



**Animal Markets and
Zoonotic Disease in
Vietnam**

COUNTRY SUMMARY: VIETNAM

CULTURAL CONTEXT

Vietnam's significant development in recent decades, prompted by economic and political reforms, has transformed it into a lower middle-income country. Basic rural infrastructure has improved but not kept pace with economic growth. With increasing wealth has come increasing demand for animal protein. Livestock is one of Vietnam's fastest growing agricultural sectors, with major infrastructure support provided by private companies such as Cargill. There are rising prices and demand for wild meat, associated with prestige, wealth, and high status. Animals are bought or consumed as pets, for food, for traditional medicine, and more. The country is a potential hotspot for emerging zoonotic disease given these systems of animal production and a high level of biodiversity.

ANIMAL MARKETS

Live animal markets sell both livestock and wild animals, and are culturally important, though younger Vietnamese are increasingly turning to supermarkets to source their food. Many markets sell poultry and pigs brought together to market by middlemen from a number of smallholder farms. Many restaurants keep live or recently-killed animals for sale to customers, including animals such as snakes or civet cats and rarer species such as pangolins. In addition to the legal and illegal wildlife trade and production of domestic animals, Vietnam supports a growing wildlife farming industry, where animals are sourced from captive breeders or from the wild and intensively farmed in captivity. The nature of smallholder farms, wildlife farms, and legal and illegal wildlife trade are such that they overlap significantly, particularly in rural forested or mountainous areas, where decentralized public health practices and government policies generally are less likely to be enforced, where veterinary care is slim to non-existent, and where poverty and hunger are primary drivers, particularly as the wealth gap in Vietnam widens. A smallholder farmer of traditional livestock—pigs, chickens, ducks, dogs—may also officially or unofficially breed civets, porcupine, field rats, or other wild species to generate income. This same farmer may be a hunter or trade for illegal wildlife with a hunter to restock wildlife for breeding purposes.

DRIVERS OF ZOOONOTIC DISEASE RISKS

Despite increasing industrial production, livestock farming still primarily takes place on “smallholder” backyard farms, often alongside wildlife farms, where biosecurity is low or non-existent and species are mixed together with free roaming wild waterfowl and other animals. In competition with the industrial sector and amid increasing production costs, livestock density is high everywhere; some trading and sale of sick animals continues. Interfaces where domestic poultry, pigs, and wild aquatic birds interact, sharing water and food, are of particular public health concern. Some of these challenges are rooted in

poverty; others in lack of public health literacy. Wildlife supply chains contribute to zoonotic risk. Increasing wildlife “farms,” breeding various species, usually in poor conditions, are loosely regulated and poorly monitored; illegal activity and corruption are rampant. In rural areas, animals are kept in close contact with livestock, humans, other farmed wildlife, as well as native free-roaming wildlife. It is in these overlapping areas where risk of zoonotic disease appears greatest. Recent disease outbreaks have included avian influenza virus H5N1, foot and mouth disease, porcine reproductive and respiratory syndrome (“blue ear” disease), and African swine fever.

RISK MITIGATION AND RELEVANT CHALLENGES

Lack of monitoring and baseline information on wildlife populations are among many factors challenging understanding and addressing disease dangers posed by the wildlife trade. While monitoring the illegal wildlife trade between countries is difficult, monitoring and regulating legal wildlife trade is equally challenging, in great part because of the extent to which legal and illegal markets overlap. Livestock production regulation fails to account for a highly diverse, diffuse system of small producers. There is currently little incentive in Vietnam’s food system to regularly engage in safe practices.

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INTRODUCTION

Vietnam is situated along the eastern edge of the Indochina peninsula in Southeast Asia, with China to the north, and Laos and Cambodia to the west. Annamite mountain range marks its western border and its eastern border of coast includes the Gulf of Tonkin, the Gulf of Thailand and Pacific Ocean. Inland, the Mekong and Red rivers give rise to fertile Mekong and Hong River Deltas, respectively, for growing rice and other crops. It is a hilly agricultural nation of densely forested highlands, tropical lowlands, and miles of coastline. The country is roughly divided into highlands and Hong River Delta in the north, Annamite Range and coastal lowlands in the center, and Mekong Delta in the south. The climate is tropical monsoon, with an average annual humidity of 84 percent. Micro climates across the country vary considerably due to topographical change and differences in latitude.¹

Vietnam is a communist state led by the chief of state (the president). The head of government is the prime minister. In Vietnam's mixed economy the Vietnamese people have limited opportunity for private economic development; to a great extent the economy remains government-controlled. Importantly, Vietnam is a member of the Asia-Pacific Economic Cooperation, the Association of Southeast Asian Nations, and the Trans-Pacific Partnership.

The country has undergone tremendous development in the past 30 years, prompted by economic and political reforms under Doi Moi (roughly translated as “renovation”) market-oriented reforms^{2,3}. Doi Moi shifted the country from a centralized command economy to a mixed economy, or directed planning supported by an open, market-based economy, which brought collective agricultural production, and most price controls and subsidies to an end.⁴ The major unit of agricultural production was officially recognized to be the household, and production factors were given to the farmers themselves.⁵ The 1993 Land Law increased security and allowed turnover of land-use rights; tax reform improved farmers' economic situation and cooperatives or state-owned farms were redesigned to be responsive to farmers' needs. Collectively, the reforms set the household at the center of Vietnam's agricultural center; 14 million households make 79% of their income from farming.⁶

Subsequent fast-paced economic growth has transformed Vietnam into a lower middle-income country; more than 45 million people were lifted out of poverty, and the population is experiencing corresponding fast-paced demographic and social change. However, the gap between the poorest and wealthiest in Vietnam is increasing, and mobility out of the lower class is decreasing.⁷ In terms of sheer numbers, the population of Vietnam is expected to reach 120 million by 2050 (from 96.5 million in 2019); 55.5 percent of the current population is under 35, with a life expectancy of 76 years. While

1. Ronald J. Cima, ed. "Geography," in *Vietnam: A Country Study*, (Washington DC: GPO for the Library of Congress, 1987), <http://countrystudies.us/vietnam/33.htm>.
2. "The World Bank in Vietnam," The World Bank, updated April 14, 2023, <https://www.worldbank.org/en/country/vietnam/overview#1>.
3. Mai Hoa Do et al., "Strengthening Public Health Management Capacity in Vietnam: Preparing Local Public Health Workers for New Roles in a Decentralized Health System," *Journal of Public Health Management & Practice* 24 Suppl 2 (2018): S74–81, doi: 10.1097/PHH.0000000000000755.
4. Mai Hoa Do et al., "Strengthening Public Health Management Capacity in Vietnam: Preparing Local Public Health Workers for New Roles in a Decentralized Health System," *Journal of Public Health Management & Practice* 24 Suppl 2 (2018): S74–81, doi: 10.1097/PHH.0000000000000755.
5. Joshua M. Steinfeld and Khi V. Thai, "Political Economy of Vietnam: Market Reform, Growth, and the State," *Maryland Series in Contemporary Asian Studies* 2013, no. 3 (2013): 25.
6. Regional Office for Asia and the Pacific, *Rapid Growth of Selected Asian Economies: Lessons and Implications for Agriculture and Food Security Republic of Korea, Thailand and Viet Nam* (Bangkok: FAO, 2006), <https://www.fao.org/3/ag089e/AG089E00.htm#TOC>.
7. Joshua M. Steinfeld and Khi V. Thai, "Political Economy of Vietnam: Market Reform, Growth, and the State," *Maryland Series in Contemporary Asian Studies* 2013, no. 3 (2013): 25.

the population on the whole is aging rapidly, the middle class is growing, and currently accounts for 13 percent of the population (it is expected to reach 26 percent by 2026.)⁸ Growth has had negative impacts on natural resources and the environment. Alongside increasing reliance on fossil fuels, water demand, exploitation of sand, fisheries, and timber, waste management and pollution pose tremendous challenges.⁹ Basic rural infrastructure has improved in recent years, but it has not kept pace with economic growth, resulting not only in infrastructure bottlenecks¹⁰ but also, as this case study reveals, blind spots in the supply chain that pose risk of zoonotic viral transmission—both in terms of animal to animal transmission and animal to human transmission.

With increasing wealth have come changes in dietary preferences, particularly an increasing demand for meat; livestock represents one of Vietnam’s fastest growing agricultural sectors.¹¹ The consumption of livestock products—especially pork, cow milk, and eggs—has increased dramatically between 2010 and 2020, with growth rates in Vietnam leading all countries in the Southeast Asian region.¹² For example, total production of meat increased by 152% between 2007 and 2016 (from 3.29 to 5.02 million tons). Over the same period, production of cattle and poultry products grew 174% faster than the average output of all animal populations.¹³ To keep pace with this demand, livestock production is shifting from smallholder rural farms, with live and slaughtered animals sold in traditional markets, to industrialized production systems on mid-, large-, and mega-sized farms. While the number of households raising animals is decreasing as animal populations in the country grow,¹⁴ and as large-scale and industrial retail become more common, with products sold in supermarkets and convenience stores, small-scale production and traditional markets are expected to persist in Vietnam; smallholder farms still produce 90% of vegetables and 65% of pork products in the domestic market.¹⁵

Even as smallholder farms remain key to the food security of Vietnam, they are experiencing growing pressure, both from economic competition and due to zoonotic disease, such as African Swine Fever. Vietnam is a member of several free-trade agreements including the Trans-Pacific Partnership; to meet increasing demand for animal products, the country is importing less expensive food. This intensifies market competition for smallholder farms, as imported beef, chicken, and some specialty pork products are cheaper than equivalent products that are domestically sourced.¹⁶ Amid this growing pressure, the outbreak of African Swine Fever in 2019 was devastating to smallholder farms; some six million swine were culled. In 2020, amid the COVID-19 pandemic, lockdowns, and implementation of

8. “The World Bank in Vietnam,” The World Bank, updated April 14, 2023, <https://www.worldbank.org/en/country/vietnam/overview#1>.

9. “The World Bank in Vietnam,” The World Bank, updated April 14, 2023, <https://www.worldbank.org/en/country/vietnam/overview#1>.

10. Regional Office for Asia and the Pacific, *Rapid Growth of Selected Asian Economies: Lessons and Implications for Agriculture and Food Security* Republic of Korea, Thailand and Viet Nam. (Bangkok: FAO, 2006), <https://www.fao.org/3/ag089e/AG089E00.htm#TOC>.

11. Pham Van Dung et al., *Livestock Policies in Son La Province, Vietnam: A Review* (Hanoi: Alliance of Bioversity International and CIAT, 2020), <https://cgspace.cgiar.org/bitstream/handle/10568/111509/%5b110%5d%20Livestock%20Policy%20Review%20-%20Final.pdf?sequence=1&isAllowed=y>.

12. “The World Bank in Vietnam,” The World Bank, updated April 14, 2023, <https://www.worldbank.org/en/country/vietnam/overview#1>.

13. Pham Van Dung et al., *Livestock Policies in Son La Province, Vietnam: A Review* (Hanoi: Alliance of Bioversity International and CIAT, 2020), <https://cgspace.cgiar.org/bitstream/handle/10568/111509/%5b110%5d%20Livestock%20Policy%20Review%20-%20Final.pdf?sequence=1&isAllowed=y>.

14. Pham Van Dung et al., *Livestock Policies in Son La Province, Vietnam: A Review* (Hanoi: Alliance of Bioversity International and CIAT, 2020), <https://cgspace.cgiar.org/bitstream/handle/10568/111509/%5b110%5d%20Livestock%20Policy%20Review%20-%20Final.pdf?sequence=1&isAllowed=y>.

15. Hung Nguyen-Viet et al., “Food Safety in Vietnam: Where We Are at and What We Can Learn From International Experiences,” *Infectious Diseases of Poverty* 6, no. 1 (2017): 39, doi: 10.1186/s40249-017-0249-7.

16. Hung Nguyen-Viet et al., “Food Safety in Vietnam: Where We Are at and What We Can Learn From International Experiences,” *Infectious Diseases of Poverty* 6, no. 1 (2017): 39, doi: 10.1186/s40249-017-0249-7.

new regulations on live markets,¹⁷ many smallholder farms that produce poultry for traditional markets, at least temporarily, ceased production.¹⁸ These market and epidemiological dynamics can contribute to smallholder farms making desperate choices to survive. For example, in a 2020 study of public health awareness among livestock farmers in Vietnam, one participant reported that recently, after some of his pigs died from foot and mouth disease, he panicked and sold all of his pigs quickly, at a slightly cheaper price, rather than risk losing them all. In the same study, 94.9% of participants said they did not contact government authorities if they had sick or dead animals; 80.3% did not reach out for local veterinary assistance; more than 38% did not even separate sick animals from healthy animals. There is currently little incentive in Vietnam's food system for those who regularly engage in safe practices.¹⁹

To a great extent, such apparent disregard for safety is rooted in a lack of basic public health awareness and health literacy, or a person's ability "to use and apply information to make decisions related to their health."²⁰ Poor health literacy has been at least partially attributable to the social and economic developmental changes instigated by Doi Moi.²¹ Decentralizing health services has meant decision-making and resources have moved to provincial and district levels.²² While in theory this could empower health workers and people at a local level and improve health efficiency, this has not been borne out due to infrastructure weakness, limited resources, and a lack of health workers in far-flung, rural, and mountainous areas of the country. In other words, responsibility for policy-making, assessment, training, and education have all been shifted to the periphery of the health system where little if any of these are being implemented or performed²³—even as smallholder livestock farmers are continually encountering zoonotic agents at every step of their work, from daily feeding to slaughter (which usually takes place in the home, or in a neighboring home).^{24 25 26} This is poignant in terms of the transmission and spread of zoonotic disease; as a result of the cutback of subsidies for vaccination since Doi Moi, vaccination coverage decreased from 70% to 80% in the 1980s to 40% to 50% in the 1990s.²⁷

Decentralized implementation of policies has meant that in rural areas, where the majority of smallholder farms are located, vaccination campaigns are limited by lack of storage and transport facilities and simply by non-compliance with medical standards for vaccination procedures.²⁸

17. "Directive No. 29/CT-TTg on a Number of Urgent Solutions for Wildlife Management," *LuatVietnam*, July 23, 2020, <https://english.luatvietnam.vn/directive-no-29-ct-ttg-on-a-number-of-urgent-solutions-for-wildlife-management-187252-Doc1.html>.

18. Trang Dang and Hang Le of Humane Society International, Vietnam. Personal Interview. June 17, 2021.

19. Khuong Cao Ba et al., "Health Literacy Toward Zoonotic Diseases Among Livestock Farmers in Vietnam," *Environmental Health Insights* 14 (2020): 1178630220932540, <https://doi.org/10.1177/1178630220932540>.

20. Khuong Cao Ba et al., "Health Literacy Toward Zoonotic Diseases Among Livestock Farmers in Vietnam," *Environmental Health Insights* 14 (2020): 1178630220932540, <https://doi.org/10.1177/1178630220932540>.

21. Mai Hoa Do et al., "Strengthening Public Health Management Capacity in Vietnam: Preparing Local Public Health Workers for New Roles in a Decentralized Health System," *Journal of Public Health Management & Practice* 24 Suppl 2 (2018): S74–81, doi: 10.1097/PHH.0000000000000755.

22. Mai Hoa Do et al., "Strengthening Public Health Management Capacity in Vietnam: Preparing Local Public Health Workers for New Roles in a Decentralized Health System," *Journal of Public Health Management & Practice* 24 Suppl 2 (2018): S74–81, doi: 10.1097/PHH.0000000000000755.

23. Mai Hoa Do et al., "Strengthening Public Health Management Capacity in Vietnam: Preparing Local Public Health Workers for New Roles in a Decentralized Health System," *Journal of Public Health Management & Practice* 24 Suppl 2 (2018): S74–81, doi: 10.1097/PHH.0000000000000755.

24. Khuong Cao Ba et al., "Health Literacy Toward Zoonotic Diseases Among Livestock Farmers in Vietnam," *Environmental Health Insights* 14 (2020): 1178630220932540, <https://doi.org/10.1177/1178630220932540>.

25. Sinh Dang-Xuan et al., "Food Safety Perceptions and Practices among Smallholder Pork Value Chain Actors in Hung Yen Province, Vietnam," *Journal of Food Protection* 79, no. 9 (2016): 1490–7, <https://doi.org/10.4315/0362-028X.JFP-15-402>.

26. Trang Dang and Hang Le of Humane Society International, Vietnam. Personal Interview. June 17, 2021.

27. Joshua M. Steinfeld and Khi V. Thai, "Political Economy of Vietnam: Market Reform, Growth, and the State," *Maryland Series in Contemporary Asian Studies* 2013, no. 3 (2013): 25.

28. Joshua M. Steinfeld and Khi V. Thai, "Political Economy of Vietnam: Market Reform, Growth, and the State," *Maryland Series in Contemporary Asian Studies* 2013, no. 3 (2013): 25.

