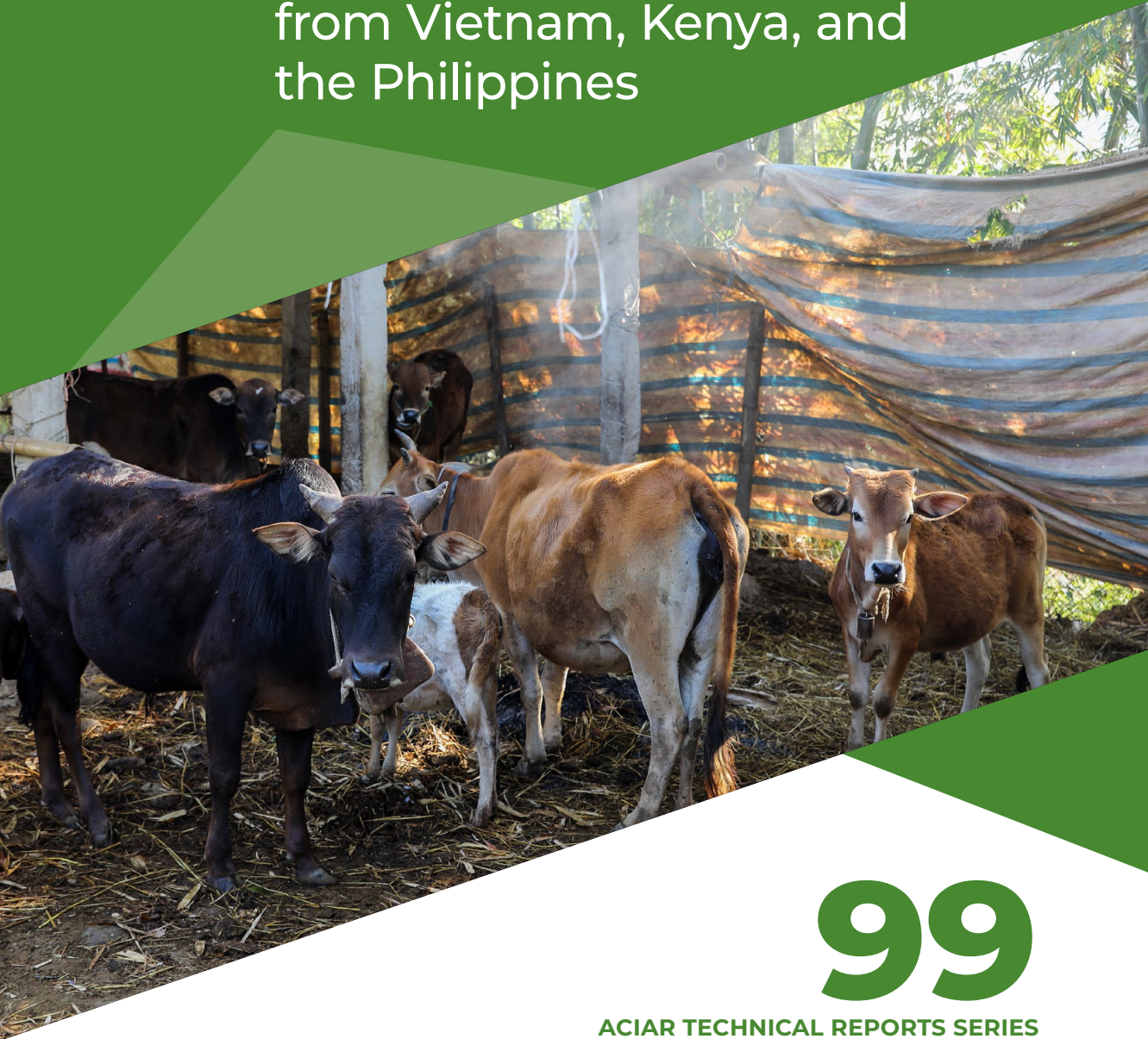




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Rapid assessment of the impact of COVID-19 on wet market reforms: case studies from Vietnam, Kenya, and the Philippines



99

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Rapid assessment of the impact of COVID-19 on wet market reforms

Case studies from Vietnam, Kenya, and the Philippines

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Foreword

The COVID-19 pandemic was a global health and economic crisis that disrupted the lives and livelihoods of diverse communities around the world and will have impacts for years to come. Beyond the health impacts of the pandemic, the pandemic negatively impacted food production and supply chains in many parts of the world. The affected population included almost 500 million smallholder farmers who produce food for half of the world's population, many of whom are among the 2.7 billion people across the globe living on less than \$2 per day.

The Australian Centre for International Agricultural Research (ACIAR) is mandated under the ACIAR Act (1982) to work with partners across the Indo-Pacific region to generate the knowledge and technologies that underpin improvements in agricultural productivity, sustainability and food systems resilience. We do this by funding, brokering and managing research partnerships for the benefit of partner countries and Australia.

ACIAR supported partners from RMIT to work with institutions in the Philippines, Kenya and Vietnam to investigate the effects of the biosecurity measures and infection control policies on the food production and distribution systems in these three countries by listening to the experiences of both people whose livelihoods depend on these systems and government stakeholders.

This report explores the various stakeholders' perceptions of the safety of traditional wet markets, which became the focus of international media attention early in the pandemic. It is the first of three 'deeper dive' assessments of research-for-development issues related to the COVID-19 pandemic, which are the conclusion of a three-stage assessment process that began with ACIAR Technical Report 95 *Food systems security, resilience and emerging risks in the Indo-Pacific in the context of COVID-19: a rapid assessment*.

This technical report provides an understanding of the context in which the COVID-19 pandemic restrictions were enacted in Kenya, Vietnam and the Philippines, and provides recommendations for the management of future global crises that could moderate the severity of impact of biosecurity measures on food systems and livelihoods.



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Acronyms and abbreviations

G20	Group of Twenty, forum for international economic cooperation
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KES	Kenyan shilling
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PHP	Philippine peso
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LGU	Local Government Unit, the Philippines
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VND	Vietnamese dong
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NEMA	National Environment Management Authority
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NMIS	National Meat Inspection Service
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RMIT	Royal Melbourne Institute of Technology
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1 Summary



1

Summary

This report is on the ‘Rapid assessment of the impact of COVID-19 on wet market reforms: case studies from Vietnam, Kenya, and the Philippines’ (LS/2020/204) project. The project used social science methods to understand the impact of biosecurity reforms and infection control policies at wet markets during the COVID-19 pandemic in:

- Kenya
- the Philippines
- Vietnam.

It evaluated 2 particular global policy trends:

1. efforts to promote veterinary public health bans and reforms to wet markets in Asia and Africa to prevent future pandemics
2. the negative consequences on food systems from Covid-19 lockdowns and other non-pharmaceutical interventions.

An expert team of social scientists from the Royal Melbourne Institute of Technology (RMIT) performed the comparative study between June and December 2021. They worked with expert partners from:

- the Planetary and Global Health Program at St. Luke’s Medical Center College in the Philippines
- the Institute for Anthropology, Gender and African Studies at the University of Nairobi, Kenya
- the Vietnam Academy of Social Sciences.

The team conducted 60 key informant interviews with stakeholders in government, academia, civil society and the private sector (20 per country). These data were triangulated with rapid ethnographic observations and interviews at 15 urban and rural food markets in Kenya (5), the Philippines (2) and Vietnam (8).

The research was also informed by rapid media analysis and policy document review for each country.

Key findings

Social narratives influencing stakeholder responses to wet market biosecurity reform

In 2020, COVID-19 led to global policy statements promoting bans of and reforms to wet markets in Asia and Africa in an attempt to prevent future pandemics. Contrary to the initial expectations of the project, we found no evidence that this rhetoric influenced policy or reform efforts apart from those related to infection control.

