT-BYT-BNN&PTNT of MOH and MARD (MOH and MARD 2013). Local departments compile their own reports for reporting purposes to their line ministries (MOH and MARD). Data on zoonotic disease is not included. Regulation No. 6552/QCPH-SYT-SNN was promulgated between MOH and MARD at the end of September, 2022. The regulation has not been disseminated nor officials trained on collecting and sharing information on zoonotic disease, particularly zoonotic disease emergence from wildlife.

Resources in terms of budget, laboratory facilities and equipment, and professional staff are limited. There is no budget for the implementation of periodic and large-scale monitoring of zoonotic disease on wildlife. At the same time, current laboratory equipment and facilities are only sufficient to analyze samples of some common types of zoonotic diseases. For in-depth analysis and for emerging diseases, local departments must send disease samples to other specialized regional units (i.e., Pasteur Institute and RAHO 6 in Ho Chi Minh city) for analysis. The capacity of professional staff, especially at the district and commune levels, is limited. Understanding of zoonotic diseases in wildlife among veterinary staff is only superficial. The number of veterinary staff remains small compared to their workload requirements, for those in charge of animal husbandry and veterinary medicine for many species of domestic animals.

Some of the major difficulties and challenges in zoonotic disease data collection, management, and sharing are summarized below:

- There is no close coordination among relevant units in the province at all levels, especially at commune and district levels.
- There is no specific reporting guideline for zoonotic disease cases (incidents).

- Farm owners rely solely on their informal peer network or learn from experience how to treat wildlife diseases. Local veterinarians do not have knowledge about wildlife diseases or zoonotic diseases in wild animals.
- There are significant barriers to the effective, efficient management and sharing of zoonotic disease data. Zoonotic disease data is mainly used for longitudinal reporting (to line ministries of each department). The number of people who have accounts to log in and manage data at all levels is still very limited (usually only one to two accounts/unit). Other departments can request data from each other via Excel files extracted from their database. Zoonotic disease data is not yet integrated among related sectors in the province.
- Resources (human, financial, facilities) are limited. Particularly, officials at the district and commune levels do not have in-depth knowledge of zoonotic diseases in wildlife.
- The specialized data management systems used by local sub-sectors are limited in many aspects (see Section 3.3).
- There is no common platform to update and manage zoonotic diseases in wildlife and human populations.

4.2 RECOMMENDATIONS AND NEXT STEPS

4.2.1 Policy Recommendation

4.2.1.1 FOR PROVINCIAL GOVERNMENT AGENCY

- Promote the Coordination Mechanism (approved by Dong Nai DOH and DARD in September 2022) and share it at the grassroots level. This guideline should be disseminated throughout the entire province to personnel from relevant sectors. Periodic district- and community-level disease information sharing should be implemented through monthly meetings among members of either the Sub-Steering Committee of Disease Prevention or the People's Health Care committee in each locality.
- The PPC should submit a written request to MOH and MARD for approval to extract existing data from the two zoonotic disease database systems (health and animal health systems) for integration of the data into a new OH data platform for the province.
- Allocate a reasonable budget for research activities to assess major zoonotic disease risks in wildlife and for periodic surveillance activities throughout the province. Focus on high-risk wildlife species such as civets, bamboo rats, and porcupines for research and analysis.

- Improve the capacity of local laboratories to conduct in-depth analyses of zoonotic diseases.
- Develop specific guidance for the regular collection and data entry of zoonotic diseases in all localities in line with Article 5 and Annexes 4, 5, 6, and 7 of the Coordination Mechanism Guideline (DOH and DARD 2022). Veterinary and medical staff should evaluate information received to determine the appropriate level of OH integration in disease prevention and control activities.
- Extend the current functions and tasks of the animal health and forest protection sector to include monitoring and managing zoonotic diseases in wildlife.

4.2.1.2 FOR STOP SPILLOVER PROJECT

Promote the interdisciplinary Coordination Mechanism Guideline for zoonotic disease data collection, management, and sharing. The project should support relevant stakeholders to develop detailed action plans to disseminate and implement the Coordination Mechanism Guideline at the district and commune level to ensure data collection and sharing on zoonotic diseases is consistent and systematic in Dong Nai Province. This will be implemented as part of Activity 2.1.1.1.