Compounding the lack of resources is a general lack of understanding and/or implementation of appropriate practices regarding basic sanitation, personal protection equipment, antibiotic use, vaccination, and waste management.²⁹ As a result, there is no reliable data to interpret regarding disease prevalence; systematic monitoring is likewise lacking, and the surveillance system does not work.³⁰ All of this is dangerous and increases the risks of rapid and widespread transmission of zoonotic viral infections.³¹

A further consequence of increasing prosperity in urban areas is the rapidly rising price and demand for wild meat.³² In Vietnam, eating wild meat is associated with prestige, social leverage, high income, and high status. Serving and/or paying for wild meat is used to show respect and to “demonstrate competence” in business relations to such an extent that in a recent study, some consumers of wild meat have said they have limited control over their choice to use it, as “powerful individuals” may demand it.³³ Results of a 2011 study investigating the social context of consumption of wild animal products in central Hanoi show that not only businessmen and finance professionals, but also government officials have been major consumers of wild meat.³⁴ It has been suggested that government officials’ preference for wild meat may be at least in part behind the reason why poor regulation and implementation of policies related to wildlife farms are allowed to continue.³⁵

The aforementioned consumption patterns and prices reflect its role as a luxury food, not a necessary source of protein.³⁶ Poaching is what is meeting demand, especially among the most wealthy people at expensive restaurants. Corruption is a contributing factor; individuals in influential positions can often have pricey wild fare paid for by corporate or institutional funds, and they may have the political power to avoid legal charges or fines. Cheaper, legal, and farmed alternatives are consumed by the rising middle class in more casual establishments and in social drinking contexts.³⁷

Vietnam is a significant consumer of wild meat in urban restaurant settings.³⁸ Increasing affluence and a booming economy (between 1990 and 2010 it grew at an average annual rate of 7.3%, and the per capita income almost quintupled)³⁹ are giving rise to greater and greater demand for wild animal products within Vietnam, where in recent decades, patterns of wild meat consumption have changed accordingly. Consuming wild meat in Vietnam is not a matter of subsistence or survival, but a

29. Khuong Cao Ba et al., “Health Literacy Toward Zoonotic Diseases Among Livestock Farmers in Vietnam,” *Environmental Health Insights* 14 (2020): 1178630220932540, <https://doi.org/10.1177/1178630220932540>.

30. Joshua M. Steinfield and Khi V. Thai, “Political Economy of Vietnam: Market Reform, Growth, and the State,” *Maryland Series in Contemporary Asian Studies* 2013, no. 3 (2013): 25.

31. Khuong Cao Ba et al., “Health Literacy Toward Zoonotic Diseases Among Livestock Farmers in Vietnam,” *Environmental Health Insights* 14 (2020): 1178630220932540, <https://doi.org/10.1177/1178630220932540>.

32. Nguyen Van Song, “Wildlife Trading in Vietnam: Situation, Causes, and Solutions,” *The Journal of Environment & Development* 17, no. 2 (2008): 145–65, <https://doi.org/10.1177/1070496508316220>.

33. Rebecca Drury, “Hungry for Success: Urban Consumer Demand for Wild Animal Products in Vietnam,” *Conservation & Society* 9, no. 3 (2011): 247–57, <https://www.jstor.org/stable/26393047>.

34. Rebecca Drury, “Hungry for Success: Urban Consumer Demand for Wild Animal Products in Vietnam,” *Conservation & Society* 9, no. 3 (2011): 247–57, <https://www.jstor.org/stable/26393047>.

35. Lan Ho, Mai Trinh and Pham Thong of Save Vietnam’s Wildlife. Personal Interview. June 23, 2021.

36. Rebecca Drury, “Hungry for Success: Urban Consumer Demand for Wild Animal Products in Vietnam,” *Conservation & Society* 9, no. 3 (2011): 247–57, <https://www.jstor.org/stable/26393047>.

37. Rachel Shairp et al., “Understanding Urban Demand for Wild Meat in Vietnam: Implications for Conservation Actions,” *PLoS ONE* 11, no. 1 (2016): e0134787, <https://doi.org/10.1371/journal.pone.0134787>.

38. Rachel Shairp et al., “Understanding Urban Demand for Wild Meat in Vietnam: Implications for Conservation Actions,” *PLoS ONE* 11, no. 1 (2016): e0134787, <https://doi.org/10.1371/journal.pone.0134787>.

39. Rachel Shairp et al., “Understanding Urban Demand for Wild Meat in Vietnam: Implications for Conservation Actions,” *PLoS ONE* 11, no. 1 (2016): e0134787, <https://doi.org/10.1371/journal.pone.0134787>.

popular trend related to and signaling personal wealth and status. A significant amount of wild animal species are part of commercial trade networks that serve the growing urban middle class.⁴⁰

Results of a study exploring wild meat consumption patterns in Ho Chi Minh City suggest that the price disparity across wild meat options is in great part due to the perception that the wilder the animal, the more expensive and desirable the fare; wild animals consume a natural diet while “inactive farmed animals eat an artificially and chemically enhanced diet.” Per this conception, it is wild meat that will actually pass on the benefits of traditional medicine philosophy, of nutrition, and of the aphrodisiac abilities of wild animals.⁴¹ Exclusivity, rarity, and cost are closely connected for consumers of wild meat. Says one interviewee in the aforementioned study, “Everyone knows that wild civet has a high value... so when they want to show their value they eat it. But farmed civet, everyone can have it, so its value is not high, so it does not show high value.”⁴² Importantly, the same study strongly suggests that the highest number of instances of wild meat consumption are amid casual recreational gatherings with friends and family, not as business-related events; researchers believe this reflects that consumers are being driven not only to signal their status and wealth, but are influenced by an increasingly prevalent norm “to meet a certain standard of decency in terms of the volume and grade of goods consumed, and to match personal consumption with that of peers and comparable means.”⁴³

Vietnam is considered a hotspot or epicenter for emerging zoonotic disease.⁴⁴ Disease outbreaks have ravaged Vietnam’s livestock subsector in recent decades, including avian influenza virus H5N1, foot and mouth disease, porcine reproductive and respiratory syndrome (“blue ear” disease), and African swine fever.⁴⁵ Despite a slow and steady shift to large-scale industrial production, livestock farming still primarily takes place on “smallholder” backyard and village farms, where biosecurity is low or non-existent. Farming practices—including awareness and knowledge of the risks of zoonotic disease—vary widely across regions.⁴⁶ With intensifying competition with the industrial sector, and working against expensive and increasing production costs, livestock density is high and illegal trading and sales of sick animals continue.⁴⁷ Further, amid rising prosperity and in a booming economy, consumption of livestock animal products is increasing rapidly. Between 2010 and 2020, growth rates in animal product consumption in Vietnam led all Southeast Asia countries.⁴⁸ Vietnam already consumes as much pork per capita as does the US,⁴⁹ and as of 2015, its population of approximately 94 million people was already

40. Rebecca Drury, “Hungry for Success: Urban Consumer Demand for Wild Animal Products in Vietnam,” *Conservation & Society* 9, no. 3 (2011): 247–57, <https://www.jstor.org/stable/26393047>.

41. Rebecca Drury, “Hungry for Success: Urban Consumer Demand for Wild Animal Products in Vietnam,” *Conservation & Society* 9, no. 3 (2011): 247–57, <https://www.jstor.org/stable/26393047>.

42. Rebecca Drury, “Hungry for Success: Urban Consumer Demand for Wild Animal Products in Vietnam,” *Conservation & Society* 9, no. 3 (2011): 247–57, <https://www.jstor.org/stable/26393047>.

43. Rebecca Drury, “Hungry for Success: Urban Consumer Demand for Wild Animal Products in Vietnam,” *Conservation & Society* 9, no. 3 (2011): 247–57, <https://www.jstor.org/stable/26393047>.

44. Khuong Cao Ba et al., “Health Literacy Toward Zoonotic Diseases Among Livestock Farmers in Vietnam,” *Environmental Health Insights* 14 (2020): 1178630220932540, <https://doi.org/10.1177/1178630220932540>.

45. Pham Van Dung et al., “Livestock Policies in Son La Province, Vietnam: A Review (Hanoi: Alliance of Bioversity International and CIAT, 2020), <https://cgspace.cgiar.org/bitstream/handle/10568/111509/%5b110%5d%20Livestock%20Policy%20Review%20-%20Final.pdf?sequence=1&isAllowed=y>.

46. Khuong Cao Ba et al., “Health Literacy Toward Zoonotic Diseases Among Livestock Farmers in Vietnam,” *Environmental Health Insights* 14 (2020): 1178630220932540, <https://doi.org/10.1177/1178630220932540>.

47. Pham Van Dung et al., “Livestock Policies in Son La Province, Vietnam: A Review (Hanoi: Alliance of Bioversity International and CIAT, 2020), <https://cgspace.cgiar.org/bitstream/handle/10568/111509/%5b110%5d%20Livestock%20Policy%20Review%20-%20Final.pdf?sequence=1&isAllowed=y>.

48. Pham Van Dung et al., “Livestock Policies in Son La Province, Vietnam: A Review (Hanoi: Alliance of Bioversity International and CIAT, 2020), <https://cgspace.cgiar.org/bitstream/handle/10568/111509/%5b110%5d%20Livestock%20Policy%20Review%20-%20Final.pdf?sequence=1&isAllowed=y>.

49. “Opportunities and Challenges in Vietnam’s Feed Sector,” eFeedLink, accessed October 17, 2023, <https://www.efeedlink.com/contents/12-10-2015/162b611f-3ce2-40eb-982a-a8859e5c77e1-d004.html>.

consuming several times more red meat than all of Indonesia's then 280 million people. These trends are projected to continue growing at 5% to 7% for at least another decade.⁵⁰

According to the Department of Livestock Production, in 2020 the number of live pigs in the country was up 5% year-over-year, to 26.17 million. Cows were up 4.2% at 5.87 million, and egg production was up 9.5%, at 14.5 billion eggs.⁵¹ According to the General Department of Customs, Vietnam imported 301,000 pigs, 3.4 million poultry and 518,000 live buffalos for slaughtering.⁵² Also in 2020, Vietnam's total *export* value totaled \$1.2 billion: \$28.5 million from fresh, chilled or frozen pork products; \$1.4 million from eggs; \$7.3 million from honey; \$25.1 million from fresh poultry and \$28.1 million from processed meat.⁵³

In July of 2021, the International Finance Corporation, a member of the World Bank Group, announced an investment of \$43 million into GREENFEED Vietnam to help it expand pork production “to ensure a reliable supply of safe and quality pork while enhancing livestock production practices in Vietnam. The investment is meant to help address pork shortages and price volatility caused by African swine flu, which severely decreased pork supply,⁵⁴ and is meant to help GREENFEED scale up its farming capacity and adopt biosecure and sustainable production practices to provide traceable, safe pork in-country.⁵⁵

As of 2020, the Asian Development Bank's portfolio of projects and programs in Vietnam totaled more than \$4.7 billion, aimed at the COVID-19 pandemic, transport connectivity and urban development, education and health services, climate change mitigation and integrating the regional and global economy. The Asian Development Bank is also working to help Vietnam strategically over 2021–2025 on Vietnam's Socio-economic Development Plan 2021–2025, including technological innovation, private-public partnerships, climate change adaptation and mitigation, and possibly financing multi-sector projects at a subnational level.⁵⁶

Together with the World Bank, Vietnam has created a blueprint for future development, with the aim of transitioning into a modern industrialized country by 2035. The path forward is to be supported by three pillars: “Economic Prosperity with Environmental Sustainability,” “Equity and Social Inclusion,” and “A Capable and Accountable State.”⁵⁷ As such, and given that it is now among the world's fastest growing agribusiness centers,⁵⁸ the agricultural sector in Vietnam sits at a turning point⁵⁹; the government's agricultural restructuring plan defines its goals in terms of economically, socially, and environmentally

50. “Opportunities and Challenges in Vietnam's Feed Sector,” eFeedLink, accessed October 17, 2023, <https://www.efeedlink.com/contents/12-10-2015/162b6f1f-3ce2-40eb-982a-a8859e5c77e1-d004.html>.

51. “Livestock Industry Targets Production Growth of 6 Percent,” Vietnam+, January 8, 2021, <https://en.vietnamplus.vn/livestock-industry-targets-production-growth-of-6-percent/194455.vnp>.

52. “Livestock Industry Targets Production Growth of 6 Percent,” Vietnam+, January 8, 2021, <https://en.vietnamplus.vn/livestock-industry-targets-production-growth-of-6-percent/194455.vnp>.

53. “Livestock Industry Targets Production Growth of 6 Percent,” Vietnam+, January 8, 2021, <https://en.vietnamplus.vn/livestock-industry-targets-production-growth-of-6-percent/194455.vnp>.

54. Ngoc Mai, “IFC Invests US\$43 Million in GREENFEED Vietnam,” Hanoi Times, July 1, 2021, <http://hanoitimes.vn/ifc-invests-us43-million-in-greenfeed-vietnam-for-sustainable-livestock-production-317908.html>.

55. Ngoc Mai, “IFC Invests US\$43 Million in GREENFEED Vietnam,” Hanoi Times, July 1, 2021, <http://hanoitimes.vn/ifc-invests-us43-million-in-greenfeed-vietnam-for-sustainable-livestock-production-317908.html>.

56. “Viet Nam and ADB,” Asian Development Bank, accessed October 21, 2021, <https://www.adb.org/countries/viet-nam/main>.

57. “Vietnam and the World Bank,” Wikipedia, updated September 27, 2023, https://en.wikipedia.org/wiki/Vietnam_and_the_World_Bank.

58. “Opportunities and Challenges in Vietnam's Feed Sector,” eFeedLink, accessed October 17, 2023, <https://www.efeedlink.com/contents/12-10-2015/162b6f1f-3ce2-40eb-982a-a8859e5c77e1-d004.html>.

59. World Bank Group, *Transforming Vietnamese Agriculture: Gaining More for Less* (Hanoi: Hong Duc Publishing House, 2016), <https://documents1.worldbank.org/curated/en/116761474894023632/pdf/108510-WP-PUBLIC.pdf>.

sustainable development.⁶⁰ In short, Vietnam seeks to build a model of agricultural development that would enable real competitiveness in the global marketplace and that would also—respecting the country’s own constraints and realities of climate change—be sustainable and viable in the long term.⁶¹ In terms of zoonotic disease particularly, the World Bank has stated that while emergency responses have sometimes been effective in addressing disease in poultry and pig production and in shrimp aquaculture, Vietnam must pay more attention and invest further resources to promote best practices in animal husbandry and aquaculture, and to surveil disease and improve early warning systems.⁶² Integrating smallholder farms into agricultural supply chains and strengthening private-public partnerships among farmers may help Vietnam achieve these goals as it works to overcome long-term challenges of competitiveness and sustainability in the agricultural sector.⁶³

In 2021 the United States Agency for International Development created a consortium to improve livestock management and combat risks of zoonotic disease. The five-year, \$33 million consortium is led by Cargill, and includes Ausvet, Heifer International, and the International Poultry Council. The group aims to increase capacity across several Asian and African countries to prevent, identify, and respond to zoonotic disease threats (among other disease threats), and will do so by working directly on large and small farms, throughout animal markets, and their supply chains. Ausvet is charged with collecting real-time data and insight on disease surveillance, vaccination, and other animal health programs to help farmers, industries, and the government in Vietnam make data-driven decisions in maintaining and improving animal health.⁶⁴

Finally, 2020 saw a wave of large companies investing in Vietnam’s livestock sector, in particular. Domestic enterprises Minh Du, Cao Khanh, and Dabaco expanded poultry production.⁶⁵ The extent to which agribusiness in Vietnam is dependent upon foreign investment has become politically controversial,⁶⁶ and foreign enterprises making large investments in 2020 in Vietnam’s livestock sector included Cargill, Japfa, Hoa Phat, Thaco, Mavin, Hung Nhon, and Tan Long.⁶⁷ The investment projects tend to involve large production scale and high technology, according to the Department of Livestock Production, which the department says aids the modernization and sustainable development of the livestock industry.⁶⁸ Cargill, for example, which has identified Vietnam as a “very important market

60. World Bank Group, *Transforming Vietnamese Agriculture: Gaining More for Less* (Hanoi: Hong Duc Publishing House, 2016), <https://documents1.worldbank.org/curated/en/116761474894023632/pdf/108510-WP-PUBLIC.pdf>.

61. “4. New Opportunities in Agriculture, Manufacturing and Services in Viet Nam,” OECD iLibrary, accessed October 21, 2021, <https://www.oecd-ilibrary.org/sites/e04aa448-en/index.html?itemId=/content/component/e04aa448-en>.

62. World Bank Group, “*Transforming Vietnamese Agriculture: Gaining More for Less* (Hanoi: Hong Duc Publishing House, 2016), <https://documents1.worldbank.org/curated/en/116761474894023632/pdf/108510-WP-PUBLIC.pdf>.

63. Claire H. Hollweg, Tanya Smith, and Daria Taglioni, *Vietnam at a Crossroads: Engaging in the Next Generation of Global Value Chains* (Washington, DC: World Bank, 2017), <https://openknowledge.worldbank.org/handle/10986/26215>.

64. Cargill, Inc., “USAID Launches Cargill, Ausvet, Heifer International and IPC Consortium to Combat Threat of Infectious Diseases, Antimicrobial Resistance to Human and Animal Health,” Cision® PR Newswire, April 12, 2021, <https://www.prnewswire.com/news-releases/usaaid-launches-cargill-ausvet-heifer-international-and-ipc-consortium-to-combat-threat-of-infectious-diseases-antimicrobial-resistance-to-human-and-animal-health-301266871.html>.

65. “Livestock Industry Targets Production Growth of 6 Percent,” Vietnam+, January 8, 2021, <https://en.vietnamplus.vn/livestock-industry-targets-production-growth-of-6-percent/194455.vnp>.

66. “Opportunities and Challenges in Vietnam’s Feed Sector,” eFeedLink, accessed October 17, 2023, <https://www.efeedlink.com/contents/12-10-2015/162b6f1f-3ce2-40eb-982a-a8859e5c77e1-d004.html>.