Rather, we found 3 main narratives that framed the problem of biosecurity, and the preferred solutions and changes, in the 3 case study countries.

First, a ‘human health’ narrative questioned global thoughts about pandemic risks. It framed markets as a source of food security rather than biosecurity risk. It also emphasised the need to strengthen veterinary public health policy for endemic diseases.

The only COVID-19 pandemic policies that influenced wet markets were those related to infection control. Health risks at markets were mostly about 'freshness' rather than strict biomedical categories.

Second, a 'modernisation' narrative saw biosecurity as part of a broader socioeconomic development process. This brought out:

- infrastructural gaps
- spatial arrangements
- the conflict between reform and business interests/constraints.

Market cleanliness and organisation related to biosecurity.

The third narrative centred on local livelihoods and:

- the conflict between market vendors and sellers
- efforts to reform biosecurity and modernise market infrastructure.

This narrative called into question certain regulations and policies, including bans and closures. It also highlighted the importance of cultural heritage and the ways in which local stakeholders organise for collective political action.

Our research found that wet market biosecurity strategies occur within these 3 contrasting narratives. The narratives emphasise different aspects of health and risk, reflecting the different worldviews and interests of the social groups who depend on, regulate and supervise market activities.

Policy reform efforts should take these different narratives into account to avoid negative impacts on local livelihoods, culture and food security.

Effect of lockdowns on wet markets and food systems

Major concerns were raised from the start of the pandemic about infection control policies, such as lockdown and other non-pharmaceutical intervention. Concerns said these would severely disrupt food systems and socioeconomic wellbeing, especially among more vulnerable communities.

This project found that COVID-19 lockdowns and other non-pharmaceutical restrictions caused a ripple effect across the food supply chain in all 3 countries. There was a combination of reduced supplies and demand. This was more severe in Vietnam (due to stricter lockdown). In the Philippines and Kenya markets were deemed an 'essential service' early in the pandemic.

The study also found:

- transport restrictions were a major policy challenge as they prevented goods from moving to market
- while some market stakeholders had concerns about COVID-19, the economic consequences of restrictions were viewed as a far greater threat to them than the virus itself
- infection control policies were believed to have had very negative effects on market vendors and sellers as well as transporters, traders, butchers, day labourers, and farmers, including:
 - reduced production and labour needs
 - food spoilage
 - lost income
 - debt
 - psychosocial stress
 - lost customer networks.

It is believed that socioeconomic status changed consumer behaviour during the pandemic. Many lower-income populations reported lowering their intake of animal protein. Middle and higher-income groups relied more on supermarkets and online vendors. Some market stakeholders also reported breaking rules to avoid negative impacts. Others gained financially by adapting to take advantage of the crisis.

Our qualitative study found that lockdowns and other pandemic restrictions negatively impacted food markets and systems in Kenya, the Philippines and Vietnam. Adverse impacts were felt across supply chains, prices, consumer behaviour, local livelihoods and psychosocial wellbeing.

Future health crisis management should:

- better consider the adverse impacts of lockdown policies on food systems
- re-examine the epidemiological justification for market closures and other disruptions
- incorporate a broader range of expertise in pandemic planning
- monitor longer-term changes caused by the pandemic especially the informal food economy.

2 Introduction



2

Introduction

The COVID-19 pandemic is the biggest shock to global and local food systems since the financial crisis of 2008 (Clapp and Moseley 2020). The responses to the pandemic during 2020 to 2022 revealed deep vulnerabilities in local, national and regional food systems (Robins et al. 2020). Identifying and examining the nature of these vulnerabilities will show how to mitigate future disruptions to food systems.

In the livestock sector, lockdowns and movement restrictions greatly impacted animal trade, abattoirs, and consumer markets. These restrictions are also thought to have had a serious impact on smallholder farmers, particularly women, who rely on the sale of livestock products at informal markets for their livelihoods.

The pandemic also highlighted existing concerns about the potential role of wet markets in amplifying novel disease spillover. The term ‘wet market’ – linked to the melting ice used to preserve and wash floors from slaughter – is a heterogeneous category (Lin et al. 2021). Wet markets in Asia were singled out in 2020 as an alleged source of global pandemic risk with calls to close, ban, regulate, and reform them (Aguirre et al. 2020; Petrikova et al. 2020; Lynteris and Fearnley 2020).

Concerns about wet markets centred heavily on keeping, slaughtering and selling wild animals in so-called ‘wildlife wet markets’. However many wet markets do not sell wildlife or bushmeat. In fact, wildlife represent only a small fraction of the animals

sold at wet markets in Asia and Africa. This led to high-level political pressure for veterinary public health and biosecurity reforms – for example, by the Australian Minister of Agriculture at a G20 meeting in April 2020 (BBC 2020). In these narratives, pandemic risks are often linked to wider concerns about:

- biological and ecological conservation
- the (illegal) global wildlife trade
- animal welfare and animal rights (D’Cruze et al. 2020; Saravanamutta et al. 2020; Sape 2020).

Hence there are a diverse range of ‘wet markets’ that must be grouped by their scale, produce and type of animals, among other factors. In this sense, many ‘wet markets’ are thought as ‘traditional’ or ‘fresh-food’ markets (Roesel and Grace 2014; Zhong et al. 2019).

This study defines the term ‘wet markets’ broadly to mean any fresh-food market where live animals (poultry, ruminants, seafood and wildlife) are kept, slaughtered and sold to consumers alongside fruits, vegetables and/or grains.

Emerging diseases that could cause a pandemic are low-probability but high-impact events. However outbreaks of endemic food-borne and zoonotic diseases at wet markets happen more frequently (Grace et al. 2012; Grace, 2015; Roesel and Grace, 2014). For example, with *Salmonella*, *Campylobacter*, or *E. coli*.

Framing wet markets as sources of disease and threats to biological diversity may also create narrow and simplistic policies that ignore positive contributions to:

- local nutrition
- livelihoods
- sociocultural wellbeing (Eskew and Carlson, 2020; Zhong et al. 2020).

Outdated governance and management reforms to reduce zoonotic infection risks may result in unintended socioeconomic, health and wellbeing consequences for communities and the resilience of food systems.

This project explored how the COVID-19 pandemic impacted wet markets using 3 case study countries: Vietnam, Kenya and the Philippines. These countries were selected in consultation with ACIAR staff. Selection considered current ACIAR country partnerships. All 3 countries had various types of COVID-19 lockdowns and restrictions that impacted wet markets and the livestock sector in 2020 to 2021.

3 Objectives



3 Objectives

The goal of this rapid assessment project was to understand how the COVID-19 pandemic impacted wet markets in Vietnam, Kenya and the Philippines. It specifically looked at biosecurity reforms and infection control policies by:

- developing a framework to understand change at wet markets that included policy, legal, biosecurity, infrastructural, socio-cultural, and management dimensions
- mapping the policy and social networks that influence the functioning and reform of wet markets, including different narratives, interests, values, power dynamics, and contextual forces
- understanding how markets were impacted by, and responded to, COVID-19 restrictions and how the pandemic influenced the perception and framing of wet markets as foci for disease risk

By understanding these 3 things the final objective was to learn the impact of the COVID-19 pandemic on wet market reforms. This includes on system vulnerabilities and resilience. The emerging lessons and evidence could inform future ACIAR investments in the area of food safety and One Health.

4 Methodology



4 Methodology

The project was conducted from June to December 2021 and was divided into 3 phases:

1. Policy document and media analysis
2. Key informant interviews
3. Rapid ethnographic methods

Detailed documents guided the methodology in each phase to create a standard approach. The goal was for meaningful comparisons between Kenya, the Philippines and Vietnam.

Ethical clearance was obtained from:

- RMIT University (2021-24245-15509) in Australia
- St. Luke's Medical Center College of Medicine in the Philippines
- the Kenyatta National Hospital/ University of Nairobi Ethical Review Committee (KNH-ERC/A/322) in Kenya.