4.2.2 *Technical Solutions*

4.2.2.1 FOR LOCAL AGENCIES

- Develop a common platform to integrate zoonotic disease data in animal and human populations in Dong Nai Province. At the same time, assign responsibility to a government agency to act as the focal point for general management and coordination of data updates and sharing, per item b), Article 2, Section III in the Master Plan of Digital Transformation of Agriculture Industry and Rural Development by 2025, as approved by the Dong Nai Provincial Peoples' Committee (Dong Nai PPC 2022).
- Develop a guideline for zoonotic disease data collection and management and develop procedures for reporting zoonotic disease incidents in wildlife and human populations.
- Conduct training and capacity building for professional staff (especially at the district and commune levels) in risk identification, disease assessment, and prevention and treatment of zoonotic diseases in animals and humans.

4.2.2.2 FOR STOP SPILLOVER PROJECT

- The project should provide technical support to local agencies on training and capacity building for professional staff in risk identification, disease assessment, and prevention and treatment of zoonotic diseases in animals and humans.
- The STOP Spillover project should not directly fund the development of an integrated data sharing platform. It should instead address the current lack of wildlife disease data and intelligence that will flow into the platform.
- The project should provide technical support to local agencies on training and capacity building for professional staff in risk identification, disease recognition and assessment, and prevention and treatment of zoonotic diseases in animals and humans as part of its ongoing activities in risk reduction.
- Activity 2.2.2.1 builds on the results of a behavior risk assessment and a rapid biosafety assessment to develop and implement interventions. Trials of Improved Practices (TIPs) on wildlife farms includes conducting training for key professional officers, roll-out training in best practices for farmers, peer educators or community facilitators to help wildlife farming households improve their biosecurity and zoonosis prevention practices. As appropriate, improved practices should facilitate intersectoral collaboration and disease reporting.
- Use of behavior risk assessment results (Activity 1.2.6.1) to develop a social behavior change strategy and participatory syndromic surveillance activity for actors along the value chain, including zoonotic disease data collection and sharing from wildlife facilities to relevant governmental agencies that address the lack of wildlife health care and zoonotic disease reporting.

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APPENDIX I: ASSESSMENT OF ANIMAL AND HUMAN HEALTH DATA MANAGEMENT SYSTEMS IN DONG NAI PROVINCE

#	Aspects of the data management systems related to wildlife and human health	Province org.	Đ.Quan 1	D.Quan 2	T.Phu 1	T.Phu 2	Mean	stdev	SE
1	Local governments' policies and guidelines on routine surveillance of zoonotic disease in wildlife and human populations.	2.5	2	1	2.8	2.5	2.2	0.71	0.11988
2	Level of coordination among government agencies from provincial to commune levels in zoonotic disease identification and spillover risk reduction.	3	4	1	3.7	4	3.1	1.26	0.21367
3	Budget of the local government for "large-scale zoonotic disease surveillance."	3.8	2.3	4	2.8	4.5	3.5	0.90	0.15278
4	Zoonotic disease incident management systems for wildlife animals.	2	2.3	1	3.3	2	2.1	0.82	0.13907
5	Zoonotic disease incident management systems for human population.	4	3	3	5	5	4.0	1.00	0.16903
6	Capacity of local human resources (HR) in zoonotic disease surveillance, identification, and spillover risk reduction.	2	3.3	3	4	2.5	3.0	0.76	0.12906
7	Availability and/or ease of access to lab facilities and equipment for zoonotic disease sample tests.	4	2	2	2.3	4	2.9	1.05	0.17712
8	Mechanism to integrate zoonotic disease data in wildlife and human populations at the provincial government level.	1	1	1	1.7	1	1.1	0.31	0.05291
9	Accessibility of local One Health (OH) network members to data on wildlife zoonotic disease.	3	1.6	1	3.2	1	2.0	1.07	0.18110
10	Accessibility of local OH network members to data on zoonotic disease in human populations.	4	1.5	3	3	1	2.5	1.22	0.20702