67. “Livestock Industry Targets Production Growth of 6 Percent,” Vietnam+, January 8, 2021, <https://en.vietnamplus.vn/livestock-industry-targets-production-growth-of-6-percent/194455.vnp>.

68. “Livestock Industry Targets Production Growth of 6 Percent,” Vietnam+, January 8, 2021, <https://en.vietnamplus.vn/livestock-industry-targets-production-growth-of-6-percent/194455.vnp>.

for us globally [that] presents clear growth opportunities,”⁶⁹ stores and distributes grains and oilseeds for its customers from warehousing facilities at Saigon International Terminals, the main products Cargill supplies to its customers in Vietnam, including animal feed producers.⁷⁰ In August 2021, Cargill announced a new platform geared toward helping farmers in Vietnam navigate the changing landscape of food production operations across all species.⁷¹ In a related press release put out by the company, a Cargill customer states that he “started with just a few chickens, and learned quickly that [he] did not know much in terms of breeding and disease prevention...By partnering with Cargill...[his] flock has grown to over 6,000 far-healthier birds.”⁷²

Vietnam is also a center of trading, captive breeding and consuming wildlife; the supply chains of live animals in illegal and legal wildlife trade in and through Vietnam pose significant risks of spread and spillover of zoonotic disease.⁷³ Both legal and illegal wildlife trade are thriving, growing, and comprise multi-billion-dollar industries⁷⁴ in Vietnam, which serves a source, consumer and transit country for the trade (with transit/export primarily serving China, Korea, and Japan).⁷⁵

It is widely and strongly suspected that wildlife supply chains in Vietnam significantly contribute to the necessary conditions for viral zoonoses to spill over to humans.⁷⁶ A recent study of field rats from “capture sites” in Vietnam (wild harvested or from wildlife farms) along the supply chain to consumers in restaurants revealed a high proportion of coronavirus positive wildlife and an increasing proportion of positives along the supply chain as the wildlife mixed with multiple species, creating the possibility of viral exchange and recombination. The study concluded that “The wildlife trade supply chain from the field to restaurant and end consumer provides multiple opportunities for such spillover events to occur.”⁷⁷ It is reasonable to assume that as Vietnam’s economy and demand for wild meat continue to grow, so may the risks of zoonotic disease emergence, spillover, and amplification. However, a lack of monitoring baseline information on distribution, wildlife populations, and many other factors make it challenging if not impossible to understand and adequately address the myriad impacts of the wildlife trade—on the environment, on socioeconomic well-being of the Vietnamese people, and on human health.

While monitoring the illegal wildlife trade between countries is obviously particularly difficult, monitoring and regulating *legal* wildlife trade is equally challenging, and this is in great part because of the extent to which legal and illegal markets overlap. Vietnam is seeing a significant and increasing

69. “Cargill Grows its Footprint in Vietnam,” Investment and Trade Promotion Centre, Ho Chi Minh City, accessed October 18, 2023, http://itpc.hochiminhcity.gov.vn/web/en/investors/success_stories/-/asset_publisher/bLWxgCuG4e4M/content/cargill-grows-its-footprint-in-vietnam?redirect=%2Fweb%2Fen%2Finvestors%2Fsuccess_stories&inheritRedirect=true.

70. “Cargill Grows its Footprint in Vietnam,” Investment and Trade Promotion Centre, Ho Chi Minh City, accessed October 18, 2023, http://itpc.hochiminhcity.gov.vn/web/en/investors/success_stories/-/asset_publisher/bLWxgCuG4e4M/content/cargill-grows-its-footprint-in-vietnam?redirect=%2Fweb%2Fen%2Finvestors%2Fsuccess_stories&inheritRedirect=true.

71. “Cargill Launches Feeding Intelligence, a Platform to Support Vietnamese Farmers and Help Them Tackle Complex Animal Nutrition and Health Challenges,” Cargill, accessed October 18, 2023, <https://www.cargill.com.vn/en/2021/cargill-launches-feeding-intelligence,-a-platform-to-support-vie>.

72. “Cargill Launches Feeding Intelligence, a Platform to Support Vietnamese Farmers and Help Them Tackle Complex Animal Nutrition and Health Challenges,” Cargill, accessed October 18, 2023, <https://www.cargill.com.vn/en/2021/cargill-launches-feeding-intelligence,-a-platform-to-support-vie>.

73. Nguyen Quynh Huong et al., “Coronavirus Testing Indicates Transmission Risk Increases Along Wildlife Supply Chains for Human Consumption in Viet Nam, 2013–2014,” *PLoS ONE* 15, no. 8 (2020): e0237129, <https://doi.org/10.1371/journal.pone.0237129>.

74. Chris Humphrey, “Billion-dollar Wildlife Industry in Vietnam Under Assault as Law Draft to Halt Trading,” *The Guardian*, March 18, 2020, <https://www.theguardian.com/environment/2020/mar/18/billion-dollar-wildlife-industry-in-vietnam-under-assault-as-law-drafted-to-halt-trading>.

75. Chris Humphrey, “Billion-dollar Wildlife Industry in Vietnam Under Assault as Law Draft to Halt Trading,” *The Guardian*, March 18, 2020, <https://www.theguardian.com/environment/2020/mar/18/billion-dollar-wildlife-industry-in-vietnam-under-assault-as-law-drafted-to-halt-trading>.

76. Rachel Shairp et al., “Understanding Urban Demand for Wild Meat in Vietnam: Implications for Conservation Actions,” *PLoS ONE* 11, no. 1 (2016): e0134787, <https://doi.org/10.1371/journal.pone.0134787>.

77. Rebecca Drury, “Hungry for Success: Urban Consumer Demand for Wild Animal Products in Vietnam,” *Conservation & Society* 9, no. 3 (2011): 247–57, <https://www.jstor.org/stable/26393047>.

number of wildlife “farms” where designated wildlife species (such as civets and porcupines) are purportedly bred for consumption.⁷⁸ These farms are poorly regulated, and illegal activity and corruption are rampant. For example, in November of 2020, Vietnamese authorities seized 57 animals of 19 different species from a wildlife farm, including 10 species that were protected by law.⁷⁹ While it was hoped that artificial propagation would reduce the demand for wild harvesting and increase the income of local people involved, despite some successes, this has not been borne out. Many wildlife farms wild-harvest or buy from hunters those species that are too difficult or expensive to raise in captivity. The result is mixing between species—wildlife, captive-bred, and domestic livestock included—among animals that have little or no veterinary care, are poorly fed, and kept in unsanitary, stressful and crowded conditions. These animals are then sold and transported by multiple intermediaries across the country to businesses, restaurants, traditional medicine shops, and across the border.⁸⁰ According to the aforementioned study tracking coronavirus positivity among field rats along the supply chain,⁸¹ “Commercial wildlife farming in Vietnam is part of the expanded international trade of wildlife that has been hypothesized to contribute to the cause of global epidemics.”⁸²

Both the national government and provinces in Vietnam have tried to create and implement a legal framework for addressing illegal wildlife trade, but funding and resources are scant. For various reasons discussed in greater detail below, the implementation and enforcement of existing wildlife policies pose numerous challenges and contain weaknesses, inconsistencies, and confusing overlaps across policies that must be addressed.⁸³

CULTURAL RELATIONSHIPS WITH ANIMALS

In Vietnam, “animals are generally destined for captivity as pets, livestock, or are eaten.”⁸⁴ They are bought or consumed for status, as pets, for food, for display in private zoos and collections, or for traditional medicine use.⁸⁵ Vietnam is an agricultural nation and the majority of the population is involved in the livestock sector; rural families, or “smallholder” family farms (also called “back-yard farms”) typically raise dogs, pigs, chickens, ducks, and roosters.⁸⁷ Exploiting and consuming wildlife is also a generally accepted traditional custom, and hundreds of species of fauna are used widely within the

78. Rachel Shairp et al., “Understanding Urban Demand for Wild Meat in Vietnam: Implications for Conservation Actions,” *PLoS ONE* 11, no. 1 (2016): e0134787, <https://doi.org/10.1371/journal.pone.0134787>.

79. Chris Humphrey, “Billion-dollar Wildlife Industry in Vietnam Under Assault as Law Draft to Halt Trading,” *The Guardian*, March 18, 2020, <https://www.theguardian.com/environment/2020/mar/18/billion-dollar-wildlife-industry-in-vietnam-under-assault-as-law-drafted-to-halt-trading>.

80. Chris Humphrey, “Billion-dollar Wildlife Industry in Vietnam Under Assault as Law Draft to Halt Trading,” *The Guardian*, March 18, 2020, <https://www.theguardian.com/environment/2020/mar/18/billion-dollar-wildlife-industry-in-vietnam-under-assault-as-law-drafted-to-halt-trading>.

81. Nguyen Quynh Huong et al., “Coronavirus Testing Indicates Transmission Risk Increases Along Wildlife Supply Chains for Human Consumption in Viet Nam, 2013–2014,” *PLoS ONE* 15, no. 8 (2020): e0237129, <https://doi.org/10.1371/journal.pone.0237129>.

82. Nguyen Quynh Huong et al., “Coronavirus Testing Indicates Transmission Risk Increases Along Wildlife Supply Chains for Human Consumption in Viet Nam, 2013–2014,” *PLoS ONE* 15, no. 8 (2020): e0237129, <https://doi.org/10.1371/journal.pone.0237129>.

83. Nguyen Manh Ha et al., Report on the Review of Vietnam’s Wildlife Trade Policy (Hanoi: CRES/FPD/UNEP/CITES/IUED, 2008), https://cites.org/sites/default/files/common/prog/policy/Vietnam_wildlife_trade_policy_review.pdf.

84. Khuong Cao Ba et al., “Health Literacy Toward Zoonotic Diseases Among Livestock Farmers in Vietnam,” *Environmental Health Insights* 14 (2020): 1178630220932540, <https://doi.org/10.1177/1178630220932540>.

85. Khuong Cao Ba et al., “Health Literacy Toward Zoonotic Diseases Among Livestock Farmers in Vietnam,” *Environmental Health Insights* 14 (2020): 1178630220932540, <https://doi.org/10.1177/1178630220932540>.

86. Chris Humphrey, “Billion-dollar Wildlife Industry in Vietnam Under Assault as Law Draft to Halt Trading,” *The Guardian*, March 18, 2020, <https://www.theguardian.com/environment/2020/mar/18/billion-dollar-wildlife-industry-in-vietnam-under-assault-as-law-drafted-to-halt-trading>.

87. Sayuri Umeda, “Vietnam,” in Regulation of Wild Animal Wet Markets in Selected Jurisdictions (Washington DC: Law Library of Congress, 2020), <https://tile.loc.gov/storage-services/service/ll/lglrd/2020714997/2020714997.pdf>.

country for food and medicine.⁸⁸ Economically, the wildlife trade plays an important role in commodifying natural resources within the country and is an important source of income for Vietnamese people.⁸⁹ While the illegal and legal wildlife trades are rapidly depleting Vietnam’s biodiversity even as demand for wild meat and wildlife-derived products continues to grow, many individuals and organizations are working with government officials increasingly committed to conservation and education to protect the nation’s wildlife and natural resources. Broadly speaking, even amidst exploitation and overhunting, the Vietnamese people take a great deal of pride in the rich and diverse flora and particularly the fauna of their country, and they deeply revere the wildlife upon which they depend for traditional medicines and for survival.

For example, the national animal is the water buffalo, which the Vietnamese value and respect—in a smallholder family farm, the water buffalo is treated as a member of the family; it is a source of food and power for Vietnamese people; the patterns on its hair, if symmetrical, are believed to bring good luck and health. Importantly, a traditional folktale about the Vietnamese peoples’ relationship with the water buffalo celebrates human ingenuity and domination over a strong, powerful animal that—if it were as smart as man—would never do its bidding.⁹⁰ In current times, the water buffalo is also endangered, primarily due to habitat destruction and disease and parasites transmitted by domestic livestock.⁹¹

Some traditional practices, such as consuming bear bile for its medicinal properties, reveal a similar reverence for the power or qualities of an animal that paradoxically contributes to its exploitation, decline, and possible extinction. Importantly, the perceived quality of animal medicines and other animal products is closely connected to its wildness. Bear bile, for example, one of the most common animal-derived traditional medicines used in Vietnam, was once valued for the prestige it reflected upon the consumer; this perceived prestige has been diminished, however, as bear bile farms have made bear bile more easily accessible.⁹²

Even as adoption of western medicine and conservation education are changing the relationship between animals used for traditional medicines and younger Vietnamese people, who may now disavow the practice, other socioeconomic changes (like increasing affluence) are perpetuating this dynamic of consuming an animal’s perceived strength or other qualities.⁹³ Now among members of the emerging middle class, eating wild meat is a kind of wealth-signaling gastronomic pastime. The “wildness” of the meat is important; there is disinterest in animals that have been farmed and/or in products that have been derived from farmed animals, which might thereby prove less authentic, wild, or rare—if it isn’t “rare” or “precious,” either as a traditional medicine or as a wild meat, it fails to convey the desired message of

88. Nguyen Manh Ha et al., Report on the Review of Vietnam’s Wildlife Trade Policy (Hanoi: CRES/FPD/UNEP/CITES/IUED, 2008), https://cites.org/sites/default/files/common/prog/policy/Vietnam_wildlife_trade_policy_review.pdf.

89. Nguyen Manh Ha et al., Report on the Review of Vietnam’s Wildlife Trade Policy (Hanoi: CRES/FPD/UNEP/CITES/IUED, 2008), https://cites.org/sites/default/files/common/prog/policy/Vietnam_wildlife_trade_policy_review.pdf.

90. “The Peasant, the Buffalo and the Tiger: A Tale of Strength and Wisdom,” Vietnam.com, accessed October 18, 2023, <https://www.vietnam.com/en/culture/art/fairy-tales/the-peasant-the-buffalo-and-the-tiger-a-tale-of-strength-and-wisdom.html>.

91. Piumi Rajapaksha, “Water Buffalo: 11 Facts About Vietnam’s National Animal,” Culture Trip, January 3, 2018, <https://theculturetrip.com/asia/vietnam/articles/water-buffalo-11-facts-about-vietnams-national-animal/>.

92. Rebecca Drury, “Hungry for Success: Urban Consumer Demand for Wild Animal Products in Vietnam,” *Conservation & Society* 9, no. 3 (2011): 247–57, <https://www.jstor.org/stable/26393047>.

93. Tuan Bendixsen of Animals Asia, personal interview, June 17, 2021.

status and power.^{94 95 96} This perception has been strengthened by the increasing prevalence of wildlife farming—a captive-bred civet, for example, is less desirable at a restaurant, because it is apparently less expensive and difficult to access than a wild one.⁹⁷ (Though the dynamics of wildlife farm breeding often mean a wild-harvested animal is cheaper than the resource-intensive captive-bred animals).⁹⁸ Alongside this attempt to ensure that authentic wildness will continue to communicate prestige, intensifying concern about food safety in Vietnam leads some customers to suspect that wildlife that is already dead in a restaurant has been preserved with formaldehyde to keep it fresh (a practice wildlife hunters do engage in);⁹⁹ these customers prefer to select and kill the wild animal just before consumption. For example, drinking rice wine mixed with the blood of snakes, goats, and tortoises—popular among locals as well as international tourists—involves selecting a wild animal kept alive at a restaurant, then witnessing or assisting with its slaughter, eating its organs, and drinking its blood.¹⁰⁰ Consuming the fresh blood of a live animal poses risks of animal to human transmission of zoonotic disease, as does holding captive live animals of multiple species on- or off-site for consumption at restaurants.^{101 102} As one journalist has reported of establishments in Ho Chi Minh, restaurants cave to customer demand in spite of health warnings.¹⁰³

Amid rapidly changing social and economic forces in Vietnam—urbanization, for example, and the emergence of a middle class—it isn't always easy to characterize the perception of and relationship to animals. For example, in Vietnam, dogs—important to the discussion of animal markets and emerging zoonotic disease because of the national prevalence and 100% fatality rate of rabies¹⁰⁴—may be perceived by a millennial in Hanoi as beloved pets or companions, by an older farmer as a food source, or by a market butcher as a source of income.¹⁰⁵ But given the pace of socioeconomic change, these are demographic generalizations that don't always hold true; for some, a family dog fills all roles at once: family pet, eventual food source, and/or source of income. According to Nguyen Anh Tuan, a 28 year-old tech worker in Hanoi: “Honestly, we don't feel differently towards a chicken or a dog...Chicken, fish, dog. They're all the same.” But Tuan subsequently tells the story of returning home from a trip when he was a teenager to find that his father had eaten their family dog—a shock and hurt he never recovered from, and which made him furious, as his father only ever saw the dog, Mick, as an “alarm system” and not a “friend.” At that time, the young Tuan searched for remains of a bone so he could honor Mick with a

94. Rebecca Drury, “Hungry for Success: Urban Consumer Demand for Wild Animal Products in Vietnam,” *Conservation & Society* 9, no. 3 (2011): 247–57, <https://www.jstor.org/stable/26393047>.

95. Rachel Shairp et al., “Understanding Urban Demand for Wild Meat in Vietnam: Implications for Conservation Actions,” *PLoS ONE* 11, no. 1 (2016): e0134787, <https://doi.org/10.1371/journal.pone.0134787>.

96. Tuan Bendixsen of Animals Asia, personal interview, June 17, 2021.

97. Rebecca Drury, “Hungry for Success: Urban Consumer Demand for Wild Animal Products in Vietnam,” *Conservation & Society* 9, no. 3 (2011): 247–57, <https://www.jstor.org/stable/26393047>.