The research was deemed exempt in Vietnam.

4.1 Policy document and media analysis

Relevant national policy documents and mainstream online news stories related to wet markets were collected in each country using a search term rubric.

Policy documents were found by searching government websites and in discussion with key policymakers in each country. Policy documents found and reviewed numbered:

- 29 in the Philippines
- 9 in Vietnam
- 18 in Kenya.

A search for major, national online newspaper articles that discussed wet markets and zoonotic disease risk over the last 5 years resulted in:

- 38 media articles in the Philippines
- 126 relevant articles in Vietnam
- 5 media articles in Kenya.

The policy documents and media articles were catalogued and analysed thematically in Microsoft Excel. Key insights from these sources were synthesised into country reports, including relevant academic sources. Reports were used to inform next phases of the project.

4.2 Key informant interviews

A list of key stakeholders was created. Stakeholders were identified:

- through the media and document review
- by searching websites and asking for endorsements from colleagues in each country.

The aim was to interview a representative sample from the different stakeholder groups linked to wet markets including in the sectors of:

- food
- public health
- biodiversity
- economic
- local government.

Each country team generated a preliminary list of potential key informants. Using this information,

each team produced a stakeholder map identifying clusters of stakeholders. Stakeholder maps for each country can be found in the appendices.

From this phase of the project 7 main stakeholder groups were identified that influence wet market biosecurity efforts (Figure 4 1). This helped guide next phases of the research. Categories of stakeholders were found to be similar in each of the 3 countries, although the specific organisations were different.

Stakeholder maps were discussed by the project team and used to guide the final selection of 20 key informants in each country. This ensured a balanced representation between the different sectors shown in Table 4.1. Where certain

informants were not available, substitutes were found from the same stakeholder category. This is consistent with a purposive sampling approach. Market vendors and workers and local politicians were not included in the key informant interviews. They were part of the rapid ethnographic fieldwork afterwards.

Interviews lasted about one hour each. They were done either in-person or remotely, depending on the pandemic restrictions in place at the time and the participant’s comfort. Interviews were:

- audio-recorded and summarised in the Philippines
- documented through handwritten notes in Kenya and Vietnam

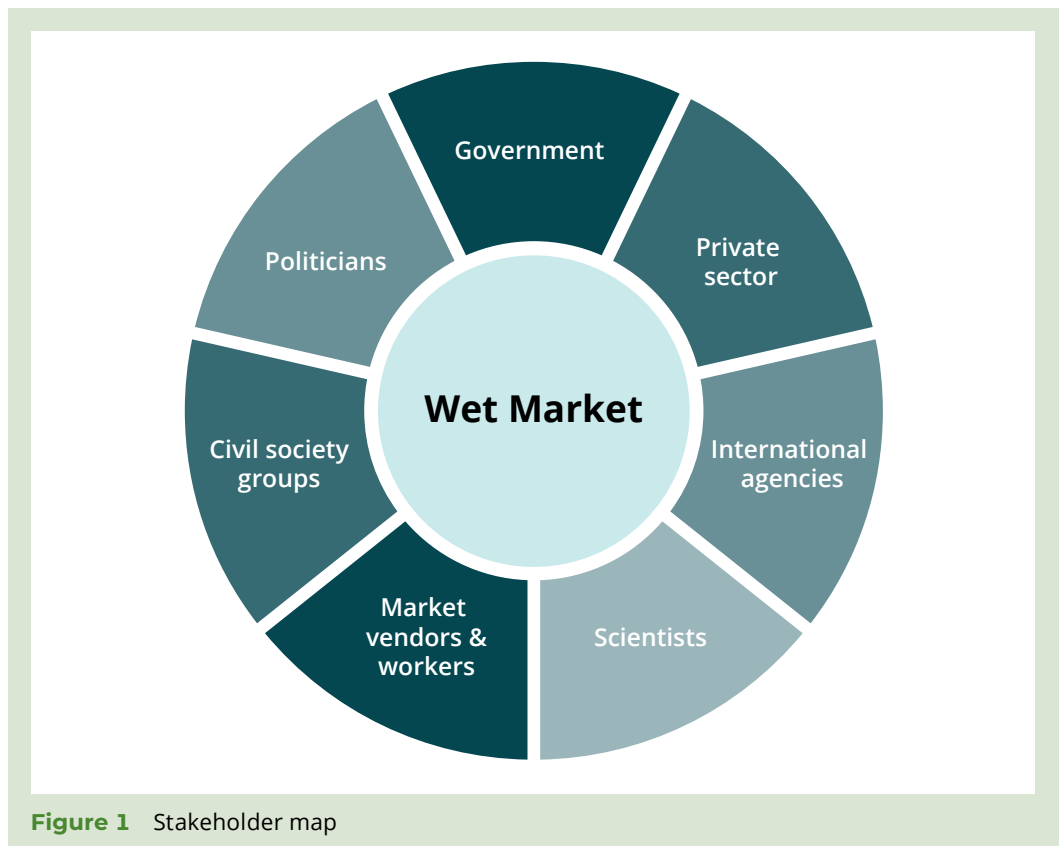


Figure 1 Stakeholder map

Table 4.1 Selected key informants by country

	Kenya	Philippines	Vietnam
Government	8	11	5
Scientist	6	2	3
International agency	5	4	3
Private sector	1	1	5
Civil society	0	2	4
Total	20	20	20

4.3 Rapid ethnography at wet markets

The final phase of the project was undertaken in October to December 2021. To understand the opinions and experiences of market workers, vendors, managers and customers, it involved:

- visiting a sample of markets in each country for one to 2 days per market
- using rapid ethnographic methods, for example observations, informal group interviews, informal interviews.

The ethnographic research included up to 3 social scientists visiting the market for a whole day. Observational notes and photographs were taken of the physical condition of the market:

- infrastructure
- trading and transportation
- hygiene
- inspections
- biosecurity practices.

At each market, key individuals with an important role related to the operation of the market and customers were selected for interviews and group discussions. Key individuals included market management board members, traders, transporters, slaughterhouse workers, veterinarians and cleaners.

Question templates were created prior to fieldwork to guide these conversations.

Data collection during this phase consisted of hand-written notes and photographs. Audio recording was not considered appropriate for informal interviews. Permission for the research was obtained from the correct government and/or private sector authority before fieldwork began at each market site.

Markets site selection first considered the diversity of wet markets in each country. Selection was done with a characteristics rubric adapted from Lin et al.'s (2021) classification of wet markets based on potential disease risk. This included whether the market sold:

- dead/live animals
- wild/domesticated animals
- perishable/non-perishable goods.

It also considered:

- type and age of the market
- geography (urban/rural, coastal/inland)
- ethno-linguistic and socioeconomic groups known to frequent the market
- the historical knowledge and local reputation of the markets, for example being the cleanest wet market or a central hub for wildlife trade.

Using this rubric, each country generated a list of 10 markets with diverse characteristics, with the initial goal of selecting 2 to 3 per country.

Table 4.2 Wet markets included in the study

	Kenya	Philippines	Vietnam
Urban	1. Nairobi Meat Market 2. Local Terminal Market 1, Nairobi	1. Arranque Market, Manila	1. Long Bien 2. Ha Vy 3. Hai Boi 4. Den Lu 5. Ha Dong 6. Dong Xuan 7. Nghia Tan 8. Bo Song (All in greater Hanoi)
Rural	3. Local Terminal Market 1, Busia 4. Fish Market, Busia 5. Rural Local Terminal Market 2, Busia	2. Rio Tuba Market, Palawan Island	

In total, the research team visited 15 markets, spending:

- 1 to 2 days each in 5 markets in Kenya and 2 markets in the Philippines
- 3 to 5 days each at 8 markets in Vietnam.