#	Aspects of the data management systems related to wildlife and human health	Province org.	Đ.Quan 1	D.Quan 2	T.Phu 1	T.Phu 2	Mean	stdev	SE
11	Frequency of database updates: zoonotic disease in wildlife animals.	1	3.6	1	3.7	1	2.1	1.45	0.24541
12	Frequency of database updates: zoonotic disease in human populations.	4	5	4.5	5	5	4.7	0.45	0.07559
13	Level and frequency of data sharing: wildlife farms.	4	4	2	4	1	3.0	1.41	0.23904
14	Level and frequency of data sharing: zoonotic disease in wildlife animals.	1	2.3	1	2	1	1.5	0.64	0.10796
15	Level and frequency of data sharing: zoonotic disease in human populations.	4	3	4.5	5	4.5	4.2	0.76	0.12817

APPENDIX II: KEY INFORMANT QUESTIONNAIRE

KII QUESTIONNAIRE FOR LOCAL OH NETWORK STAKEHOLDERS IN DONG NAI

(Current situation of zoonotic disease (ZD) monitoring, database and reporting systems in Dong Nai province)

Note: This questionnaire was used for local OH network stakeholders from the provincial to commune levels in Dong Nai province.

PART A: GENERAL INFORMATION OF THE RESPONDENTS

1. Gender: Male Female Other Prefer not to answer
2. Age: years old.
3. Ethnicity: Kin Other ethnic group (specify):
4. Area of current work Human health Animal health Forest protection Other:
5. Work location: Provincial level District level Commune level
6. Position: Leadership position Staff
7. Total number of staff in your organization: (persons).
- 8a. Do you have an account to access any of the following data systems? *(circle more than one answer, if applicable)*.
 - A. Wildlife farms;
 - B. Zoonotic diseases on wildlife animals
 - C. Zoonotic diseases on human population
- 8b. Do you have an account to manage any of the following data systems? *(circle more than one answer, if applicable)*.
 - A. Wildlife farms;
 - B. Zoonotic diseases on wildlife animals
 - C. Zoonotic diseases on human population

PART B: EVALUATION OF SOME RELATED ASPECTS

Please evaluate the following aspects by scoring from 1 (lowest) to 5 (highest score).

#	Aspects of the data management system related to wildlife and human health	Score (1->5)	Remarks
1	Local government's policies and guidelines on routine surveillance of (zoonotic diseases) ZD in wildlife and human populations.		
2	Level of coordination among government agencies from provincial to commune levels in ZD identification and spillover risk reduction.		
3	Budget of the local government for "large-scale ZD surveillance".		
4	ZD Incident management systems for wildlife animals.		
5	ZD Incident management systems for human population.		
6	Capacity of local human resources (HR) in ZD surveillance, identification and spillover risk reduction.		
7	Availability and/or ease of access to lab facilities and equipment for ZD sample tests.		
8	Mechanism to integrate ZD data in wildlife and human populations at the provincial government level.		
9	Accessibility of local OH network members to data on wildlife ZD.		
10	Accessibility of local OH network members to data on ZD in human population.		
11	Frequency of database updates: ZD in wildlife animals.		
12	Frequency of database updates: ZD in human population.		
13	Level and frequency of data sharing: wildlife farms		
14	Level and frequency of data sharing: ZD in wildlife animals		
15	Level and frequency of data sharing: ZD in human population		

Notes: Definition of zoonotic diseases: A zoonosis is an infectious disease that has jumped from a non-human animal to humans. Zoonotic pathogens may be bacterial, viral or parasitic, or may involve unconventional agents and can spread to humans through direct contact or through food, water or the environment ([WHO, 2020](#)).

PART C: CURRENT SITUATION

Policies and guidelines of the local government

1. Does the local government have specific policy and/or guidelines on “routine surveillance” of the following? (*circle more than one answer, if applicable*).

1. ZD in domestic animals
2. ZD in wildlife animals
3. ZD in human population
4. None of the above
5. Don't know.

2. Does the local government have a guideline for ZD incident reporting procedures at the localities (districts and communes)?

- Yes No Don't know.

If yes, please share with us a copy of the document.

3. Does the local government have a guideline on data sharing regarding ZD incidents for shared understanding and joint planning of spillover risk reduction?

- Yes No Don't know.

4. Does the local government have a specific guiding document on a coordination mechanism among the government agencies in ZD spillover risk identification and mitigation?

- Yes No Don't know.

If yes, please share with us a copy of the document.