98. Lan Ho, Mai Trinh and Pham Thong of Save Vietnam's Wildlife. Personal Interview. June 23, 2021.

99. Lan Ho, Mai Trinh and Pham Thong of Save Vietnam's Wildlife. Personal Interview. June 23, 2021.

100. Valerie Wheatley, “Eat a Snake in Hanoi, Vietnam: Everything You Need to Know,” March 15, 2023, <https://wanderingwheatleys.com/eat-cobra-snake-in-hanoi-vietnam/>.

101. Tuan Bendixsen of Animals Asia, personal interview, June 17, 2021.

102. Lan Ho, Mai Trinh and Pham Thong of Save Vietnam's Wildlife. Personal Interview. June 23, 2021.

103. Tao Jun, Tieu Bao, “Vietnamese Consuming Wild Animal Meat, Blood as Sexual Tonics Driving Some Species to Extinction,” *XinhuaNet*, May 19, 2017, http://www.xinhuanet.com/english/2017-05/19/c_136298841.htm.

104. Adam Parascandola of Humane Society International, personal interview, June 2, 2021.

105. Patrick Winn, “Eat, Prey, Love: Vietnam's Dogs Double as Family Members and Dinner,” *The World*, accessed October 18, 2023, <https://www.pri.org/stories/eat-prey-love-vietnam-s-dogs-double-family-members-and-dinner>.

burial, but found nothing. As an adult, says Tuan: “I can really love dogs...If I see pictures of dogs getting killed, I’m touched. But if my friends invite me to go eat dog meat, I can let it go.”¹⁰⁶ Note what Tuan says of the conditions under which he will eat dog meat: while out with friends; in Vietnam, dog meat can sell for three times the price of pork—social norms regarding consumption of animal-derived products are powerful in a culture where one is expected to conform to certain behaviors, and where social status and “face” drive personal choices.¹⁰⁷ ¹⁰⁸ Further complicating generalizations amid the rapid pace of change, especially in Vietnam’s urban areas, there is rising tension between those who keep dogs as pets and those who sell dogmeat. In the dogmeat trade in Vietnam, middlemen capture and round up stray dogs, then bring them either to market to slaughter or to informal slaughterhouses (again, usually in someone’s home).¹⁰⁹ ¹¹⁰ “Stray” dogs, however, are often stolen pets. According to the Animals Asia website, the media regularly reports on violent clashes between pet owners and sellers of dogmeat; since a single meat dog is already valued at half the price of the highest possible fine related to criminal charges for stealing or killing someone’s companion animal, “thieves steal pets with relative impunity.”

VIETNAM’S GEOGRAPHIC & ECONOMIC CONTEXT

Market Types, Supply Chains, Stakeholders, and Risks

Common animal markets in Vietnam include:

- Smallholder/household farms
- State-owned farms
- Industrial farms
- Traditional or live animal markets
- Supermarkets/convenience stores
- Traditional medicine stores
- Restaurants
- Wildlife farms

This case study provides background information on the scale, market function, stakeholders, supply chain, and risk of disease transmission and spillover among swine and poultry in domestic livestock markets, and among commonly traded and trafficked wildlife (wild harvested and bred) in the legal and illegal wildlife trades, respectively. The nature of smallholder farms, wildlife farms, and legal and illegal hunting and trading are such that they overlap significantly, particularly in rural forested or mountainous areas, where decentralized public health practices and government policies generally

106. Patrick Winn, “Eat, Prey, Love: Vietnam’s Dogs Double as Family Members and Dinner,” *The World*, accessed October 18, 2023, <https://www.pri.org/stories/eat-prey-love-vietnam-s-dogs-double-family-members-and-dinner>.

107. Patrick Winn, “Eat, Prey, Love: Vietnam’s Dogs Double as Family Members and Dinner,” *The World*, accessed October 18, 2023, <https://www.pri.org/stories/eat-prey-love-vietnam-s-dogs-double-family-members-and-dinner>.

108. Rachel Shairp et al., “Understanding Urban Demand for Wild Meat in Vietnam: Implications for Conservation Actions,” *PLoS ONE* 11, no. 1 (2016): e0134787, <https://doi.org/10.1371/journal.pone.0134787>.

109. Adam Parascandola of Humane Society International, personal interview, June 2, 2021.

110. Tuan Bendixsen of Animals Asia, personal interview, June 17, 2021.

are less likely to be implemented, where veterinary care is slim to non-existent, and where poverty and hunger are increasingly drivers as the wealth gap in Vietnam widens. For example, a smallholder farmer of traditional livestock—pigs, chickens, ducks, a dog—may also be officially or unofficially attempting to breed civets, porcupine, snakes, or any number of other wild species in order to generate income—and this same farmer may be a hunter himself, and/or may trade for illegal wildlife with a hunter in order to restock wildlife for breeding purposes. The smallholder’s poultry, which has been in close proximity to if not intermixing directly with swine and porcupine, would generally be transported by a middleman to a live bird market, alongside birds from neighboring farms. His swine are transported by a different middleman, also alongside neighbors’ swine, and are slaughtered in a neighbor’s home or a local collective slaughterhouse (also usually a home). The wildlife—sometimes but not always—is likewise transported live by different middlemen, and on to traders (sometimes multiple traders) to a final destination either internationally, or to an urban restaurant where it will be held alive until it is ordered either on- or off-menu. It is precisely in these gray areas where there appears to be the greatest risk of transmission of zoonotic disease.

DOMESTIC LIVESTOCK & FARMS

Briefly, poultry—primarily chickens and ducks—are transported live by middlemen from smallholder farms to traders at traditional markets, where they are kept alive until sold, and usually butchered on-site for the consumer. Traditional markets are a long- and dearly-held, significant cultural tradition in Vietnam; located in more densely populated areas, traditional markets host an enormous number of poultry types and species from different geographical locations, creating an environment that contains pathogens from many different places, and where viruses can spread.

Swine are similarly important in Vietnam’s culture and economy. Vietnam is the fourth largest pig producer in the world.¹¹¹ Swine are recognized as an important intermediate host—also known as mixing vessels or reservoirs—for many viral and bacterial zoonoses, including influenza, Japanese encephalitis, Nipah virus, hepatitis E, all major public health concerns in Southeast Asia.^{112 113} Indeed, the 2009 H1N1 influenza pandemic confirmed the role of swine in the generation of influenza reassortants from avian, human, and swine viruses. While the movements of live animals along the supply chain from farm to consumer are recognized as pathways for disease transmission, the structure of the swine industry and movements of swine along the supply chain vary widely across regions and types of farms, are poorly understood, and have not been well-studied,¹¹⁴ neither in a context of zoonotic disease nor otherwise. At the time of writing, no long-term surveillance program focusing on zoonotic diseases in swine exists in Vietnam.¹¹⁵

111. Eugénie Baudon et al., “Swine Influenza Viruses in Northern Vietnam in 2013–2014,” *Emerging Microbes & Infections* 7 (2018): 123, <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6028489/>.

112. Eugénie Baudon et al., “Analysis of Swine Movements in a Province in Northern Vietnam and Application in the Design of Surveillance Strategies for Infectious Diseases,” *Transboundary and Emerging Diseases* 64, no. 2 (2017): 411–24, <https://pubmed.ncbi.nlm.nih.gov/26040303/>.

113. Eugénie Baudon et al., “Swine Influenza Viruses in Northern Vietnam in 2013–2014,” *Emerging Microbes & Infections* 7 (2018): 123, <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6028489/>.

114. Eugénie Baudon et al., “Analysis of Swine Movements in a Province in Northern Vietnam and Application in the Design of Surveillance Strategies for Infectious Diseases,” *Transboundary and Emerging Diseases* 64, no. 2 (2017): 411–24, <https://pubmed.ncbi.nlm.nih.gov/26040303/>.

115. Eugénie Baudon et al., “Analysis of Swine Movements in a Province in Northern Vietnam and Application in the Design of Surveillance Strategies for Infectious Diseases,” *Transboundary and Emerging Diseases* 64, no. 2 (2017): 411–24, <https://pubmed.ncbi.nlm.nih.gov/26040303/>.

There are three types of farms currently operating in Vietnam: smallholder family farms, state-owned farms, and larger, privately-owned industrial farms. The size of each varies based on geographical location. Generally, industrial farms are very large and situated near Hanoi and Ho Chi Minh City. There are few state-owned farms or cooperatives; those remaining post–market-reform often keep exotic breeding swine.¹¹⁶ To provide a sense of the proportion of these farms across the country, pork accounts for 70% of all Vietnam’s livestock products. Smallholder farms account for 80% of this production; state-owned farms account for 4%-5% and privately owned industrial farms account for the remaining 10%-15%.¹¹⁷ As a result of Doi Moi market reforms, the family householder farm is the main stakeholder in Vietnam’s agricultural sector; some 14 million households generate 79% of their income from farming.¹¹⁸

Traditionally, a typical smallholder farm will raise dogs, pigs, chickens, ducks, and roosters, and most families raising livestock are also engaged in other agricultural work, such as growing tea plants and vegetables for their own consumption.^{119 120} In terms of numbers, a typical family farm may have 10 to 20 different types of poultry, possibly a cow or water buffalo, and anywhere from one or two sows and 10 fattener pigs.^{121 122} Medium-sized smallholder farms can raise up to 300 different species of livestock^{123 124}; as an example, in the Red River Delta, 60% of family farms keep pigs, and produce more than 60 pigs per year.¹²⁵

Smallholder farms also have low or nonexistent biosecurity investment.¹²⁶ Inadequate feeding, inefficient veterinary care and inbreeding are weaknesses, according to studies on the transformation of Vietnamese agriculture since Doi Moi.¹²⁷ For example, after subsidy elimination associated with market reform, vaccination rates for livestock fell from 70%–80% in the 1980s to 40%–50% in the 1990s.¹²⁸ Disease outbreaks are nearly impossible to control among smallholder farms because of the frequency of movement between and among neighbors and in terms of transport to market. The 2019 African swine fever outbreak, which resulted in the culling of millions of pigs, for example, was devastating to smallholder farms, who depended upon government support to help restock.¹²⁹ Currently, amid COVID-19, many smallholder farms are minimizing or ceasing completely raising livestock until the future

116. Eugénie Baudon et al., “Analysis of Swine Movements in a Province in Northern Vietnam and Application in the Design of Surveillance Strategies for Infectious Diseases,” *Transboundary and Emerging Diseases* 64, no. 2 (2017): 411–24, <https://pubmed.ncbi.nlm.nih.gov/26040303/>.

117. Joshua M. Steinfeld and Khi V. Thai, “Political Economy of Vietnam: Market Reform, Growth, and the State,” *Maryland Series in Contemporary Asian Studies* 2013, no. 3 (2013): 25

118. Regional Office for Asia and the Pacific, *Rapid Growth of Selected Asian Economies: Lessons and Implications for Agriculture and Food Security* (Republic of Korea, Thailand and Viet Nam. (Bangkok: FAO, 2006), <https://www.fao.org/3/ag089e/AG089E00.htm#TOC>.

119. Khuong Cao Ba et al., “Health Literacy Toward Zoonotic Diseases Among Livestock Farmers in Vietnam,” *Environmental Health Insights* 14 (2020): 1178630220932540, <https://doi.org/10.1177/1178630220932540>.

120. Trang Dang and Hang Le of Humane Society International, Vietnam. Personal Interview. June 17, 2021.

121. Trang Dang and Hang Le of Humane Society International, Vietnam. Personal Interview. June 17, 2021.

122. Joshua M. Steinfeld and Khi V. Thai, “Political Economy of Vietnam: Market Reform, Growth, and the State,” *Maryland Series in Contemporary Asian Studies* 2013, no. 3 (2013): 25

123. Trang Dang and Hang Le of Humane Society International, Vietnam. Personal Interview. June 17, 2021.

124. Joshua M. Steinfeld and Khi V. Thai, “Political Economy of Vietnam: Market Reform, Growth, and the State,” *Maryland Series in Contemporary Asian Studies* 2013, no. 3 (2013): 25

125. Joshua M. Steinfeld and Khi V. Thai, “Political Economy of Vietnam: Market Reform, Growth, and the State,” *Maryland Series in Contemporary Asian Studies* 2013, no. 3 (2013): 25

126. Khuong Cao Ba et al., “Health Literacy Toward Zoonotic Diseases Among Livestock Farmers in Vietnam,” *Environmental Health Insights* 14 (2020): 1178630220932540, <https://doi.org/10.1177/1178630220932540>.

127. Joshua M. Steinfeld and Khi V. Thai, “Political Economy of Vietnam: Market Reform, Growth, and the State,” *Maryland Series in Contemporary Asian Studies* 2013, no. 3 (2013): 25

128. Joshua M. Steinfeld and Khi V. Thai, “Political Economy of Vietnam: Market Reform, Growth, and the State,” *Maryland Series in Contemporary Asian Studies* 2013, no. 3 (2013): 25

129. Trang Dang and Hang Le of Humane Society International, Vietnam. Personal Interview. June 17, 2021.

becomes a little clearer. Though industrialized farms are better suited to weather pandemic-related volatility, and though industrialized farms are on the rise independent of COVID-19, because Vietnam is fundamentally agricultural and so many people rely on farming for their income, it is generally believed that the government will continue to support smallholder farms.¹³⁰

Nationally, the Department of Animal Health is responsible for animal health, and manages national, regional, and international centers. Subdepartments of Animal Health are responsible for animal health at the provincial level, managing inland quarantine and controlling inter-province animal movement. District veterinary stations are responsible for disease surveillance, monitoring outbreaks and vaccines within a commune. At commune and village levels, “para vets” are responsible for providing animal health care; they have limited training and loosely monitored activity, and compensation is very low. Particularly in rural villages, public health awareness and health literacy in general (e.g., regarding how infection spreads) are extremely low among smallholder farms. For example, in the aforementioned 2020 study¹³¹:

- Only half of the farmers knew rodents could transmit rabies;
- Only 32% understood that rabies could be transmitted via scratch;
- 38% did not regularly separate sick animals from healthy animals;
- 80.3% did not call for support from local vet workers for any reason;
- 94.9% did not report to local authorities if they had sick or dead animals;
- 23.4 sometimes or often used human medicine to treat livestock, including human antibiotics;
- 90.3% did not vaccinate livestock against common zoonotic diseases like avian influenza H5N1;
- 44.9% did not vaccinate their dogs against rabies;
- Most participants did not use gloves, masks, or boots when interacting with livestock; and
- 47.3 percent used biogas for waste management, 22.5% composted, and 26.2% “discharged waste products into the surrounding environment” or used waste as manure.

There is limited data and little or no monitoring or surveillance to indicate whether these numbers are generally representative of smallholder farms in Vietnam. If we err on the side of caution in assessing risk of transmission and possible spillover of zoonotic disease, there are many dangerous factors at play here, among them, lack of adequate veterinary care, intermixing of species and sick and healthy animals, lack of vaccination, and poor communication between local authorities and farmers.

Swine

The supply chain of swine from smallholder family farms and larger companies and family farms, through slaughter and on to market, pose particular threats of transmission of zoonotic disease, of animal-to-human transmission, animal-to-animal transmission and human-to-human transmission. Important to such considerations are three salient facts. First, pork is the most important livestock product for Vietnam; in recent decades, the amount of pork produced per capita has increased

130. Trang Dang and Hang Le of Humane Society International, Vietnam. Personal Interview. June 17, 2021.

131. Khuong Cao Ba et al., “Health Literacy Toward Zoonotic Diseases Among Livestock Farmers in Vietnam,” *Environmental Health Insights* 14 (2020): 1178630220932540, <https://doi.org/10.1177/1178630220932540>.

dramatically while other livestock production changes have been less significant. In 2015, pork consumption in Vietnam was among the highest in the world, accounting for 56% of total meat consumption in the country—the most of all meat products¹³² Second, swine are hosts, mixing vessels, and reservoirs for viral and bacterial zoonoses, and swine are a critical consideration in the generation of new reassortants from avian, human, and other swine influenza viruses.¹³³ ¹³⁴ Third, no long-term surveillance monitoring of zoonoses in swine exists or has been implemented in Vietnam¹³⁵; swine influenza surveillance doesn't seem to be critically important in Vietnam because unlike human and avian flu, it does not cause significant morbidity or mortality so it is not economically impactful.¹³⁶ However, as a 2014 study detecting influenza viruses in swine in Hanoi suggests, the smallholder farming lifestyle brings humans, pigs, and poultry into close contact, increasing the opportunity for novel reassortant influenza viruses to emerge.¹³⁷ This same study concludes:

Influenza viruses from humans and reassortants between humans and swine viruses are currently circulating in swine in Vietnam. Moreover, highly pathogenic avian influenza is endemic in the country. The high density of human pig and poultry populations in Vietnam and their close proximity is conducive to interspecies transmission and reassortment of influenza viruses, as swine have been described as mixing vessels for influenza viruses from the three species. However, surveillance of influenza in swine is not performed on a continuous basis and data on human influenza viruses is scarce.¹³⁸

Swine Supply Chain

Swine production in Vietnam is moving very slowly from being concentrated in smallholder farms (where it still accounts for the vast majority) to larger scale commercial farms. On smallholder farms, pigs are kept in close proximity within outdoor concrete holder pens, where they remain, or in barns.¹³⁹ The size and number of pigs varies; a typical smallholder farm would raise up to 10 fattener pigs at one time, and produce 60 pigs per year. When a single pig or multiple pigs are ready for sale, a farmer either slaughters them himself in the home, or sells them to a middleman who transports the swine, usually two or three pigs at a time via motorbike, to local slaughterhouses (also homes) or to collective slaughterhouses (larger householder slaughterhouses). Depending on the region, distance from farm to

132. Sinh Dang-Xuan et al., "Food Safety Perceptions and Practices among Smallholder Pork Value Chain Actors in Hung Yen Province, Vietnam," *Journal of Food Protection* 79, no. 9 (2016): 1490–7, <https://doi.org/10.4315/0362-028X.JFP-15-402>.