The names and locations of the visited markets are shown in Table 4.2.

Unless stated below, each market:

- sold live and dead animals and animal parts
- conducted some animal slaughter
- sold an assortment of fresh hot food, vegetables, fruits, grains and various consumer goods.

Site selection in Kenya

In Kenya, all markets were privately owned and run, although government veterinarians were attached to each for inspections and oversight.

Two markets were selected in Nairobi. One had a slaughterhouse for cattle, sheep and goats and was a main supplier of meat to

both high-end and low-end butcheries. The second market only sold already slaughtered animals and supplied two-thirds of the beef supply to wholesalers and retailers throughout Nairobi. It was also rumoured to sell bush meat on the black market.

Three rural markets were selected in Busia County, a cross-border area on the Kenyan-Ugandan border. This allowed the research team to explore the impact of the pandemic on cross-border trade, food systems and biosecurity reforms. The 2 main markets were selected in Busia. They were 30 km apart from each other and sold both live and slaughtered cattle, sheep and goats.

The research team also visited:

- the main fish market in Busia town, considered one of the largest fish markets in Kenya, to explore the dynamics of different animal value chains
- a rural pig slaughterhouse in Malaba town
- 3 small rural butcheries in Busia County, to get more information from retail vendors.

Site selection in Vietnam

COVID-19 lockdowns occurred in many parts of Vietnam during the second half of 2021. This restricted the research team to the Hanoi area. Nonetheless, 8 wet markets were selected and visited in greater Hanoi, representing a range of wholesale, retailer and temporary markets:

- Four large, modern wholesale markets with hundreds of stalls each (Long Bien, Ha Vy, Den Lu), and one poultry-only market (Hai Boi).
- Three of the largest traditional wet markets in the Hanoi area (Ha Dong, Dong Xuan and Nghia Tan), located in dense residential areas.
- One temporary market (Bo Song), which meets in different locations.

Site selection in the Philippines

The research team chose one urban and one rural wet market known to sell both wild and domesticated live animals:

- Arranque Wet Market is a busy urban market located in Binondo, Manila City (the capital of the Philippines). It is a notable source of Chinese medicine and exotic food products such as eels, black chickens and frogs.
- The Rio Tuba Public Market is in a barangay (village) in the south of Palawan Island, considered a remote part of the country. Palawan is recognised as a biodiversity hotspot and an epicentre for illegal wildlife trade. The Rio Tuba market is also known to be an important cross-border trading post with other Southeast Asian countries, especially Malaysia.

4.4 Data analysis

Each country team conducted a thematic analysis on the key informant interviews and rapid ethnographic data. This analysis was collated into a country report. Before drafting this report, biweekly online group meetings allowed the teams to present preliminary data and high-level findings. Project members agreed on a generic thematic structure for the country reports to support the comparative analysis of the case studies.

From the data, 10 main themes were identified to guide the final analysis of fieldwork data:

- disease risk perceptions
- political responses
- animal biosecurity conditions
- biosecurity reform efforts
- the consequences of biosecurity reforms
- the role of wet markets in food systems
- the impact of the pandemic on food systems
- the impact of the pandemic on wet markets
- the influence of the pandemic on consumer behaviour
- drivers of policy change.

Country reports had a detailed analysis from each of these themes, including photographs and observational descriptions. The country reports were collated and analysed comparatively. There were multiple requests for each country team to review draft analyses, clarify, and give more data.

4.5 Study limitations

There are several limitations to the exploratory study. The amount of time researchers could spend at the wet markets was short. For example, there was only one visit to Kenya and the Philippines with 1 to 2 days spent at in each site. This limited the depth of some data collection, particularly for sensitive topics such as:

- illegal wildlife trading
- non-compliance with biosecurity practices.

It also limited the ability to validate preliminary findings.

Markets are busy places. Many informal interviews and discussions were conducted during market hours as vendors and managers went about their work. To limit interruptions, research teams explored one different theme with each participant. Taking notes verbatim without a recorder was also a challenge for some of the field researchers.

Many of the key informant interviews were conducted online rather than in-person. This limited national stakeholders, especially government officials, in being candid. Researchers could not develop enough rapport during the interview.

Pandemic restrictions also made it hard to set up interviews and get to markets to conduct the rapid ethnography. These sorts of delays affected data collection in Vietnam and the Philippines.

Questions remain about the degree of theoretical saturation. The project covered many different topics across 3 different countries and many different types of markets. The media and policy analysis, which was done before the fieldwork, gave early insights to guide later data collection and analysis. The key informant interview and rapid ethnography guides were standardised so they could be compared.

Both methods used the same types of questions.

The general conclusion was that the theoretical saturation was achieved with the core themes. However more time and research would have made analyses deeper regarding:

- how the pandemic affected different types of market stakeholders (women, farmers, people experiencing poverty, supermarkets, smallholder farmers, slaughterhouse workers)
- the ways in which market stakeholders sell and use different animal parts and how these are traded in the value chain
- how markets are governed and managed differently depending on whether they are rural or urban and formal or informal, and the opinions and experiences of customers (which was limited in the fieldwork)
- the general perception of government pandemic policies.

There were also specific policy points related to details of previous biosecurity policies and the nature of the wildlife trade. These were raised by only one informant and we did not have enough time to clarify. More time for member-checking of key findings would have been useful.

Despite these limitations, the research team felt that this exploratory study captured sufficient, robust data which supported:

- the themes and sub-themes identified
- the overall objectives.

5 Results and discussion



5 Results and discussion

5.1 Wet markets and biosecurity reform: Three social narratives influence stakeholder responses to policy

Our analysis identified 3 main narratives about wet markets that shaped how different stakeholders

perceived and engaged with biosecurity reforms. These narratives were health, modernisation and local livelihoods, as shown in Figure 5-1.

Different stakeholder groups thought about these 3 narratives differently. Each had a dominant set of interests that shaped how they perceived and approached their activities at wet markets, shown in Table 5.1.

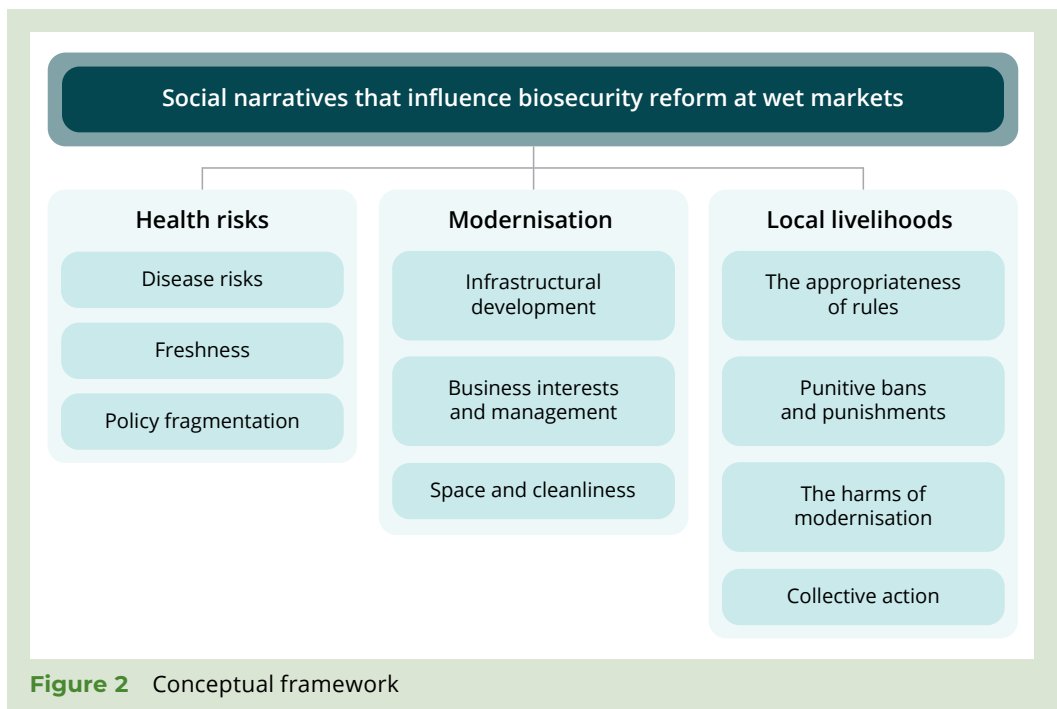


Figure 2 Conceptual framework

Table 5.1 Wet market stakeholders and their dominant interests

Stakeholder	Dominant interest
Government	Policy, regulations and coordination
Market managers	Business and administration
International agencies	Project priorities
Scientists	Disease surveillance
Market vendors and workers	Livelihoods
Civil society	Advocacy
Politicians	Political strategy