Resources and capacity in ZD surveillance and spillover risk reduction

5. Can you evaluate the current amount of budget allocated for ZD surveillance in Dong Nai province?

1. Sufficient for routine and large-scale ZD surveillance in wildlife and human population;
2. Insufficient
3. Don't know.

6. The current lab equipment and facilities in Dong Nai province meet the requirements ZD sample tests

1. Strongly agree
2. Agree
3. Partially agree
4. Disagree
5. Strongly disagree
6. Don't know

7. In your opinion, how strong is the current capacity of human resources in Dong Nai province in terms of ZD surveillance, identification and spillover risk reduction?

- Very strong Strong Average Limited Poor Don't know

Surveillance activities

8. Can you evaluate the **frequency of large-scale ZD surveillance** conducted in Dong Nai province? (*circle one answer in each column below*).

[A] On wildlife farms	[B] On human populations
1. Annually 2. Every 2 years; 3. Every 3 years; 4. Rarely; 5. None 6. Don't know.	1. Annually 2. Every 2 years; 3. Every 3 years; 4. Rarely; 5. None 6. Don't know.

9. Scope of ZD surveillance conducted in the last 5 years (*circle more than one answer, if applicable, in each column below*).

[A] On wildlife farms	[B] On human populations
1. Entire province; 2. Some districts; 3. Small-scale. 4. None. 5. Don't know.	1. Entire province; 2. Some districts; 3. Small-scale. 4. None. 5. Don't know.

10. Who conduct the surveillance activities? (*circle more than one answer in each column below, if applicable*).

[A] On wildlife farms	[B] On human populations
1. Staff of animal health sub-sector 2. Staff of human health sub-sector 3. Staff of forest protection sub-sector 4. Other projects related to wildlife 5. None of the above	1. Staff of animal health sub-sector 2. Staff of human health sub-sector 3. Staff of forest protection sub-sector 4. Other projects related to human health 5. None of the above

ZD data management systems

11. How are ZD data captured and reported at different localities? (*circle more than one answer in each column below, if applicable*).

[A] On wildlife farms	[B] On human populations
1. Via surveillance; 2. Via ZD incident reports of local OH network members; 3. Other (specify): 4. None 5. Don't know.	1. Via surveillance; 2. Via ZD incident reports of local network members; 3. Other (specify): 4. None 5. Don't know.

12. How are ZD data stored? (circle one answer in each column below).

[A] On wildlife farms	[B] On human populations
1. Via database software 2. In the form of printed reports/documents 3. None 4. Don't know.	1. Via database software 2. In the form of printed reports/documents 3. None 4. Don't know.

13. What **types of data** does the current system of your organization store? (circle more than one answer, if applicable).

- A. Wildlife farms & wildlife species in Dong Nai province;
- B. ZDs on human population in Dong Nai province;
- C. ZDs on wildlife animals in Dong Nai province;
- D. ZDs on domestic animals in Dong Nai province.
- E. My organization does not store data

14. How often are the data in the system updated?

- 1. Every month
- 2. Every quarter
- 3. Biannually
- 4. Annually
- 5. Other (specify):
- 6. N/A.

15. How many persons in your organization have an official account to access and manage the data system ?
..... (persons).

16. Does the current database software of your organization have sufficient functions and updated data that meet the need for your work?

- 1. Yes
- 2. No
- 3. N/A

If not, please provide more details on the gaps:

.....

.....
17. Does the current database software of your organization allow data entry in the off-line mode and sync data later when internet is available?

1. Yes
2. No
3. N/A

Data utilization, level of coordination & sharing

18. How are the ZD data used in decision making? (*circle more than one answer, if applicable*).

1. For reporting purpose to the national level
2. For decision making at my organizational level
3. For cross-sectoral decision making at the provincial level
4. Other (specify):

19. How often do different government agencies from animal health and human health sectors and related stakeholders communicate and share data on ZD incidents in wildlife and human populations?

1. Every month
2. Several times a year
3. Once a year
4. None
5. Don't know.
6. Other answers:

.....
20. Which of the following **data and information** do you have **“regular access”** to? (*can choose multiple answers, if applicable*).

- F. Wildlife farms & wildlife species in Dong Nai province;
- G. Zoonotic diseases (ZDs) on human population in Dong Nai province;
- H. ZDs on wildlife animals in Dong Nai province;
- I. ZDs on domestic animals in Dong Nai province.