133. Eugénie Baudon et al., "Analysis of Swine Movements in a Province in Northern Vietnam and Application in the Design of Surveillance Strategies for Infectious Diseases," *Transboundary and Emerging Diseases* 64, no. 2 (2017): 411–24, <https://pubmed.ncbi.nlm.nih.gov/26040303/>.

134. Eugénie Baudon et al., "Swine Influenza Viruses in Northern Vietnam in 2013–2014," *Emerging Microbes & Infections* 7 (2018): 123, <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6028489/>.

135. Eugénie Baudon et al., "Analysis of Swine Movements in a Province in Northern Vietnam and Application in the Design of Surveillance Strategies for Infectious Diseases," *Transboundary and Emerging Diseases* 64, no. 2 (2017): 411–24, <https://pubmed.ncbi.nlm.nih.gov/26040303/>.

136. Eugénie Baudon et al., "Swine Influenza Viruses in Northern Vietnam in 2013–2014," *Emerging Microbes & Infections* 7 (2018): 123, <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6028489/>.

137. E Baudon et al., "Detection of Novel Reassortant Influenza A (H3N2) and H1N1 2009 Pandemic Viruses in Swine in Hanoi, Vietnam," *Zoonoses and Public Health* 62, 6 (2015): 429–34, <https://pubmed.ncbi.nlm.nih.gov/25363845/>.

138. Baudon et al., "Detection of Novel Reassortant Influenza A (H3N2) and H1N1 2009 Pandemic Viruses in Swine in Hanoi, Vietnam," *Zoonoses and Public Health* 62, 6 (2015): 429–34, <https://pubmed.ncbi.nlm.nih.gov/25363845/>.

139. Trang Dang and Hang Le of Humane Society International, Vietnam. Personal Interview. June 17, 2021.

farm and timing, a middleman might pick up pigs from separate families and keep them in his home until he has three or four to transport together to slaughter. Though the process varies widely, records are generally not kept, and pigs are not traceable (practices that themselves present risks). It is clear that there are risks of zoonotic disease transmission in this basic model of smallholder swine production, including relatively small enclosures for pig-rearing, mixing of pigs from different farms while in transport, and holding pigs from multiple locations in a middleman's home.¹⁴⁰

Once the swine are in the local or collective slaughterhouse (both relatively small-scale), they are manually killed by what is usually a household operation of husband and wife,¹⁴¹ and typically with a knife or a hammer.^{142 143} A 2017 study on small-scale swine slaughterhouses in Vietnam found that the majority of these slaughterhouses in rural areas are about 20 meters away from the main living area and many of these slaughterhouses do not have separate killing areas or separate areas for removing organs and viscera; none of this complies with government regulations. Further, a fifth of those slaughterhouses included in the study use biogas to treat waste—the rest allow liquid waste to run out into sewers, rivers, and public places.¹⁴⁴ A typical small-scale slaughterhouse will kill between one and six pigs daily, and the work provides a smallholder family about three-fourths of its income.¹⁴⁵ The majority of these slaughterhouses fail to meet regulatory standards required by the Ministry of Agricultural and Rural Development, and less than half of slaughtering workers and farmers are even aware of such standards.¹⁴⁶

Slaughterhouses are obviously important “nodes” in the supply chain and critical points of health risk.¹⁴⁷ A study of swine influenza viruses in North Vietnam over 2013–2014 took virological and serological samples from a collective slaughterhouse in Hanoi, three local slaughterhouses, and a weaner market (live piglet market) in Hung Yen Province. Among its findings, avian influenza viruses can be and are transmitted to swine in Vietnam, likely attributable to poultry and pigs interacting in the same backyard/smallholder farms with little or no biosecurity.¹⁴⁸

For larger scale farms, there are larger slaughtering operations.^{149 150} As an example, an abattoir in Van Phuc slaughterhouse in Hanoi manually slaughters approximately 1500 pigs daily; individual pigs are not marked or identified and there is no way to trace them; the only tracking information is the daily

140. Trang Dang and Hang Le of Humane Society International, Vietnam. Personal Interview. June 17, 2021.

141. Nguyen Thi Duong Nga et al., “An Evaluation of Economic Viability of Small Scale Slaughterhouses in Vietnam: Implication for Pig Value Chain Development,” 2017 Asian Society of Agricultural Economists (ASAE) 9th International Conference, January 11–13, Bangkok, Thailand.

142. Nguyen Thi Duong Nga et al., “An Evaluation of Economic Viability of Small Scale Slaughterhouses in Vietnam: Implication for Pig Value Chain Development,” 2017 Asian Society of Agricultural Economists (ASAE) 9th International Conference, January 11–13, Bangkok, Thailand.

143. Trang Dang and Hang Le of Humane Society International, Vietnam. Personal Interview. June 17, 2021.

144. Nguyen Thi Duong Nga et al., “An Evaluation of Economic Viability of Small Scale Slaughterhouses in Vietnam: Implication for Pig Value Chain Development,” 2017 Asian Society of Agricultural Economists (ASAE) 9th International Conference, January 11–13, Bangkok, Thailand.”

145. Nguyen Thi Duong Nga et al., “An Evaluation of Economic Viability of Small Scale Slaughterhouses in Vietnam: Implication for Pig Value Chain Development,” 2017 Asian Society of Agricultural Economists (ASAE) 9th International Conference, January 11–13, Bangkok, Thailand.

146. Nguyen Thi Duong Nga et al., “An Evaluation of Economic Viability of Small Scale Slaughterhouses in Vietnam: Implication for Pig Value Chain Development,” 2017 Asian Society of Agricultural Economists (ASAE) 9th International Conference, January 11–13, Bangkok, Thailand.

147. Nguyen Thi Duong Nga et al., “An Evaluation of Economic Viability of Small Scale Slaughterhouses in Vietnam: Implication for Pig Value Chain Development,” 2017 Asian Society of Agricultural Economists (ASAE) 9th International Conference, January 11–13, Bangkok, Thailand.

148. Eugénie Baudon et al., “Swine Influenza Viruses in Northern Vietnam in 2013–2014,” *Emerging Microbes & Infections* 7 (2018): 123, <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6028489/>.

149. Trang Dang and Hang Le of Humane Society International, Vietnam. Personal Interview. June 17, 2021.

150. Nguyen Thi Duong Nga et al., “An Evaluation of Economic Viability of Small Scale Slaughterhouses in Vietnam: Implication for Pig Value Chain Development,” 2017 Asian Society of Agricultural Economists (ASAE) 9th International Conference, January 11–13, Bangkok, Thailand.

number of pigs originating by province.¹⁵¹ At least one existing study on swine slaughterhouses indicates that influenza transmission may be occurring at the slaughterhouse among swine from different origins. The same study indicates that workers do not wear any personal protective equipment, and that data assessing transmission of influenza from swine to humans is needed.¹⁵² Pork products from these large-scale slaughterhouses usually go to supermarkets or convenience stores.^{153 154}

Risk Factors

Critically as relates to zoonotic disease transmission risk factors, rural smallholder farms perform multiple functions and sometimes all functions in the swine supply chain. More than half of smallholder farms raise swine, slaughter, and process them to sell in local markets or to household or neighboring consumers.¹⁵⁵ Further, *every* rural “slaughterhouse” is actually a home.¹⁵⁶ A 2017 study describes rural smallholder slaughterhouses in the Hung Yên province as follows:

[The] average area of household slaughterhouse is about 120 m squared...depend[ing] on landholding size, population density and level of industrialization...The area for killing animals is smaller...roughly 26 m squared...The setting of killing area is quite simple, normally with cement floor, reservoirs, table/cage for taking blood, table for cutting meat. Some slaughterhouses have equipment for processing such as meat grinder, cookers, stove/gas cooker. In this area, there are also places with [a] knife, pots, [and a] basket for containing meat. All slaughterhouses in rural area[s] practice manual slaughtering.¹⁵⁷

In a 2017 examination of the knowledge, perceptions and practices of food safety, disease, and health risk along the pork value chain in Hung Yen Province, researchers found:

- In most slaughterhouses, there is no separate entrance for pigs and people can freely access the killing area;
- Workers usually wear boots but no uniforms, aprons, or other personal protective equipment;
- There are no regulations or standard operating procedures, and
- Informal rules involve menial understanding of hygiene and cleanliness.¹⁵⁸

Further, among small and medium sized slaughterhouses, regulations are not implemented or

151. Baudon et al., “Detection of Novel Reassortant Influenza A (H3N2) and H1N1 2009 Pandemic Viruses in Swine in Hanoi, Vietnam,” *Zoonoses and Public Health* 62, 6 (2015): 429–34, <https://pubmed.ncbi.nlm.nih.gov/25363845/>.

152. Eugénie Baudon et al., “Swine Influenza Viruses in Northern Vietnam in 2013–2014,” *Emerging Microbes & Infections* 7 (2018): 123, <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6028489/>.

153. Trang Dang and Hang Le of Humane Society International, Vietnam. Personal Interview. June 17, 2021.

154. Nguyen Thi Duong Nga et al., “An Evaluation of Economic Viability of Small Scale Slaughterhouses in Vietnam: Implication for Pig Value Chain Development,” 2017 Asian Society of Agricultural Economists (ASAE) 9th International Conference, January 11–13, Bangkok, Thailand.

155. Nguyen Thi Duong Nga et al., “An Evaluation of Economic Viability of Small Scale Slaughterhouses in Vietnam: Implication for Pig Value Chain Development,” 2017 Asian Society of Agricultural Economists (ASAE) 9th International Conference, January 11–13, Bangkok, Thailand.

156. Nguyen Thi Duong Nga et al., “An Evaluation of Economic Viability of Small Scale Slaughterhouses in Vietnam: Implication for Pig Value Chain Development,” 2017 Asian Society of Agricultural Economists (ASAE) 9th International Conference, January 11–13, Bangkok, Thailand.

157. Nguyen Thi Duong Nga et al., “An Evaluation of Economic Viability of Small Scale Slaughterhouses in Vietnam: Implication for Pig Value Chain Development,” 2017 Asian Society of Agricultural Economists (ASAE) 9th International Conference, January 11–13, Bangkok, Thailand.

158. Sinh Dang-Xuan et al., “Food Safety Perceptions and Practices among Smallholder Pork Value Chain Actors in Hung Yen Province, Vietnam,” *Journal of Food Protection* 79, no. 9 (2016): 1490–7, <https://doi.org/10.4315/0362-028X.JFP-15-402>.

followed; nearby residents report bad smells and stagnated dirty water that can cause itchy hands and feet.¹⁵⁹ Even in cities, slaughterhouse waste is typically discharged directly into surface water without being treated, and “is a high strength source of waste containing large amounts of protein, fat, and suspended matter (i.e., meat, blood, bones, and viscera).”¹⁶⁰

After slaughter, pork products are transported to a local wet market, usually uncovered and in open air on motorbikes, which poses significant risk of bacterial zoonoses, as do general practices of selling meat off of wood surfaces, which are perceived to present pork in a more appealing way, and using cloth to wipe down the wood surface throughout the day. At this point, once butchered and in the market, there are myriad risks of spreading bacterial and parasitic zoonotic disease to humans.¹⁶¹

Poultry

Highly pathogenic avian influenza viruses pose a serious threat economically and epidemiologically in Vietnam, both to the poultry sector and to human health.¹⁶² In Vietnam, 90% percent of households, or some 8 million households as of 2006, keep backyard chickens or raise “small-scale” poultry farms; poultry alone contributes nearly a fifth of a household income, second only to swine. Chickens account for three-quarters of the poultry population, and waterfowl, such as ducks and pheasant, make up the remainder. 65% of these households raise fewer than 200 birds a year; 10% to 15% are considered semi-commercial or commercial farms with 200 to 500 birds raised per year. Industrial farms—integrated with foreign companies such as CP Group, Japfa, Cargill, and Procono—make up a small but growing sector. As with swine production, there is a small number—12 as of 2006—of remaining state farms run by the Ministry of Agricultural and Rural Development; they too raise animals for particular breeding purposes. Commercial and industrial poultry production systems usually involve standard procedures for high biosecurity; birds are kept indoors all the time, and there is no contact with other poultry or wildlife. Poultry products are sold commercially, e.g., in supermarkets and convenience stores in a system with high biosecurity level and birds and products processed and marketed.¹⁶³

Important to this case study, however, and despite very slow but steady growth in the industrial sector, the majority of poultry in Vietnam is produced by smallholders—approximately 70% worth. On these smallholder backyard “farms,” poultry free ranges, are fed household scraps, there is negligible biosecurity, and birds are consumed locally. They produce breeding chicks independently, and without monitoring; this poor diet and free ranging in contact with wildlife (and among swine) leaves them vulnerable to disease. Most of these households are poor; the extent to which poultry is sold in a live market as opposed to being consumed locally varies by region, but is usually about 50%. Semi-commercial poultry production likewise involves low to minimal biosecurity; birds are raised in layered

159. Sinh Dang-Xuan et al., “Food Safety Perceptions and Practices among Smallholder Pork Value Chain Actors in Hung Yen Province, Vietnam,” *Journal of Food Protection* 79, no. 9 (2016): 1490–7, <https://doi.org/10.4315/0362-028X.JFP-15-402>.

160. Anh Tien Do et al., “Performance of Airlift MBR for On-site Treatment of Slaughterhouse Wastewater in Urban Areas of Vietnam,” *Water Science and Technology* 74, no. 9 (2016): 2245–51, https://www.researchgate.net/publication/307547969_Performance_of_airlift_MBR_for_on-site_treatment_of_slaughterhouse_wastewater_in_urban_areas_of_Vietnam.

161. Sinh Dang-Xuan et al., “Food Safety Perceptions and Practices among Smallholder Pork Value Chain Actors in Hung Yen Province, Vietnam,” *Journal of Food Protection* 79, no. 9 (2016): 1490–7, <https://doi.org/10.4315/0362-028X.JFP-15-402>.

162. Diep T. Nguyen et al., “Prevalence and Distribution of Avian Influenza A(H5N1) Virus Clade Variants in Live Bird Markets of Vietnam, 2011–2013,” *Avian Diseases* 58, no. 4 (2014): 599–608, <https://doi.org/10.1637/10814-030814-Reg>.

163. Stéphanie Desvaux et al., *A General Review and a Description of the Poultry Production in Vietnam* (Hanoi: Agricultural Publishing House, 2008), https://agritrop.cirad.fr/562460/1/document_562460.pdf.

cages or open sheds, sometimes spending time outside the shed where there might be exposure to wild birds, rodents, and other wildlife; they are sold in larger live bird markets.¹⁶⁴ In general, though to date outbreaks have been concentrated in the Mekong River Delta and Red River Delta, increasing outbreaks have been reported from coastal provinces and along major north–south trade routes in the mountains.¹⁶⁵

Supply Chain for Poultry

Among smallholder farms, and in terms of risk of zoonoses, the supply chain of poultry differs in important ways from that of swine. First and foremost, regarding initial sale from the farm to a middleman for transport, there is a troubling trend among smallholder poultry farmers in Vietnam to respond to viral outbreaks by highly pathogenic avian influenza by immediately selling their poultry to avoid loss of income—a practice that can obviously increase probability of rapid, widespread zoonotic disease transmission.¹⁶⁶ A 2020 study was undertaken by an international team of researchers who followed 53 farmers managing more than 1000 poultry flocks from 2015 to 2017; the researchers emphasize that smallholder farmers in Vietnam are making daily decisions about when and where to sell the animals they raise, and these daily decisions can have a powerful impact on how, how far, and how fast a disease spreads. Additionally, researchers found that vaccination rates were almost zero for smallholder farms of 16 or fewer birds, but nearly 100% for larger flocks (200 or more). Further, smaller, unvaccinated groups of birds are sold into trading networks, especially during outbreaks.¹⁶⁷

Once in his possession, the middleman transports live chickens, duck, pheasant and other poultry alongside poultry from neighboring farms to local live/wet markets. The middleman may pick up 10 chickens from one farm, 15 from another, 10 from still another—until he has stacked in wire or bamboo cages enough to make his trip to the market worthwhile—sometimes scores of birds from several different farms at once.¹⁶⁸ In other words, there has been significant mixing of flocks in a constrained space by the time live poultry arrives at a live market. Here, flocks mix further; sometimes in a market free range, where poultry are exposed to wildlife such as rodents and to stray or pet dogs and feral cats. If live birds are not sold on the day they arrive in market, they may be consolidated together—further mixing flocks—by another trader overnight, before market the following day. Especially around the time of Buddhist holidays, poultry may be both kept on the farm and transported together with live wild-caught birds that, in religious observance, are captured, sold, and released back into the open air by the consumer. Stacking of cages of birds in proximity to poultry, when it does occur in the day market and/or overnight, would expose poultry to zoonotic viral strains in wild bird populations.¹⁶⁹

The live market itself poses additional risks of transmitting zoonotic disease both directly to people as well as to other live animals kept and sold there. In a market setting, rodents, stray cats, stray

164. Stéphanie Desvaux et al., *A General Review and a Description of the Poultry Production in Vietnam* (Hanoi: Agricultural Publishing House, 2008), https://agritrop.cirad.fr/562460/1/document_562460.pdf.