Health risk, biosecurity and food safety

Key informants questioned global narratives around pandemic risks. They talked about the need to strengthen understanding and policy related to endemic disease risks. The research team found that food safety at wet markets was mainly understood in reference to 'freshness' rather than strict biomedical categories about disease risk.

Wet markets, COVID-19 and pandemic spillover

Global rhetoric to ban wet markets and restrict wildlife sales emerged during the early months of the pandemic. No evidence was found that this influenced specific market reform in the 3 case study countries in 2020 and 2021. Rather, rising infections and the challenges of lockdown and other non-pharmaceutical interventions outshone policy attention on wet markets. This meant the only COVID-19 pandemic policies that influenced wet markets were about infection control.

Wet markets were not generally seen as important sources of emerging disease risk. Rather, markets were overwhelmingly viewed as essential means of providing food security and livelihoods – of **improving** health – rather than 'risky' or unhealthy places.

There seemed to be no change in viewing wet markets as a possible source of human health risk. This was despite the alleged market origin of COVID-19 that dominated the international media in 2020 and 2021.

Concerns were raised that wet markets were shown as 'petri dishes' for novel diseases by international media. Concerns were furthered by a general view that wild or exotic animals were rarely sold at formal markets. Live animals being sold were overwhelmingly domesticated livestock, fish and poultry.

The COVID-19 pandemic led to a range of biosecurity measures at wet markets that were aimed at containing SARS-CoV-2, rather than preventing novel pathogens from animals. These measures are shown in Table 5.2. They resulted in a few unexpected improvements in biosecurity more generally. For example, in Kenya water was made more readily available. It is believed this improved sanitation and allowed vendors to better wash their meat. Also, a mandate to open markets only during the day led to better supervision as government officials were present at that time.

In Vietnam, some markets had new washbasins and hand sanitiser at the market gates during peak times of COVID-19 transmission. After case numbers came down hand washing and hand sanitising became less of a concern.

Table 5.2 Summary of pandemic restrictions identified at wet markets

Type of pandemic restriction	Interventions
Behavioural	Mandatory face masks, face shields, and gloves; washing and disinfecting requirements; mandatory vaccination; no hand shaking; disinfecting sales areas; requiring customers to wash hands; no spitting; more frequent garbage collection.
Movement	Social distancing; curfews; transport restrictions; shopping voucher systems during lockdowns; greater spacing between market stalls; seat arrangements; limit visiting time; avoiding the area if sick; body temperature checks; testing requirements; designated entry and exit points.
Closure	Lockdowns; closures if COVID-19 cases are reported; closures if the market does not abide by the pandemic restriction rules.
Politicians	Political strategy

Overall, the main view was that once restrictions were removed, things would revert to 'normal'. Therefore there have been no major biosecurity changes in wet markets as a result of the COVID-19 pandemic.

The research team observed, and heard from informants about, an active trade in wildlife and wild meats in all 3 study countries. This is described in Table 5.3. However they found wildlife rarely ends up at the formal wet markets visited. This kind of sale more often occurs in 'black market' or 'shadow selling' scenarios.

Wild meat selling was believed to be concentrated in:

- the informal settlements in Kenya
- rural or hard-to-reach wet markets in the Philippines
- unofficial mobile bird markets in Vietnam where wild birds are often hidden in discreet places between domesticated species such as chickens, ducks, swans, or pigeons.

Policy debate about wildlife meat was not driven by concerns related to pandemic risk. Rather, it focused on ecological conservation and biological diversity. In Vietnam, there are 360 animals on the 'red book' of endangered species issued by the Vietnam Environment Administration. Laws banning their sale were strengthened in mid-2020. A report by the non-government organisation PanNature in 2021 found no change in wildlife markets due to the pandemic. It noted a lack of data on wildlife farms and breeding facilities for exotic animals, which have limited veterinary oversight and hygiene (Phan et al. 2021).

In the Philippines, the Wildlife Resources Conservation and Protection Act (Wildlife Act), prohibits the unlawful trade of wild animals and wildlife by-products. Enforcement of the Wildlife Act has been stronger in recent years, including at the Manila market site during the pandemic. Wild animal farming, however, falls outside the Wildlife Act and may serve as a cover for wildlife laundering (Mayuga 2021). Parrots, lovebirds, macaws, snakes, turtles, and crocodiles are among the wild animals allowed to be farmed by the Biodiversity Management Bureau.

Table 5.3 Wildlife traded and sold at the selected research markets

	Kenya	Vietnam	Philippines
Directly observed	None	Snakes, turtles, rats, birds, rabbits, cats	Birds (lovebirds, parakeets)
Mentioned by informants	Zebra, impala, buffalo	Snakes, turtles, rats, birds, rabbits, cats, pangolin	Live wild animals: exotic reptiles (pythons, turtles, monitor lizards, iguanas, geckos, chameleons) and exotic birds (mya birds, cockatoos) Wildlife products: wild boar meat, turtle meat, pangolin meat

Table 5.4 Past disease outbreak believed to have been associated with wet markets

Kenya	Philippines	Vietnam
Avian influenza, Rift Valley fever, tuberculosis, brucellosis, measles, salmonella, <i>E. coli</i> , cholera, typhoid, antimicrobial resistance.	Highly pathogenic avian influenza (H5N6, H5N1), foot-and-mouth disease, African swine fever, anthrax, canine parvovirus, <i>salmonella</i> , amoebiasis, cholera.	H5N1, African swine fever, MERS-CoV, measles, <i>salmonella</i> , <i>E. coli</i> , antimicrobial resistance.

A technical working group had formed before the pandemic to revisit the Wildlife Act. It aimed to increase penalties and law enforcement on the illegal wildlife trade. Such efforts in all 3 countries have built public awareness that the indiscriminate trading of wild animals and wildlife is prohibited. However wildlife farming was acknowledged to be growing, blurring the boundaries in current laws and oversight.

Government informants and scientists believed media and international organisations were over-prioritising novel pandemic risks at wet markets over the more systemic risks of endemic diseases. Of a much greater concern than novel viruses from wildlife were:

- food-borne diseases
- epizootics such as African swine fever and highly pathogenic avian influenza
- endemic zoonotic diseases from domestic livestock.

In the Philippines, both African swine fever and highly pathogenic avian influenza had swept through the country in the months before the COVID-19 pandemic. This caused:

- affected animals to be culled
- bans and regulations on interprovincial trade
- increased inspections
- farm disinfection and quarantine.

In Kenya, one slaughterhouse in Busia County was temporarily closed in 2014 and again in 2017 because of an outbreak of anthrax and foot-and-mouth disease.

Table 5.4 includes disease outbreaks reported by key informants in interviews during the research project. Findings include that market staff and vendors generally had a lack of awareness about previous disease outbreaks and could not name specific diseases.