21a. Can you evaluate the **ease of access to data on ZD** (on wildlife population) **“from other government agencies”** in your province?

1. Easy (any time when I need);
2. Rather difficult
3. Highly difficult
4. No permission to access
5. Don't know.
6. Other (specify):

21a. Can you evaluate the **ease of access to data on ZD** (on human population) **“from other government agencies”** in your province?

1. Easy (any time when I need);
2. Rather difficult
3. Highly difficult
4. No permission to access
5. Don't know.
6. Other (specify):

22. Types of data do other organizations share with you (*can choose multiple answers, if applicable*).

- A. Wildlife farms & wildlife species in Dong Nai province;
- B. Zoonotic diseases (ZDs) on human population in Dong Nai province;
- C. ZDs on wildlife animals in Dong Nai province;
- D. ZDs on domestic animals in Dong Nai province.
- E. Other (specify):

Quality management of ZD data

23. How were data on ZD verified and processed to ensure data quality in the database system?

.....
.....

PART D: GAP, CHALLENGES AND NEEDS

24. Which of the followings do you consider the biggest challenges in **ZD data management systems & sharing** in Dong Nai province? (*Select maximum 3 answers*).

- A. No integrated and/or shared data on ZD in wildlife and human populations for shared understanding of potential risk and coordinated interventions.
- B. Lack of cross-sectoral coordination mechanism among local government agencies.
- C. No formal ZD incident reporting guidelines among the local government agencies.
- D. Other (please specify):

25. Is it necessary to have a consolidated database system to include ZD data in wildlife and human population for shared understanding and coordinated action on spillover risk reduction in Dong Nai province?

1. Yes, it is highly needed;
2. Not sure.
3. No, it is not necessary;

Reasons for your answer above:

.....

26. Can the current database systems (of CDC, and/or Sub-Department of Forest Protection) be integrated and/or modified to include data on ZD diseases in wildlife and human populations?

1. Yes

- 2. No
- 3. Not sure

26a. If yes, please indicate which database software can be modified, and why?

.....
.....
.....

26b. If no or not sure, please explain the reason for your answer below:

.....
.....
.....

PART E: SUGGESTIONS FOR IMPROVEMENTS OF THE CURRENT ZD DATA MANAGEMENT SYSTEMS

27. If there are several options to integrate data on ZD in wildlife and human populations below, which option do you prefer? And why?

- 1. Modify the current database software;
- 2. Create a new digital platform that can integrate both data of ZD in wildlife animals and human populations.
- 3. Other (please specify):

Reasons for your answer:

.....
.....
.....

APPENDIX III: FGD GUIDING QUESTIONS

GUIDING QUESTIONS/TOPICS FOR FOCUS GROUP DISCUSSIONS

1. What are the current challenges and gaps in ZD data collection, management and sharing in Dong Nai province?
2. What should be done to improve ZD data management and sharing for informed decision making to reduce ZD spillover risks?
3. Scoring of different aspects of ZD data management (Table below).

Scoring: Please discuss in groups to evaluate the following aspects by scoring from 1 (lowest) to 5 (highest score).

#	Aspects of the data management system related to wildlife and human health	Score (1- >5)	Reasons for the scores	What should be changed to improve the score?
1	Local government's policies and guidelines on routine surveillance of ZD (zoonotic diseases) in wildlife and human populations.			
2	Level of coordination among government agencies from provincial to commune levels in ZD identification and spillover risk reduction.			
3	Budget of the local government for "large-scale ZD surveillance".			
4	ZD Incident management systems for wildlife animals.			
5	ZD Incident management systems for human population.			
6	Capacity of local human resources (HR) in ZD surveillance, identification and spillover risk reduction.			
7	Availability and/or ease of access to lab facilities and equipment for ZD sample tests.			

#	Aspects of the data management system related to wildlife and human health	Score (1->5)	Reasons for the scores	What should be changed to improve the score?
8	Mechanism to integrate ZD data in wildlife and human populations at the provincial government level.			
9	Accessibility of local OH network members to data on wildlife ZD.			
10	Accessibility of local OH network members to data on ZD in human population.			
11	Frequency of database updates: ZD in wildlife animals.			
12	Frequency of database updates: ZD in human population.			
13	Level and frequency of data sharing: wildlife farms			
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