165. Diep T. Nguyen et al., “Prevalence and Distribution of Avian Influenza A(H5N1) Virus Clade Variants in Live Bird Markets of Vietnam, 2011–2013,” *Avian Diseases* 58, no. 4 (2014): 599–608, <https://doi.org/10.1637/10814-030814-Reg>.

166. Sara LaJeunesse, “Vietnam Farmers’ Poultry Sales During Outbreaks May Increase Virus Transmission,” *ScienceDaily*, August 28, 2020, <https://www.sciencedaily.com/releases/2020/08/200828140301.htm>.

167. Sara LaJeunesse, “Vietnam Farmers’ Poultry Sales During Outbreaks May Increase Virus Transmission,” *ScienceDaily*, August 28, 2020, <https://www.sciencedaily.com/releases/2020/08/200828140301.htm>.

168. Trang Dang and Hang Le of Humane Society International, Vietnam. Personal Interview. June 17, 2021.

169. Trang Dang and Hang Le of Humane Society International, Vietnam. Personal Interview. June 17, 2021.

dogs and pet dogs (that some keep for security) are prevalent.¹⁷⁰ All are potential sources of meat in the dog and cat meat trades. Dog and cat meat are popular in Vietnam. The majority of dogs in Vietnam are sourced by rounding up stray dogs, or stealing pets. The dogs are transported 200–400 per truck, stacked in wire cages that are strapped to the truck. There is poor enforcement of quarantine, and multiple traders, middlemen, and handoffs are involved. The dogs are sold live or slaughtered in live markets. They are sometimes slaughtered by restaurants themselves, either inside or just outside the restaurant, or in households with rooms designated as slaughter rooms. There are few slaughterhouses designated for dogs. Recently, according to one anonymous source, rabies testing was performed at one of these slaughterhouses, and 4/400 or an alarming 1% tested positive. In all slaughterhouses, including this one, there is zero biosecurity; workers do not wear personal protective equipment, and the manner of slaughter is manual: workers beat dogs to death, usually with a hammer to the skull. Contact with animal blood and bodily fluid, and intense contact with animals in the midst of slaughter (that could involve bites and scratching) all pose significant risks to the workers.

Stray cats are likewise rounded up from around Vietnam, including from live markets, and transported, slaughtered, and served as meat in parallel fashion; results of a 2016 study investigating the prevalence of parasitic zoonotic infection in 12 cat slaughterhouses in North Vietnam suggests that in the cat trade—and perhaps in the dog trade, by extension—they are transported over great distances, posing significant threat of disease transmission, as well as exposure to zoonotic infection from live birds and weaners (piglets) being sold at the live markets.¹⁷¹

Risk Factors

Based upon the summary above, major risk factors along the poultry and swine supply chains, primarily but not exclusively among smallholder farms, and especially further out from urban areas, include the following:

- Inadequate veterinary care;
- Inadequate safety measures;
- Inadequate health literacy/health awareness;
- Inadequate awareness and implementation of national policies and regulations;
- Poor diet and inbreeding/genetic homogeneity leading to weaker animals and immune systems;
- Close confinement of animals in inadequate space;
- Confinement of multiple species;
- Intermixing of wild and domestic animals;
- Particular species risk (e.g., swine and poultry as reservoirs, mixing vessels, and common carriers of highly pathogenic viral influenza strains);
- Limited compliance with vaccination requirements or recommendations;
- Transport across large distances under stressful conditions;

170. Trang Dang and Hang Le of Humane Society International, Vietnam. Personal Interview. June 17, 2021.

171. Hung Manh Nguyen, Yulia V. Tatonova, and Henry Madsen, "Infections by Hepatic Trematodes in Cats from Slaughterhouses in Vietnam," *Journal of Parasitology* 104, no. 3 (2018): 306–9, <https://pubmed.ncbi.nlm.nih.gov/29466091/>.

- Informal exchanges and sales without record or tracing of animals;
- Manual slaughter without safety, sanitation or personal protective guidelines and that does not conform to existing regulations;
- Human exposure to animal blood, tissue and other biological matter;
- Inadequate waste management;
- Limited quarantine enforcement;
- Further mixing of multiple live flocks and species in a wet market;
- Multiple human-to-human touchpoints through middleman- and trader-centered market system;
- Overall little to no long-term disease surveillance, and
- Economic disincentive to follow healthy/safe practices in all steps of the supply chain.

Obviously, the transmission of zoonotic viruses in Vietnam presents tremendous challenges to national, provincial, regional, and commune/village government and authorities for disease surveillance, control, and intervention. These challenges likely require “a massive coordination effort by the national infrastructure for veterinary services.”¹⁷²

Regulations & Obstacles to Implementation and Enforcement

The 2015 Law on Veterinary Medicine provides for the prevention and treatment of and fighting against animal epidemic diseases, the quarantine of animals and animal products, the control of the slaughter, preparation, and processing of animals and animal products, the inspection of veterinary hygiene and the management of veterinary drugs and veterinary practice. It is meant to ensure—among other things—an expeditious, thorough response to disease outbreaks at all levels of governance, to prevent the spread of disease, and protect the livelihood of Vietnam’s smallholder farmers. The Law also details prohibited acts related to animal husbandry, such as slaughter or transport of diseased animals, that are not regularly addressed among smallholder farmers, middlemen and slaughterers.¹⁷³

More recently, in response to recent avian flu and African swine fever outbreaks, the national government issued several policies aimed at supporting livestock producers, including providing subsidies and instituting price controls on inputs and outputs, and providing financial support for breeders and credit packages to speed the recovery of farmers affected by disease outbreaks.¹⁷⁴ For example, the 2019 Government Resolution No.42/NQ-CP provides financial support for farmers, ranchers, and cooperatives impacted by African swine fever. Support was based on the market price and production costs for each breed of pig, and small and medium enterprises were typically eligible for support equaling 30% of their disease-related losses. Many such policies increase the financial compensation available to farmers for each infected swine and poultry in an effort to encourage farmers to cull infected animals, not

172. Diep T. Nguyen et al., “Prevalence and Distribution of Avian Influenza A(H5N1) Virus Clade Variants in Live Bird Markets of Vietnam, 2011–2013,” *Avian Diseases* 58, no. 4 (2014): 599–608, <https://doi.org/10.1637/10814-030814-Reg>.

173. Sayuri Umeda, “Vietnam,” in *Regulation of Wild Animal Wet Markets in Selected Jurisdictions* (Washington DC: Law Library of Congress, 2020), <https://tile.loc.gov/storage-services/service/lilg/lrd/2020714997/2020714997.pdf>.

174. Pham Van Dung et al., “Livestock Policies in Son La Province, Vietnam: A Review (Hanoi: Alliance of Bioversity International and CIAT, 2020), <https://cgspace.cgiar.org/bitstream/handle/10568/111509/%5b110%5d%20Livestock%20Policy%20Review%20-%20Final.pdf?sequence=1&isAllowed=y>.

sell them. Between 2005 and 2015, these compensation rates for each animal rose by 15%.¹⁷⁵

In theory, the aforementioned policies are meant to be financed by the national Ministry of Finance, supported by research under the Ministry of Agricultural and Rural Development, and realized at the local level by provincial agencies. However, disease outbreaks remain a critical issue for Vietnam's livestock sector. As can be seen from the summaries above, smallholder farmers cannot afford adequate biosecurity practices—if indeed they are even educated on and aware of them—so illegal trading of sick animals remains an issue, as does slaughter that does not comply with extant policy. Further, because production areas are expensive, livestock population density is as high as possible on smallholder farms, which increases the likelihood of the rapid spread of pathogens. Finally, as mentioned above, local animal testing and quarantine points are not readily available, and where they exist, usually have inadequate equipment or resources for best practices, including pre-emptively alerting communities of disease risk.¹⁷⁶ It would be virtually impossible to control the intermixing of millions of heads of poultry with swine, wildlife, and other species living on smallholder farms—top-down mandates will simply fail. Instead, smallholders may need incentive-based options that help stakeholders make safe decisions in the interests of both their finances and personal and public health.

According to an OECD Multi-dimensional Review of Vietnam, smallholder farms need to be better integrated into agricultural supply chains to make these farmers competitive and improve incomes in rural areas.¹⁷⁷ The same report recommends that a more transparent and conducive market environment could provide more equal opportunity to private, public, and foreign companies. It also recommends encouraging partnership between universities and entrepreneurs to create and accelerate innovation. Lastly, the report recommends policies aimed at stimulating the business services sector and public support for the kind of foreign direct investment that can help Vietnamese firms.¹⁷⁸

A World Bank Livestock Competitiveness and Food Safety Project introduced Good Animal Husbandry Practices to smallholder farmers, a project that ran from 2009 to 2015. The focus was on improving biosecurity measures, upgrading slaughterhouses and sanitation in wet markets, and training farmers, extension officers, and vet staff in best practices. It also supported MARD's Animal Husbandry and Livestock Development departments in increasing capacity for improving policymaking and strengthening disease inspection, surveillance, and monitoring across provinces. The results of the project show mortality rates for pigs and poultry falling 15% and 11.8% from 41% and 33%, respectively. In addition, 43 medium and large slaughterhouses installed waste disposal systems and management practices that actually meet the national standards, and 381 wet markets improved waste management facilities that do the same.¹⁷⁹

Importantly, the World Bank Group also recommends that as Vietnam enables its small farms to achieve economies of scale, it must facilitate agricultural diversification in response to emerging

175. Pham Van Dung et al., "Livestock Policies in Son La Province, Vietnam: A Review (Hanoi: Alliance of Bioversity International and CIAT, 2020), <https://cgspace.cgiar.org/bitstream/handle/10568/111509/%5b110%5d%20Livestock%20Policy%20Review%20-%20Final.pdf?sequence=1&isAllowed=y>.

176. Pham Van Dung et al., "Livestock Policies in Son La Province, Vietnam: A Review (Hanoi: Alliance of Bioversity International and CIAT, 2020), <https://cgspace.cgiar.org/bitstream/handle/10568/111509/%5b110%5d%20Livestock%20Policy%20Review%20-%20Final.pdf?sequence=1&isAllowed=y>.

177. "4. New Opportunities in Agriculture, Manufacturing and Services in Viet Nam," OECD iLibrary, accessed October 21, 2021, <https://www.oecd-ilibrary.org/sites/e04aa448-en/index.html?itemId=/content/component/e04aa448-en>.

178. "4. New Opportunities in Agriculture, Manufacturing and Services in Viet Nam," OECD iLibrary, accessed October 21, 2021, <https://www.oecd-ilibrary.org/sites/e04aa448-en/index.html?itemId=/content/component/e04aa448-en>.

179. Tiếng Việt, "Better Food Safety and Production Efficiency with Good Animal Husbandry Practices," The World Bank, April 14, 2016, <https://www.worldbank.org/en/results/2016/04/14/vietnam-better-food-safety-and-production-efficiency-with-good-animal-husbandry-practices>.

food demand, income, and employment needs, and must anticipate and prevent the degradation and other problems that will occur if agricultural promotion is in conflict with its goals of sustainability and environmental protection.¹⁸⁰

LEGAL AND ILLEGAL WILDLIFE TRADE

Vietnam is a significant consumer, source, and transit for legal and illegal wildlife trades. In recent years and of particular concern regarding transmission of zoonoses, Vietnam has also become an important center of captive breeding.¹⁸¹ Wildlife is commonly traded and used in Vietnam for meat, pets, skins, traditional medicine, or display in private zoos and collections, and these markets are legal.¹⁸² There are over 200 wildlife species being traded in domestic and international markets; approximately 20% are wild mammals, 45% snakes, 30% turtles, 3% birds and 2% other species. According to the Asian Development Bank, the vast majority of wildlife sourced in and crossing Vietnam is destined for international markets, and of that, the majority is sent to China.¹⁸³ Both illegal and legal wildlife are not only matters of domestic consumption but of expanding regional and international consumption; lack of trade monitoring, baseline information on distribution, and wildlife population data make it very hard to get a comprehensive sense of scope and scale, particularly as concealing the trade increases as law enforcement increases, and given the role of corruption and participation of government workers otherwise surviving on poverty-level salaries.¹⁸⁴

National government and provinces have been working hard to set up a legal framework for environmental protection and in accordance with CITES and its own policies, but resources are modest and the problems are tremendous.¹⁸⁵ Indeed, according to a study investigating the conservation impact of wildlife farming of porcupines in Vietnam, “the monitoring and control of wildlife trade in Vietnam (including wildlife farms) is under-resourced, weak, and ineffectual.”¹⁸⁶ In fact, much of the risk of zoonotic disease transmission in the wildlife trade arises in the gray areas where legal trade and illegal trade overlap: wildlife farms.

This section of the case study cites several papers documenting wildlife farm research, and sketches the legal and illegal supply chain of wildlife to its most common destinations domestically, in restaurants, and internationally, usually to China. In general, there are six types of supply chain channels, and all of them include risk factors, including mixing of species, poor hygiene/sanitation measures, poor health of animals, close confinement, confinement of multiple species, transportation over large

180. Claire H. Hollweg, Tanya Smith, and Daria Taglioni, Vietnam at a Crossroads: Engaging in the Next Generation of Global Value Chains, Directions in Development, 2017. (Washington, DC: World Bank, 2017), <https://openknowledge.worldbank.org/handle/10986/26215>.

181. Nguyen Van Song, “Wildlife Trading in Vietnam: Situation, Causes, and Solutions,” *The Journal of Environment & Development* 17, no. 2 (2008): 145–65, <https://doi.org/10.1177/1070496508316220>.

182. Sayuri Umeda, “Vietnam,” in *Regulation of Wild Animal Wet Markets in Selected Jurisdictions* (Washington DC: Law Library of Congress, 2020), <https://tile.loc.gov/storage-services/service/lil/ljldr/2020714997/2020714997.pdf>.

183. Anh Cao Ngoc and Tanya Wyatt, “A Green Criminological Exploration of Illegal Wildlife Trade in Vietnam,” *Asian Journal of Criminology* 8 (2013): 129–42, <https://doi.org/10.1007/s11417-012-9154-y>.

184. Nguyen Van Song, “Wildlife Trading in Vietnam: Situation, Causes, and Solutions,” *The Journal of Environment & Development* 17, no. 2 (2008): 145–65, <https://doi.org/10.1177/1070496508316220>.

185. Nguyen Van Song, “Wildlife Trading in Vietnam: Situation, Causes, and Solutions,” *The Journal of Environment & Development* 17, no. 2 (2008): 145–65, <https://doi.org/10.1177/1070496508316220>.

186. Emma G.E. Brooks, Scott I. Robertson, and Diana J. Bell, “The Conservation Impact of Commercial Wildlife Farming of Porcupines in Vietnam,” *Biological Conservation* 143, no. 11 (2010): 2808–14, <https://doi.org/10.1016/j.biocon.2010.07.030>.

distances, dangerous slaughter in restaurants that exposes humans (international tourists among them) to animals' blood, tissue, and other biological matter, collection of wild animals from remote areas, and negligible if non-existent disease surveillance among wildlife farms, nearly half of which are unregistered. The significant overlap of wildlife farming with illegal poaching and hunting (and poultry and swine production)—often managed by the same household and largely unregulated—involves extremely risky behavior and practices that increase the probability of transmission of zoonotic disease across species and to humans.

Wildlife Farms

The National Action Plan on strengthening the wildlife trade management towards 2010 (2004) aimed to “develop captive breeding and artificial propagation of wildlife as a tool for conservation and fighting hunger and poverty.” The economic theory is that farmed substitutes for wild species—a farmed civet instead of a wild-caught civet—would eventually lower the prices and subsequently diminish incentives to poach wild-caught civets. But culturally, Vietnamese consumers have set a premium on wild animals—not farmed animals. So farmed wildlife are only working as substitutes in some situations.¹⁸⁷ In part, for wildlife farms to be economically competitive with wild-caught wildlife, enforcement risk has to be high, such that the cost of laundering wild-caught animals is high. Currently, laundering of wild animals appears to be the most profitable option. Wildlife farming is expensive, time-intensive, and very difficult.¹⁸⁸ Wild-caught animals are cheaper and easier to supply, especially if there is little chance of getting caught, and/or the fine for getting caught is low.¹⁸⁹

Even as the original goals of wildlife farming per the National Action Plan have not been well-implemented, captive breeding and artificial propagation activity has been increasing dramatically.¹⁹⁰ ¹⁹¹ This is a result of policy measures that promote and improve or simplify registration and certifying procedures for wildlife farming, and in response to growing domestic and international demand for wildlife.¹⁹² Indeed, to meet such high demand, wildlife bred in captivity are often supplemented with stocks including wild-caught animals from several different regions across Vietnam and Southeast Asia¹⁹³—a very high-risk behavior.

To provide a sense of scope and scale of wildlife farming in Vietnam, the CITES Management Authority of Vietnam under the Vietnam Administration of Forestry and Ministry of Agriculture and Rural Development conducted a survey of captive wildlife facilities in 12 provinces in 2014. The results include the following:

187. Rachel Shairp et al., “Understanding Urban Demand for Wild Meat in Vietnam: Implications for Conservation Actions,” *PLoS ONE* 11, no. 1 (2016): e0134787, <https://doi.org/10.1371/journal.pone.0134787>.

188. Quyen Vu et al., *An Analysis of Wildlife Farming in Vietnam* (Hanoi: Education for Nature—Vietnam (ENV), 2017), <https://env4wildlife.org/wp-content/uploads/2021/03/Farming-Report-Oct-23-2017.pdf>.