Meat safety – freshness, disease and veterinary inspections

Human health risks from wet markets were generally viewed through the lens of meat safety, especially the concept of ‘freshness’. In urban markets, meat came from official slaughterhouses with quality certification and a timestamp, indicating freshness. In rural markets, freshness was related to on-site slaughter and the fact that animals were often reared locally by the vendors themselves.

The visual colour and texture of meat are seen as indicators of freshness. Meat is frequently touched by both customers and sellers to explain and assess the freshness. In some markets, incandescent bulbs have been replaced with LEDs because the yellow hues give the illusion that fish and meat are fresher in colour. Freshness was also often explained with reference to the fact that customers never got sick.

Frozen foods were generally viewed as ‘unfresh’, or of lesser quality and safety. Major themes for local market sellers when explaining meat safety included:

- how close the source of the animal was
- trust between stakeholders in the value chain
- visual freshness.

‘Due to our culture, we have concentrated on fresh produce and we don’t like packaged and processed food. We are averse to labelled standardised foods, many consumers thus believe in these informal markets – they want meat from butcheries and to be able to point and say “give me that cut of meat!”.’

**Male key informant,
Veterinary Office, Kenya.**

‘There’s trust for both suki – for the buyer and the seller. [...]

There’s that trust that what you are buying is not double-dead, hot meat, rancid, spoiled, putrid.’

Male key informant, labour group representative, the Philippines

‘I want to buy food in wet markets because the price is cheaper than in supermarkets. Buying food in wet market, I can choose “The fish is swimming, the chicken is crowing” to make sure it fresh. The sellers also help me to scale fish and pluck chicken feathers. Furthermore, the frozen food is not tasty.’

Female customer, Vietnam.

Researchers observed many different conditions that would be unhygienic or risky under biomedical standards, such as:

- vendors touching and prodding meat with bare hands
- adjusting masks or handling money after touching meat without washing their hands
- cooked meat stalls beside raw meat
- raw meat stored directly on the ground without containers
- raw blood taken from drainage to cook into sausages
- use of stored (stagnant) water for washing
- animal caretakers and slaughterers without personal protective gear.

Meats were being displayed in open areas of the market where sunshine increases bacteria and the likelihood of food contamination. Vendors did not think diseases could transfer by touching and interacting with the meat products on display at their stall. They thought washing the meat could remove possible risk of transmission to customers.

Veterinary market inspections were influenced by regulations, protocols and veterinary capacity. Each country has regulations for pre-slaughter and post-slaughter inspections that include:

- animal clinical examination
- meat inspection
- worker biosecurity protections
- waste management
- disinfection.

Meat cannot leave a slaughterhouse before inspection and the meat inspector can condemn risky meat. It would be thrown out in the condemnation pit.

'So, let's say [...], before the pigs or the animals [...] enter the slaughterhouse, they are supposed to be inspected from the point of origin. The farm. And then, next inspection [...] would be before the live animals disembark going into the holding pens. So, once they reach the holding pen and once they are slaughtered, it is presumed that the animal is apparently healthy.'

**Female key informant,
Veterinary Office, Philippines.**

'Once there is good sanitation, meat is free from diseases. There is good inspection and once the carcass is said to have diseases we are not allowed to touch. It is condemned'.

**Informal group discussion,
market workers, Kenya.**

Food hygiene has socioeconomic dimensions. Informal markets, which include street vendors and rural weekly markets, generally lack infrastructure, oversight, and biosecurity practices. Formal markets have much more stringent laws and incentives. This is especially the case when linked to food processing companies, supermarkets, and export markets.

However it can be hard to find the divide between the formal and informal sectors. For example, in Hanoi, Vietnam, statistics from the Hanoi Department of Agriculture and Rural Development authorities showed 749 registered slaughterhouses in 2021 (456 for poultry, 220 for pigs and 61 for cow/buffalo). Many were:

- organised on the pavement
- seasonal (especially for poultry)
- operating during the night (from 11pm to 6am)
- technically illegal since poultry were banned from the inner city of Hanoi.

Even in larger formal markets, some traders actively slaughtered on-site, making food safety work challenging for veterinary inspectors. Market stakeholders were well aware of the gap between formal regulations and local conditions in all 3 countries – see **Text Box 1**.

Health risks were also believed to be driven by dishonest business practices of certain traders and sellers in the absence of meat

Text Box 1: Reluctance for photographs in markets, Kenya

There was a lot of hesitancy in our taking photographs in Kenyan wet markets, especially in the slaughterhouses. Perhaps this was because the meat inspectors and market managers already being aware of the poor conditions of the markets and the negative publicity in the media. These leaders noted they were doing their best given the limited funds and weak infrastructure and they were afraid of the pictures being used in the media which would hurt their business.

inspection. In the Philippines, there were times where protocol violators tampered with documents to allow:

- live animals to be transported unchecked between provinces
- frozen meat, which was banned in wet markets, to be sold.

In Kenya, this included:

- selling chickens that died unexpectedly or from diseases
- using cat meat in *samosa* (a kind of stuffed pastry)
- the unlawful sale of wildlife meat, mostly in informal settlements.

Some markets were known as 'dumping grounds' for poor quality meat. These were often markets whose customers were from low-income urban and lower socioeconomic groups.

'There have been cases of game meat sold in Nairobi and this often happens in the informal settlements where this meat is sold from the back of vehicles and is uninspected. Some unscrupulous businessmen have also been going around chicken farms and buying dead chickens which they slaughter and sell to poor consumers for KES100 when chicken costs KES500.'

Male key informant, veterinarian, Kenya.

'Because in the cities, in bigger areas, there is an NMIS [National Meat Inspection Service] inspector. The inspectors are trained, if not they're veterinarians who actually say this is good for human consumption. But they don't reach the hinterlands [...] in Northern Palawan, they sell wild pig along the road. Like whatever they killed for instance that evening, they will sell it. So, there's no control there.'

Female key informant, researcher, the Philippines.

'Near industrial parks, there are often temporary markets on the roadway. Workers like to buy goods on the roadside quick and cheap but are less concerned about food quality and safety. Many sellers pluck chicken and duck feathers right on the roadside, then pour wastewater and waste on the roadway, clogging drains with unbearable stench.'

Health official, Hanoi, Vietnam.

One Health and policy fragmentation

Government officials' and scientists' views on biosecurity reform centred heavily on the need to address fragmented and uncoordinated policy and regulation. They highlighted this as a major barrier to wet market biosecurity improvements. Coordination challenges between different tiers of government in newly decentralised systems were repeatedly highlighted. In Kenya, the food safety control system has 22 pieces of legislation (Kang'ethe et al. 2020). It is implemented by 12 different government bodies and entities (for slaughterhouses, milk, meat, pesticides and others).

This causes confusion for operators from:

- overlap across the regulatory agencies
- duplicated effort
- conflicting information provided to traders and consumers.

'In the livestock industry there are more than 20 policies and now we are consolidating them into 4 policies. The first is the livestock bill, the animal health bill, the veterinary public health bill then the animal welfare and protection bill and they are in the process of becoming bills of parliament.'

Male key informant, veterinary officer, Nairobi.

'In the whole country, there are 434 large slaughterhouses with veterinary control; 25,000 small slaughterhouses, of which only 30% have business licenses, 70% do not have licenses.'

Government veterinarian, Vietnam.

'Although, even if we have national laws, the problem is the implementation downstream. We have good policies. The basis of our policies are good but when they're already downstream, the difference in implementation, perception, as well as understanding of the policies... And somehow, as an LGU, because of their autonomy, [...] they can follow or not that national laws.'

Male key informant, Department of Health official, the Philippines.

Scientists in all countries called for:

- improvements in 'science-based' policies and regulation
- the need for better implementation of a One Health approach.

They also stressed large funding shortages and how hard it is to turn research into better policy.

One Health national units have been set up, such as the Philippine Committee on Zoonosis and the Kenyan Zoonotic Disease Unit. There are also national policy frameworks such as Vietnam's One Health Partnership for Zoonoses. However key informants called for more 'authentic collaboration'. They said collaborations come with 'turfing'. They also noted the lack of funding for collaborative work also prevents One Health from being applied and that health research and policy keep neglecting wildlife and environment approaches. They also noted the need for greater local ownership of the policy process.

'So, the committee on zoonosis that we attend to, together with the Department of Health, is a big step for recognising [...] whatever threat that is zoonotic in nature. Unfortunately, of course, [...] with the multitude of diseases, we are not always given enough funds to do either surveillance, testing or something.'

Male key informant, Department of Agriculture official, the Philippines.

'The agenda in wet markets is mainly guided by external forces such as the WHO but we need to find a voice for ourselves. A lot of research has been done by international groups but because these diseases are endemic with us, we need to make these diseases a priority. Food safety is not even addressed in our curriculum... We don't know what our food safety problems are and food safety issues need to be prioritised and we should identify which value chains are at risk. We lack the capacity, lab, surveillance, policies, legislation and traceability systems.'

Male key informant, researcher, Kenya.

'Currently, in Vietnam, food is managed according to the Law on Food Safety, Article 61 stipulates 'Responsibility for state management of food safety', in which, the Ministry of Health has the main responsibility, other Ministries, organisations and local authorities must cooperate with the Ministry of Health. However some regulations are still unclear, lack of specificity on the assignment of responsibilities among ministries, organisations and local authorities.'

Female key informant, Health official, Vietnam.

Economic interests and the drive towards modernisation

Efforts to enhance biosecurity were found to sit within a much wider, complex discussion about infrastructural reform and economic development. Wet markets were viewed as physical sites that represented the socioeconomic conditions of an area. Efforts to reform biosecurity were framed as part of a broader process of modernisation. This was not discussed in the language of health. It was more to do with infrastructural improvement, cleanliness, and the negotiation between formal and informal sectors.

Infrastructural improvements

Gaps in biosecurity were most often explained through the lack of physical infrastructure at wet markets – see photographs at Figure 5.2. Market vendors, workers and managers highlighted many recent improvements in infrastructure. Key informants believed market infrastructure had generally improved over the last few decades. They referenced better water and sanitation facilities and hygienic conditions, such as the slaughter, transport and waste collection described in **Text Box 2**.

Text Box 2: Infrastructure improvements in the Philippines

In the past, the slaughter of livestock was conducted in unsanitary conditions. In slaughterhouses, livestock such as pigs would be tied up on the solid floor, pierced, and then drained of blood. Then the carcass would be cleaned by removing the hair and entrails – all done on the floor of the slaughterhouse. It would then be placed in a large sink to be hosed down prior to its delivery to the wet market. The transportation of the animal to the market was similarly unhygienic. The carcass was usually loaded onto the floors of tricycles by kargadors or labourers without protective gear. These labourers would also carry the carcass from the tricycle to the counter of the meat stall for butchering.

Slaughterhouses now make use of slaughtering hooks to ensure that meat is properly elevated throughout the process, and the meat is wrapped in plastic during transport to the market. The NMIS currently accredits slaughterhouses according to their compliance to national standards, although not all municipal slaughterhouses are accredited by the regulating body. Markets have also been renovated in recent years, including the upgrade of the earthen floors to cement or tile. Some markets have been elevated to protect against flooding, and drainage within the area has been improved. Chapter IV – ‘Markets and Abattoirs’ of the Code on Sanitation of the Philippines provides the prescribed structure, sanitary facilities, and sanitary requirements of markets. The proper disposal of waste at both poultry and hog farms has also been strictly imposed



Figure 3 Slaughter practice photos at wet markets in the Philippines (A and B), Vietnam (C and D) and Kenya (E and F)

Many infrastructure gaps still exist. At visited sites, unhygienic conditions were observed including:

- in slaughterhouses
- unfiltered wastewater discharged into sewers and rivers
- crowded conditions of animal cages
- lack of available water and garbage disposal
- inadequate disinfection and cleaning.

In Vietnam, there was often no area to safely dispose of animal parts. This was particularly the case in markets where there was on-site slaughter of poultry and animals with signs of disease.

In Nairobi meat markets, workers were seen cleaning the floors every 20 minutes, wearing preventive gear and with functional handwashing stations. There were also clogged drains, meat on the floor and animal waste thrown away on the open ground.

In rural markets in Busia, Kenya, uncovered waste disposal pits were found. One of the pits had collapsed and no one had built a replacement. Some of the waste was stored in a shed.

In an urban market in Manila, the Philippines, only 3 water faucets were available for use at the meat section. Before, each stall had its own faucet, but most had been removed by market management to reduce water expenses. In places where no faucet was observed at the market, vendors had to bring their own water pails for their activities.

Business interests and management

Economic pressures were a major reason given in all 3 study countries for why infrastructure and biosecurity measures in wet markets have been poorly enforced. This was especially the case in Kenya. For private sector actors and workers at the Kenyan slaughterhouses, biosecurity was seen to impinge on their time and reduce their profits.

Wet markets are also a major source of revenue for the local and national governments. Laws demand that owners of slaughterhouses and markets meet biosecurity standards to some extent. Because it costs a lot to establish and run a market, there is less incentive to impose consequences for not complying with biosecurity policies. Market managers said acting on and complying with government policies was expensive and time consuming.

'There is very little goodwill to address these issues because people perceive it will take away profits but people need to know once we have biosecurity in place it governs everything in the chain. People need a better understanding on why these issues are important. In our setting there is emphasis on the economic importance of wet markets but biosecurity should be at the forefront too, biosecurity should be number one and everything else follows.'

Male, key informant, biomedical researcher, Kenya.

'We are struggling with waste management but we will get there soon, managing waste is our biggest challenge as it is very expensive. Getting the license to allow us to direct our liquid waste to the sewer line from NEMA [the National Environment Management Authority] costs KES100,000 per year and the officers must come to confirm the viability of the place.'

Male market manager, Nairobi, Kenya.

'Street vendors and sellers at temporary markets do not have to pay taxes and official fees, their goods are not of quality and clear origin, so they sell cheaply. The local authorities do not want to close these temporary markets because it is a source of pocket income for them.'

Female seller at Nghia Tan market, Hanoi, Vietnam.

One of the most expensive and challenging aspects of improving wet market biosecurity was infrastructure reform. Market management boards were concerned about such costs, along with:

- the business practices of managing contracts and relationships with traders
- market regulations
- infrastructure maintenance and installation
- interactions with different government ministries.

Food safety was viewed as part of infrastructure and procedural management needs, largely within environmental sanitation and alongside fire prevention and security.

The enforcement of rules and regulations was also influenced by:

- the management style of a market
- the threat of consequences if biosecurity measures and infrastructure did not pass specific standards.

However there was a sense that government support was infrequent and lacking.

'Liquid waste disposal is a big challenge but we are trying to ensure that we reach the standards that are set. A government minister once closed all the slaughterhouses here for almost a year because of poor liquid waste management. Pre-treatment is very expensive and meeting the standards that were put in place is very hard. The construction of a pre-treatment firm requires a large space and modern technology. The government has not helped us.'

Male slaughterhouse manager, Nairobi, Kenya.

'In 1993, there was a devolution, so most of our functions were devolved to LGUs. [...] Since at that time, the LGUs were overwhelmed, until now the support towards the agriculture side is very weak...well, not all. [But] a lot of provinces still do not have a provincial veterinarian.'

Male key informant, official, Department of Agriculture, the Philippines

'Ha Vy is the largest wholesale poultry market in the North, built in 1993, nearly 30 years now. The market facilities have deteriorated. The water supply and sewage systems have deteriorated. The stores are too narrow. We have proposed to invest in upgrading, renovating, and expanding the market, but so far there have been no plans.'