189. Quyen Vu et al., *An Analysis of Wildlife Farming in Vietnam* (Hanoi: Education for Nature—Vietnam (ENV), 2017), <https://env4wildlife.org/wp-content/uploads/2021/03/Farming-Report-Oct-23-2017.pdf>.

190. Nguyen Manh Ha et al., *Report on the Review of Vietnam's Wildlife Trade Policy* (Hanoi: CRES/FPD/UNEP/CITES/IUED, 2008), https://cites.org/sites/default/files/common/prog/policy/Vietnam_wildlife_trade_policy_review.pdf.

191. Chris Humphrey, “Billion-dollar Wildlife Industry in Vietnam Under Assault as Law Draft to Halt Trading,” *The Guardian*, March 18, 2020, <https://www.theguardian.com/environment/2020/mar/18/billion-dollar-wildlife-industry-in-vietnam-under-assault-as-law-drafted-to-halt-trading>.

192. Chris Humphrey, “Billion-dollar Wildlife Industry in Vietnam Under Assault as Law Draft to Halt Trading,” *The Guardian*, March 18, 2020, <https://www.theguardian.com/environment/2020/mar/18/billion-dollar-wildlife-industry-in-vietnam-under-assault-as-law-drafted-to-halt-trading>.

193. Quyen Vu et al., *An Analysis of Wildlife Farming in Vietnam* (Hanoi: Education for Nature—Vietnam (ENV), 2017), <https://env4wildlife.org/wp-content/uploads/2021/03/Farming-Report-Oct-23-2017.pdf>.

- There were 9280 captive wildlife facilities in 23 provinces; 6473 of them new, 2807 updated;
- The total number of wild animals being raised was 2,189,429, from 263 wildlife species of 6 classes (Amphibians, Arachnida, Aves, Diplopoda, Mammalia, and Reptilia);
 - 108 species of Aves included 40,411 individual birds;
 - 62 species of Reptilia included 2,013,633 individuals;
- There were 2849 facilities with 971,412 individuals of 82 animal species listed as endangered, precious, rare, and prioritized for protection;
- 3172 facilities held 99 rare wildlife species in protection, with 448,314 individuals.¹⁹⁴

Rates of registration varied across provinces, from 65.5% in Ninh Binh to 12% in Bac Lieu. Though many provinces were reporting a reduction in captive farming, 63 new species were reported being raised.¹⁹⁵ By the end of 2016 and based on data from the Forest Protection Department, there were approximately 26,000 households engaging in commercial farming in Vietnam—almost triple the amount of the CITES data just two years prior—and many of which were not registered.¹⁹⁶

Updated figures in 2017 from 4099 wildlife farms include information on 11,009 groups of animals kept on farms: 5597 wild animal groups and 5412 domestic animal groups. In total, 1,554,418 animals were being raised at surveyed farms; 996,731 wild animals belong to 175 species from five orders. The most common types of farms were for rearing porcupines (1,535 farms/25,385 animals), oriental rat-snake (675 farms/112,023 animals) and deer (524 farms/3,452 animals), while the highest in overall numbers of individuals were crocodile, softshell turtle, and oriental snake, accounting for 618,540 individuals or 62.1 % of all animals.¹⁹⁷

Most wildlife farm facilities are household enterprises,¹⁹⁸ and these households are almost always smallholder farms that also raise traditional livestock, such as poultry and swine; these farmers have heard that breeding wild porcupine, for example, may be a way to increase income, so they try it.¹⁹⁹ In fact, porcupine—a possible high-risk reservoir for zoonotic disease²⁰⁰—is among the most common wildlife species farmed. A 2010 study of the conservation impacts of wildlife farming on porcupines reported that among surveyed farms, the main reason for farming porcupines was the high level of income they guaranteed, followed by the minimal maintenance required and the “fact” that unlike livestock, “porcupines are disease-free.”²⁰¹ Of the 67 farms surveyed, 13 had recently switched from

194. Quyen Vu et al., *An Analysis of Wildlife Farming in Vietnam* (Hanoi: Education for Nature—Vietnam (ENV), 2017), <https://env4wildlife.org/wp-content/uploads/2021/03/Farming-Report-Oct-23-2017.pdf>.

195. Quyen Vu et al., *An Analysis of Wildlife Farming in Vietnam* (Hanoi: Education for Nature—Vietnam (ENV), 2017), <https://env4wildlife.org/wp-content/uploads/2021/03/Farming-Report-Oct-23-2017.pdf>.

196. Quyen Vu et al., *An Analysis of Wildlife Farming in Vietnam* (Hanoi: Education for Nature—Vietnam (ENV), 2017), <https://env4wildlife.org/wp-content/uploads/2021/03/Farming-Report-Oct-23-2017.pdf>.

197. “Wildlife Farming in Viet Nam: Southern Viet Nam’s Wildlife Farm Survey Report in a Glance,” Food and Agriculture Organization of the United Nations, accessed October 21, 2023, <https://www.fao.org/3/az118e/az118e.pdf>.

198. Emma G.E. Brooks, Scott I. Robertson, and Diana J. Bell, “The Conservation Impact of Commercial Wildlife Farming of Porcupines in Vietnam,” *Biological Conservation* 143, no. 11, (2010): 2808–14, <https://doi.org/10.1016/j.biocon.2010.07.030>.

199. Lan Ho, Mai Trinh and Pham Thong of Save Vietnam’s Wildlife. Personal Interview. June 23, 2021.

200. Emma G.E. Brooks, Scott I. Robertson, and Diana J. Bell, “The Conservation Impact of Commercial Wildlife Farming of Porcupines in Vietnam,” *Biological Conservation* 143, no. 11, (2010): 2808–14, <https://doi.org/10.1016/j.biocon.2010.07.030>.

201. Emma G.E. Brooks, Scott I. Robertson, and Diana J. Bell, “The Conservation Impact of Commercial Wildlife Farming of Porcupines in Vietnam,” *Biological Conservation* 143, no. 11, (2010): 2808–14, <https://doi.org/10.1016/j.biocon.2010.07.030>.

attempting to breed another wild species; 23% cited lack of disease in porcupines as the reason for their change.²⁰²

Commonly raised wildlife include species that are considered high risk for zoonotic diseases, including porcupine, civets, wild boar, bamboo rat and the macaque.^{203 204} The size of each wildlife farming facility, therefore, can vary widely by species and the farmer's purposes. According to CITES data, with some popular farming species, the average flock size of crocodiles was 350, but larger facilities had more (642 facilities keeping over 1000 heads and 13 facilities keeping over 5000). For ring-necked pheasants, the average flock size was 70 birds with the largest facility having 1200 birds. Mammals raised in small herds include sika deer (4 had 3 heads) and porcupine (18.5 heads).²⁰⁵

In 2020, Save Vietnam's Wildlife conducted an intensive wildlife farming survey in Lam Dong and Dak Lak provinces across 57 civet farms in two provinces. A third of surveyed farms raised multiple species; not only civets were found, but also amphibians, reptiles, mammals, and industrial poultries. Species being raised alongside civets included sika deer, wild boar, giant Asian pond turtle, bamboo rat, porcupine, Asiatic brush-tailed porcupine, boas, snakes, softshell turtle, lizards, climbing perch, Chinese edible frog, *pila*, green peafowl, domestic pigeon, and the domestic chicken. Three farms were found to raise more than five species, including civets in the same farming area. In addition, researchers reported that:

- More than half of respondents who were asked about their restocking practices admitted to buying civets from hunters or live animal sellers to sustain their farms.
- Civet farm owners reported not restocking animals frequently, and only restock once civets died or escaped.
- Seven farms reported having all civets die due to disease.
- One farm reported having more than 200 civets die simultaneously, and restocking all the animals again.
- The frequency of restocking—weekly or monthly—was higher among farms selling civet meat than farms that sell civet coffee. The restocking frequency among the former depends on the demand of the consumers and/or the number of civets bought from hunters.
- Animals are kept in small enclosures, with the average size of an enclosure less than 1 meter on each side.
- Enclosures are designed such that the male civets can easily enter the female enclosure during breeding season.
- The enclosures are often made of mesh and adjacent to each other.
- Five farms were observed to keep civets together; one large enclosure held between 4 to 10 civets in a cage of 2 to 10 m². (Since most civets are solitary animals, they are stressed and fight

202. Emma G.E. Brooks, Scott I. Robertson, and Diana J. Bell, "The Conservation Impact of Commercial Wildlife Farming of Porcupines in Vietnam," *Biological Conservation* 143, no. 11, (2010): 2808–14, <https://doi.org/10.1016/j.biocon.2010.07.030>.

203. Quyen Vu et al., *An Analysis of Wildlife Farming in Vietnam* (Hanoi: Education for Nature—Vietnam (ENV), 2017), <https://env4wildlife.org/wp-content/uploads/2021/03/Farming-Report-Oct-23-2017.pdf>.

204. Rebecca Drury, "Hungry for Success: Urban Consumer Demand for Wild Animal Products in Vietnam," *Conservation & Society* 9, no. 3 (2011): 247–57, <https://www.jstor.org/stable/26393047>.

205. Quyen Vu et al., *An Analysis of Wildlife Farming in Vietnam* (Hanoi: Education for Nature—Vietnam (ENV), 2017), <https://env4wildlife.org/wp-content/uploads/2021/03/Farming-Report-Oct-23-2017.pdf>.

when kept in the same enclosure. Tail injury or loss was among the most visible evidence of fighting.)

- Farming conditions and veterinary care were poorly regulated.
- Husbandry conditions are often unhygienic or poor, e.g., small cages, filthy with feces, leaving animals weak and vulnerable to disease; enclosures were cleaned once every day or once every week. At least one farm that sells civets for meat reported that they only cleaned once a month; the place was very dirty and probably unhealthy for the animals and people who consume sick civets.
- Slaughter and preparation of wild meat were often performed adjacent to the cages of live wildlife and with unhygienic practices.
- Costs for civet food were reported to be cheap and uniform (rice porridge with chicken/pig leftovers and banana, and coffee fruits when in season).
- Almost all respondents reported civets dying from disease (especially intestinal diseases caused by food), injury, or consumption of too many coffee beans.
- Only eight respondents reported vaccinating civets; some farmers treated civets with chicken and pig medicine.
- Some farmers reported letting civets die if they got sick (i.e., they did not report it), and did not seek medication or support since they did not understand their diseases.
- External markers or other forms of individual identification were only seen on one civet farm.

Civet farm owners admitted to often buying civet founders from either breeding farms or hunters, or both; as buying civet pairs from civet farms is more expensive, many farm owners bought them from hunters, even though half of the respondents who did so reported that wild civets usually die after one or two months. Farmed civets are reported to be sold to restaurants for civet meat or other farms for civet breeds. There are close links between civet farms and restaurants in the same region, or between civet hunters and wildlife restaurants. Selling live civet breeds are reported to be more profitable than selling civet meat, as two-month-old civets can be sold at a high price. Selling small civets as pets was also reported by respondents. Despite the requirement that farmers have registration papers ready before selling farmed wildlife, some farmers reported it takes a lot of time, so they did not work with provincial Forest Protection Departments (FPDs), and sold their civets illegally. There is very little disincentive to do so.

A 2017 analysis of wildlife farming in Vietnam reported similar findings, with a higher level of detail regarding laundering, non-registration, and bypassing FPD requirements. Researchers surveyed 26 wildlife farms and reported that:

- 26 out of 26 farms asked were involved in some degree of illegal wildlife laundering activity.
- 16 out of 26 farms asked confirmed that their farms were involved in laundering wildlife.
- 17 out of 19 farms asked were claimed by interviewees to sell transportation papers, and a number of farm owners offered to sell transportation papers to the researchers.

- 10 out of 11 farms asked were confirmed by interviewees to buy transportation papers from other farms or Forest Protection Department (FPD) officials.
- 18 out of 18 farms asked were claimed by interviewees to buy animals without transportation papers (i.e., illegal animals).
- 14 out of 14 farms asked confirmed the selling of animals without transportation papers.
- 14 of 18 farms asked stated that FPD officials had received illegal payments from their farms.
- Interviewees in 17 out of 26 farms could not or would not accurately report the number of each species present at their farm. At nine of the 26 farms where there was reporting of both the number of animals present and the number registered, the numbers did not match, and in five cases, “were wildly conflicting.”
- Production was mainly based on laundering animals through farms, with few cases in which intentional breeding was recorded.
- Many animals were injured from snare traps, indicating they’d been wild-caught.²⁰⁶

The primary ways of legitimizing illegal animals on a wildlife farm are purchasing and/or trading transportation papers across farms, proving the legal origin of the animal, and by claiming false births or not reporting deaths (and/or selling animals without permits, outright). Two farmers, however, reported that pretense or tricking FPD officials wasn’t even necessary, as they overlooked noncompliance. Sometimes, an FPD official is a neighbor or friend, and a participant in the trade.²⁰⁷

Wildlife Supply Chain

Where founder stock and farmed wildlife are ultimately bound can vary. Some interviewees reported that China was the primary sale destination, but that the urban domestic market was growing; many reported changing the species they attempted to raise based on fluctuating demand for a particular species in China. In this study, interviewees from southern provinces reported most of their wildlife was sent to China, Hai Phong City, Hanoi, and Ho Chi Minh City; wildlife farmers in central provinces said the main destinations were China and Hanoi; farmers in Hanoi said the main destinations were Hanoi, Quang Ninh and Hai Phong.²⁰⁸

Given the extent of illegal activity occurring around wildlife farming, it is difficult if not impossible to separate legal supply chains from illegal supply chains. From the wildlife farms, there are several different possible supply chains to final consumers. For example, across porcupine wildlife farms cited above, founder stock/breeding pairs were sent to much of northern Vietnam (presumably for new, rural smallholders taking up the enterprise), and some south to larger urban areas. One reported selling founder stock to China. Two farmers reported selling porcupine to restaurants for meat only if the porcupine had accidentally died or if there was a surplus of males; six reported their own supply was not enough to meet restaurant demand, and that wild-caught porcupine supplied restaurants. This

206. Quyen Vu et al., An Analysis of Wildlife Farming in Vietnam (Hanoi: Education for Nature—Vietnam (ENV), 2017), <https://env4wildlife.org/wp-content/uploads/2021/03/Farming-Report-Oct-23-2017.pdf>.

207. Lan Ho, Mai Trinh and Pham Thong of Save Vietnam’s Wildlife. Personal Interview. June 23, 2021.

208. Quyen Vu et al., An Analysis of Wildlife Farming in Vietnam (Hanoi: Education for Nature—Vietnam (ENV), 2017), <https://env4wildlife.org/wp-content/uploads/2021/03/Farming-Report-Oct-23-2017.pdf>.

same study suggests that the greatest demand is not for founder stock but from farms laundering wild animals and selling them across the country. Four farms that were willing to talk openly reported trading almost 1000 wild porcupines each year, predominantly to other farms as founder stock.²⁰⁹ Typically, then, the majority of additional income for wildlife farmers comes from selling or laundering founder stock. Animals illegally captured and raised can then be sold via a presumably legal industry to businessmen, restaurants, medicine stores and across the border.²¹⁰ The following describe several of myriad possible supply chains, and incorporates research from interviews with Save Vietnam's Wildlife, Animals Asia, and a highly sensitive, "dangerous" 2010 study in which researchers posed as consumers:

- Wildlife passes directly from hunters to ultimate consumers. This includes sales to travelers or traders from small live wild markets or stalls, and accounts for a small percentage of domestic consumption.²¹¹
- Wild-caught wildlife is sold by hunters to wildlife farmers, who either sell wildlife locally to restaurants (less the case) or pass off illegal, wild-caught "founder stock" to other wildlife farming enterprises, and sometimes internationally.^{212 213 214}
- Wild-caught and/or farmed wildlife (often impossible to tell between them) is sold to a trader who transports animals via truck to international borders.²¹⁵
- Wildlife is sold directly by professional hunters to restaurants; animals are flown or transported via motorbike, car, or bus to local restaurants.^{216 217 218}
- A hunter may sell wild-caught animals to traders, who sell them further along the chain to middlemen, who eventually sell them to wildlife meat restaurants and the consumer.²¹⁹ When this route is being used, larger numbers of animals—kept alive if possible, because they bring a higher price in restaurants and allow restaurant owners to hold them until that particular species is ordered—are congregated and sold up the chain. So, for example, further along the chain a bus might be confiscated containing a large number of animals, whereas confiscation closer to the source and original hunter is likely to turn up a smaller number.²²⁰

209. Emma G.E. Brooks, Scott I. Robertson, and Diana J. Bell, "The Conservation Impact of Commercial Wildlife Farming of Porcupines in Vietnam," *Biological Conservation* 143, no. 11, (2010): 2808–14, <https://doi.org/10.1016/j.biocon.2010.07.030>.

210. Chris Humphrey, "Billion-dollar Wildlife Industry in Vietnam Under Assault as Law Draft to Halt Trading," *The Guardian*, March 18, 2020, <https://www.theguardian.com/environment/2020/mar/18/billion-dollar-wildlife-industry-in-vietnam-under-assault-as-law-drafted-to-halt-trading>.

211. Nguyen Van Song, "Wildlife Trading in Vietnam: Situation, Causes, and Solutions," *The Journal of Environment & Development* 17, no. 2 (2008): 145–65, <https://doi.org/10.1177/1070496508316220>.

212. Emma G.E. Brooks, Scott I. Robertson, and Diana J. Bell, "The Conservation Impact of Commercial Wildlife Farming of Porcupines in Vietnam," *Biological Conservation* 143, no. 11, (2010): 2808–14, <https://doi.org/10.1016/j.biocon.2010.07.030>.

213. Lan Ho, Mai Trinh and Pham Thong of Save Vietnam's Wildlife. Personal Interview. June 23, 2021.

214. Quyen Vu et al., *An Analysis of Wildlife Farming in Vietnam (Hanoi: Education for Nature—Vietnam (ENV), 2017)*, <https://env4wildlife.org/wp-content/uploads/2021/03/Farming-Report-Oct-23-2017.pdf>.

215. Quyen Vu et al., *An Analysis of Wildlife Farming in Vietnam (Hanoi: Education for Nature—Vietnam (ENV), 2017)*, <https://env4wildlife.org/wp-content/uploads/2021/03/Farming-Report-Oct-23-2017.pdf>.

216. Nguyen Van Song, "Wildlife Trading in Vietnam: Situation, Causes, and Solutions," *The Journal of Environment & Development* 17, no. 2 (2008): 145–65, <https://doi.org/10.1177/1070496508316220>.

217. "Wildlife Farming in Viet Nam: Southern Viet Nam's Wildlife Farm Survey Report in a Glance," Food and Agriculture Organization of the United Nations, accessed October 21, 2023, <https://www.fao.org/3/az118e/az118e.pdf>.

218. Quyen Vu et al., *An Analysis of Wildlife Farming in Vietnam (Hanoi: Education for Nature—Vietnam (ENV), 2017)*, <https://env4wildlife.org/wp-content/uploads/2021/03/Farming-Report-Oct-23-2017.pdf>.

219. Nguyen Van Song, "Wildlife Trading in Vietnam: Situation, Causes, and Solutions," *The Journal of Environment & Development* 17, no. 2 (2008): 145–65, <https://doi.org/10.1177/1070496508316220>.

220. Lan Ho, Mai Trinh and Pham Thong of Save Vietnam's Wildlife. Personal Interview. June 23, 2021.

- Hunters sell wildlife to middlemen, who sell directly to a live market or domestic restaurant and then ultimately to consumers. This is one of the most common and important supply chains of illegal domestic wildlife consumption, especially for wildlife meat, and accounts for 85% to 90% of the total volume of daily domestic wildlife consumption.²²¹
- Hunters sell to traders near the border, who sell wildlife further on to domestic middlemen, who sell wildlife to international traders or intermediaries for illegal export.²²²
- International middlemen buy directly from the hunters or border traders.^{223 224}

It is important to keep in mind that throughout the supply chain routes listed above, multiple species, multiple specimens of similar species from many areas, and hunting-injured and otherwise unhealthy animals are being transported together in close confinement over great distances. How many and what kind of animal is collected can be influenced by a trader signaling to a region that there is a request for a certain species, and hunters will respond by attempting to poach that particular animal; often, however, a trader or middleman will collect whatever is available, transporting many different species in a single trip.²²⁵ To keep hunters near the borders working and supply chains moving, interested parties with the capital to do so, usually from urban areas, may incentivize poor farmers in rural areas by providing them “credit” of phones and hunting gear to get involved in the trade.²²⁶

There seem to be two primary functions of farmed wildlife: founder stock to launder or sell, and wild meat to be consumed in domestic restaurants. It’s clear that the majority of domestic demand is from wild meat consumers, and it is likely that demand is being stoked by the prevalence of wildlife farms, and vice versa.

Restaurants

The 13 most common species reserved for wildlife restaurants’ menus are snakes, palm civets, monitor lizards, porcupines, leopards, pangolins, monkeys, forest pigs, hard-shell turtles, soft-shell turtles, civets, boas, and birds.²²⁷ Often, there are several species not listed on the menu, but that consumers can ask for. These species are stored alive—off-site in a home or hidden elsewhere in the restaurant—until requested.^{228 229 230} Wild animals held in this way may be legally or illegally sourced, farmed or wild-caught. Consumers who insist on authentically wild meat will not request any species that

221. Nguyen Van Song, “Wildlife Trading in Vietnam: Situation, Causes, and Solutions,” *The Journal of Environment & Development* 17, no. 2 (2008): 145–65, <https://doi.org/10.1177/1070496508316220>.

222. Nguyen Van Song, “Wildlife Trading in Vietnam: Situation, Causes, and Solutions,” *The Journal of Environment & Development* 17, no. 2 (2008): 145–65, <https://doi.org/10.1177/1070496508316220>.

223. Nguyen Van Song, “Wildlife Trading in Vietnam: Situation, Causes, and Solutions,” *The Journal of Environment & Development* 17, no. 2 (2008): 145–65, <https://doi.org/10.1177/1070496508316220>.

224. Lan Ho, Mai Trinh and Pham Thong of Save Vietnam’s Wildlife. Personal Interview. June 23, 2021.

225. Lan Ho, Mai Trinh and Pham Thong of Save Vietnam’s Wildlife. Personal Interview. June 23, 2021.

226. Lan Ho, Mai Trinh and Pham Thong of Save Vietnam’s Wildlife. Personal Interview. June 23, 2021.

227. Anh Cao Ngoc and Tanya Wyatt, “A Green Criminological Exploration of Illegal Wildlife Trade in Vietnam,” *Asian Journal of Criminology* 8 (2013): 129–42, <https://doi.org/10.1007/s11417-012-9154-y>.

228. Anh Cao Ngoc and Tanya Wyatt, “A Green Criminological Exploration of Illegal Wildlife Trade in Vietnam,” *Asian Journal of Criminology* 8 (2013): 129–42, <https://doi.org/10.1007/s11417-012-9154-y>.

229. Tuan Bendixsen of Animals Asia, personal interview, June 17, 2021.

230. Lan Ho, Mai Trinh and Pham Thong of Save Vietnam’s Wildlife. Personal Interview. June 23, 2021.

can or has been farmed. Often, consumers who want to signal the prestige and status of purchasing, gifting, or consuming wild meat in a restaurant assume that a higher price means the animal has been wild-caught, but illegally wild-caught animals are the cheapest and easiest for restaurants to supply. In fact, the aforementioned study of wild-farmed porcupines found that restaurants source “almost all” of their porcupine meat from illegal wild sources. According to a 2003 study, across 20 Vietnamese cities there were 316 wildlife meat restaurants providing 2,040 kg of wildlife meat daily; despite authorities’ attempts to close these restaurants, they still exist in all provinces. The largest number of wildlife meat restaurants were found to be in Hanoi, Ho Chi Minh City, Hai Phong and Nghe An.²³¹

Many animals are held alive in restaurants, where consumers can select the animal, a snake, for example, that they choose to consume, and they assist in or witness its slaughter, then drink its blood mixed with rice wine and eat its organs. Rural areas have discovered this form of tourism as an increasing source of income and serve not only domestic travelers but international travelers as well.²³² Due to the illegal nature of much of the wild animal supply at restaurants, the manner and condition in which live animals are kept on- and off-site is not clear, though some have reported seeing live animals in cages just outside or in a room off the back of a restaurant.²³³ In any case, the practice—being largely illegal—is not regulated. There is no data on the number of points of contact from a wild-caught animal in a remote area of Vietnam to a restaurant consumer, but from the summaries provided above, it is conceivable and reasonable to assume that each such animal has been in close confinement with or near other species, has traveled some significant distance under stress, and has changed hands a number of times.

Risk Factors

In terms of risk of transmitting zoonotic viral infection, most of the practices described above are dangerous on their own—together they comprise an extremely dangerous high-risk trade that extends across Vietnam and its borders. Demonstrating just how risky, in the summer of 2020, in the adjacent and nearby forests of China and Thailand, there was identification of “a few” close relatives of the COVID-19 virus among pangolins.²³⁴ Across the legal and illegal trade markets, including much overlap among wildlife farming facilities (which are primarily householder operations), risk factors include:

- Inadequate veterinary care;
- Inadequate safety measures;
- Inadequate awareness and implementation of national policies and regulations;
- Poor diet, inbreeding/genetic homogeneity leading to weaker animals and immune systems;
- Close confinement of animals in inadequate space;
- Confinement of a high number of multiple, high-risk species;

231. Anh Cao Ngoc and Tanya Wyatt, “A Green Criminological Exploration of Illegal Wildlife Trade in Vietnam,” *Asian Journal of Criminology* 8 (2013): 129–42, <https://doi.org/10.1007/s11417-012-9154-y>.

232. “One Meal at a Time, Tourists Kill Wildlife in Vietnam,” *VnExpress*, December 27, 2016, <https://e.vnexpress.net/news/news/one-meal-at-a-time-tourists-kill-wildlife-in-vietnam-3514988.html>,

233. Lan Ho, Mai Trinh and Pham Thong of Save Vietnam’s Wildlife. Personal Interview. June 23, 2021.

234. Carl Zimmer, “Newly Discovered Bat Viruses Give Hints to Covid’s Origins,” *The New York Times*, October 14, 2021, <https://www.nytimes.com/2021/10/14/science/bat-coronaviruses-lab-leak.html>.

- Intermixing of wild and domestic animals;
- Poor husbandry and illegal hunting of high-risk species;
- High species diversity and abundance of both wild and farmed animals;
- Contact among animals of the same species from different locations, both wild and domestic;
- Transport across large distances under stressful conditions;
- Manual slaughter without safety measures, sometimes in a restaurant among international travelers, with direct human consumption and/or a high level of human exposure to animal blood, tissue, and other biological matter;
- Multiple human-to-human touchpoints through middleman- and trader-centered market systems;
- Overall little to no long-term disease surveillance; and
- Economic disincentives to follow healthy or safe practices in all steps of the supply chain.

Conclusion & Recommendations

In the most recent wildlife-related legislation arising in response to COVID-19, Prime Minister Nguyen Xuan Phuc ordered the Ministry of Agriculture and Rural Development to draft a directive to eliminate the illegal wildlife trade and consumption of wildlife. The directive was issued in July 2020, and called for enhanced enforcement efforts on illegal wildlife trade in Vietnam effective immediately in order to reduce the risk of new pandemics. The directive details 12 provisions and temporarily bans the import of live wild animals and wildlife products until further notice; it states that the government is eliminating illegal wildlife markets and enforcing prohibitions on the illegal hunting and trading of wild animals, including through online sales. In addition, the directive states that on the province level, inspections of wildlife rearing and trading establishments be strengthened and be “in compliance with the legal origin regulation, and of veterinary hygiene and environment food safety.”²³⁵

In general, all of the action plans and strategies emphasize that wild animals and plants are national property that need to be both protected and strictly managed. The major issues with such regulation is that they provide little instruction regarding how these strategies should be implemented, or by whom, and they fail to provide direction on monitoring or evaluating implementation.²³⁶

The Forest Protection Department (or FPD) is tasked with monitoring and enforcing these decrees, which state that all wildlife farms be registered with the relevant provincial FPD and that farms maintain accurate stock records and proof of the legal origin of their stock. Violation of these laws is supposed to result in confiscation of the animals, a fine equivalent to the value of the animals up to US\$1850, and the possibility of revoking any farm registration certificate (Decree 159/2007/ND-CP).²³⁷

To increase the cost and risk of illegal activity, these regulations obviously need to be monitored and enforced, but many have raised doubts about whether the FPD can really enforce them. First, many FPD officials lack the knowledge and experience to execute their jobs; they come from different

235. Sayuri Umeda, “Vietnam,” in *Regulation of Wild Animal Wet Markets in Selected Jurisdictions* (Washington DC: Law Library of Congress, 2020), <https://tile.loc.gov/storage-services/service/ll/lglrd/2020714997/2020714997.pdf>.

236. Sayuri Umeda, “Vietnam,” in *Regulation of Wild Animal Wet Markets in Selected Jurisdictions* (Washington DC: Law Library of Congress, 2020), <https://tile.loc.gov/storage-services/service/ll/lglrd/2020714997/2020714997.pdf>.

237. Emma G.E. Brooks, Scott I. Robertson, and Diana J. Bell, “The Conservation Impact of Commercial Wildlife Farming of Porcupines in Vietnam,” *Biological Conservation* 143, no. 11, (2010): 2808–14, <https://doi.org/10.1016/j.biocon.2010.07.030>.

disciplines and need training and supporting documents and reference materials.^{238 239} Second, and critically, the FPD does not use individual identity markers for captive wild animals, so the natural difficulty of distinguishing between wild-caught and farmed animals allows “a system where farm management record books can easily be manipulated to launder wildlife.”²⁴⁰

More specifically, provincial FPDs simply don’t have adequate means to manage or measure management on wildlife farms, so they have to rely on “the validity of management books, and the honesty of farm owners.”²⁴¹ This obviously precludes the prevention of wildlife laundering and illegal trade through captive-bred farms. Indeed, as noted by Education for Nature, Vietnam, FPD officials usually “do not count animals against the records during their inspections due to fear of financial repercussions from farm owners or the possibility of an accidental animal death during inspection.”²⁴²

A CITES assessment of the situation suggests that Vietnam’s policies to date have tried to address too many goals, making implementation more difficult, and resulting in a failure to implement goals or objectives as planned. CITES states that supervision and assessment of policies during implementation is rarely performed in particular, despite requirements or expectations.²⁴³ For any long-term monitoring or evaluation system that is established to actually work, key stakeholders—local people, government authorities, and international organizations—all need buy-in.²⁴⁴ To date, there has been little guidance for local people, especially those living in critical buffer zones of protected areas, on how they can find sources of income to replace hunting, wildlife harvesting, and contributing to wildlife laundering; so far, national regulations, focusing on conservation and law enforcement, have sometimes ignored social and economic aspects of the illegal and legal wildlife trade.²⁴⁵

One recommendation is for software development that would provide a closer and accurate view of the scale and type of animals being raised, and that monitors and traces their origins. In addition, training materials for FPD and other enforcers need to be developed, which include general guidance on regulations, standards, biosecurity, animal welfare, and disease prevention.

There is also a need to connect with and include participation and support from stakeholders in livestock, veterinary, and environmental sectors. The government needs to establish clear timelines and responsibilities for updating information on wildlife facilities, and local agencies urgently need the human and economic resources to implement, maintain, and update wildlife data.²⁴⁶

We also recommend ceasing captive breeding for those species that are difficult to breed and

238. Nguyen Manh Ha et al., Report on the Review of Vietnam’s Wildlife Trade Policy (Hanoi: CRES/FPD/UNEP/CITES/IUED, 2008), https://cites.org/sites/default/files/common/prog/policy/Vietnam_wildlife_trade_policy_review.pdf.

239. Quyen Vu et al., An Analysis of Wildlife Farming in Vietnam (Hanoi: Education for Nature—Vietnam (ENV), 2017), <https://env4wildlife.org/wp-content/uploads/2021/03/Farming-Report-Oct-23-2017.pdf>.

240. Quyen Vu et al., An Analysis of Wildlife Farming in Vietnam (Hanoi: Education for Nature—Vietnam (ENV), 2017), <https://env4wildlife.org/wp-content/uploads/2021/03/Farming-Report-Oct-23-2017.pdf>.

241. Quyen Vu et al., An Analysis of Wildlife Farming in Vietnam (Hanoi: Education for Nature—Vietnam (ENV), 2017), <https://env4wildlife.org/wp-content/uploads/2021/03/Farming-Report-Oct-23-2017.pdf>.

242. Quyen Vu et al., An Analysis of Wildlife Farming in Vietnam (Hanoi: Education for Nature—Vietnam (ENV), 2017), <https://env4wildlife.org/wp-content/uploads/2021/03/Farming-Report-Oct-23-2017.pdf>.

243. Nguyen Manh Ha et al., Report on the Review of Vietnam’s Wildlife Trade Policy (Hanoi: CRES/FPD/UNEP/CITES/IUED, 2008), https://cites.org/sites/default/files/common/prog/policy/Vietnam_wildlife_trade_policy_review.pdf.

244. Nguyen Van Song, “Wildlife Trading in Vietnam: Situation, Causes, and Solutions,” *The Journal of Environment & Development* 17, no. 2 (2008): 145–65, <https://doi.org/10.1177/1070496508316220>.

245. Nguyen Manh Ha et al., Report on the Review of Vietnam’s Wildlife Trade Policy (Hanoi: CRES/FPD/UNEP/CITES/IUED, 2008), https://cites.org/sites/default/files/common/prog/policy/Vietnam_wildlife_trade_policy_review.pdf.

246. Quyen Vu et al., An Analysis of Wildlife Farming in Vietnam (Hanoi: Education for Nature—Vietnam (ENV), 2017), <https://env4wildlife.org/wp-content/uploads/2021/03/Farming-Report-Oct-23-2017.pdf>.

which therefore lend themselves to poaching, laundering, and zoonotic disease risk, and continuing with captive breeding only for those species, such as crocodiles, that have a proven track record of successful breeding and providing or boosting income for farmers engaged in the practice.

However Vietnam proceeds, an important risk area that needs monitoring and will likely need increased monitoring for disease protection as regulations are updated, implemented, and enforced, is related to where live wildlife specimens go once confiscated. They are difficult to house, and often should not be released into the wild, particularly if they are sick or injured. Sometimes those rescuing animals are without the tools or equipment to manage the task, so sometimes “the release brings unexpected results which are hard to control.”²⁴⁷

247. Nguyen Manh Ha et al., Report on the Review of Vietnam's Wildlife Trade Policy (Hanoi: CRES/FPD/UNEP/CITES/IUED, 2008), https://cites.org/sites/default/files/common/prog/policy/Vietnam_wildlife_trade_policy_review.pdf.