Key informant, market manager, Vietnam.

These challenges also applied to markets run by the public sector where reforms were funded by centralised government spending, but funding was difficult to get.

Infrastructure reform was different for the informal sector. Its legal status varied by country. In Vietnam, informal markets were usually temporary, small markets and corner markets managed by communal authorities. They sometimes did not have operating licenses, although vendors were allowed to trade in these markets and paid market fees daily. Like Vietnam, satellite markets or talipapas and ambulant vendors in the Philippines operated on a temporary basis, without official licenses. However as they only traded within the vicinity of the market and did not occupy market stalls, they did not pay any market fees. Private stakeholders ran informal markets in Kenya, but biosecurity measures were overseen by the government.

Space and cleanliness

The modernisation narrative emphasised a different set of primary concerns about risk. These related to security and economy – in contrast to biological and health terms. Market hygiene was thought as cleanliness and space, shown in Figure 5.3. Both concepts linked to the geographical location of a market. Remote, rural markets were on the outside of politics. They were much less of a target for modernisation policies such as infrastructural reforms and biosecurity improvements than those in urban centres.

The last few decades have seen many improvements to the cleanliness and security of markets. This was often discussed in reference to infrastructure improvements such as:

- improved spacing between stalls
- cemented floors
- pulley systems for slaughterhouses
- slaughterhouse refrigeration
- better security to prevent theft.

Improvements in the look of a market was believed to encourage a culture of cleanliness with regular routines for sweeping and garbage disposal. In urban markets there were also schedules for disinfection, such as spraying chemicals, soaping and scrubbing.

Changes in management was viewed as a straightforward way to transform a market. Another way was to take a market away from traditional urban locations, which were often more crowded. When asked what improvements they would prioritise, most local market stakeholders said building and spatial reorganisations were the main priority.

In the urban market site in Manila, the Philippines, these improvements were initiated after the market was privatised. Key informants believed inspection and adherence to food safety rules had improved with:

- building renovations
- new management
- security guards
- closed-circuit cameras
- higher rental fees.

In Vietnam, new markets were planned with hygiene rules that spaced stalls further apart and reorganised the market to meet regulations that separated the areas for:

- the aquatic zone
- poultry slaughtering
- fresh meat
- vegetables, tubers and fruit.

In Busia, Kenya, main priorities for the market vendors were to improve sanitation and to construct more stalls to cater for an increased population. They viewed the main biosecurity improvements as:

- building markets away from residential areas
- fencing markets to keep out dogs
- ensuring all the workers wore full protective clothing.

Local livelihoods, restrictions and politics

A third and final narrative centres on how local livelihoods and socioeconomic practices conflict with the goals of biosecurity and modernisation. This calls into question biosecurity measures, including punitive bans and policies. It describes ways to get local politicians to support market stakeholders against veterinary public health advice that stallholders felt threatened their livelihoods. This narrative also emphasises the cultural heritage value of wet markets.



Figure 4 Photos of wet markets vendors and animal storage: Kenya (A and B), the Philippines (C and D) and Vietnam (E and F)

The appropriateness of biosecurity measures

Certain biosecurity laws and measures were considered inappropriate given local socioeconomic conditions. A list of some of the policies mentioned by key informants is in Table 5.5.

Many policy frameworks were revised after the avian influenza outbreaks in the mid-2000s in all 3 countries. Countries tended to adopt idealised global standards and norms. Market workers viewed many of these changes as burdens and annoying. Veterinary inspectors acknowledged that some policies could not be actioned due to gaps in infrastructure.

According to government informants, the main problems were:

- lack of funding
- fragmented coordination between local departments, agencies and organisations.

For example, on-site slaughter is officially banned in both Kenya and Vietnam. Despite this, it is widely practiced in all countries creating a legal grey zone. Slaughtering practices often prioritise speed over wearing protective equipment. This is partially because such equipment is not available. Also, slaughtering and processing meat is done in the heat.

In the Philippines, many people were observed working without shirts and wearing jewellery such as metal bracelets and rings. Some vendors moved freely between handling money and fresh meat with bare hands. This is despite policies that require:

- the use of personal protective equipment like gloves in wet markets
- workers to observe good personal hygiene.

In Nairobi, workers did not like to wear gloves.

'We don't like using gloves as they are not good to handle meat, they are slippery and cause one to work at a slow pace.'

Male slaughterhouse workers Local Terminal market 1, Busia.

The influence of freshness on people's views of food safety with the expectation for natural social exchanges also make it difficult to enforce constant hand washing

Workers also regularly evade rules and regulations they feel are inappropriate or harmful to their livelihoods as part of their business practices. The quotes below show food safety regulations being broken on the temperature control of meats, unofficial use of animal parts and unsafe discharging of wastewater.

Table 5.5 Some policies believed to be inappropriate/harmful by key informants

Kenya	Vietnam	Philippines
Commercial chicken farming must have at least 5 acres of land	Veterinary laws ban the sale of live animals at wet markets and require all livestock to be killed at slaughterhouses	The Local Government Code devolved the regulatory functions of national agencies to the LGU
All livestock (including chickens) should be killed in a slaughterhouse		Lower tariffs on imported pork products

'Frozen meat, ideally, is prohibited from the wet market. If the [...] vendor is insistent on selling frozen meat, one of the requirements is to have a freezer. [...] because there are times that when you buy frozen meat, it's boxed but frozen. Then you will just see the box is just under the table, not in the freezer. Because when that thaws out, you would recognise that the consistency of the meat is different. You wouldn't know that when it was slaughtered, it had bacteria and when it was frozen, the bacteria were also frozen [...] It's still one of our problems. Controlling it.'

Female key informant, veterinarian, Provincial Veterinary Office, the Philippines.

'Blood that comes directly from the veins of animals is used for making mutura, the rest of the blood is directed to blood tanks. We do not recommend people to take blood out of the slaughterhouse. It can be contaminated and cause some diseases. People who take blood do so without the meat inspector's consent.'

Male key informant, meat inspector, Nairobi, Kenya.

'After the chickens and ducks are slaughtered, I will sell offal to the catfish farmers in the village. Every day, my slaughterhouse has about 20–30 kg of offal. Chicken and duck feathers are sold to collectors for processing. Wastewater and the rest are poured down the drain, from this drain will lead directly to the irrigation ditch in the field.'

Market vendor, Vietnam.

Slaughtered animal parts which could be waste products, such as bile, hooves, omasum tripe, horns, tails, bones, discarded meat and blood, are sometimes sought for food and other uses. In the Philippines, pig's blood is often used for a Filipino dish called dinuguan (pork blood stew).

In Kenya, several products such as bile, omasum and gall bladder stones are exported by the Chinese for sale as medicinal or aphrodisiac products. In a slaughterhouse in Kenya, bile being drained into a container and discarded blood being collected for later use were both observed.

'There were some waste materials which were initially not being utilised but now they are sold, e.g. eyeballs, penises and small pieces of meat that fall on the ground, and there are traders who are buying them. There seems to be markets outside the country. We regard them as inedible, but we don't know what they are using them for. The ones collecting the small pieces of meat that fall on the ground say that they need them for dogs and pigs, but we are not sure, and they might end up being consumed by people.'

Female key informant, veterinary officer, Kenya.

Veterinary laws in Vietnam require all poultry to be killed at slaughterhouses and not at wet markets. However, vendors at temporary and roadside markets outside the reach of veterinary inspectors regularly carry out public slaughter. A poultry seller in Nghia Tan market, Vietnam, complained:

'Since it was forbidden to slaughter livestock and poultry at the market, the number of customers has decreased markedly. Meanwhile, the slaughter of poultry at temporary markets is common. Poultry vendors at the temporary or roadside markets do not have to pay taxes and fees for market management. The sanitary conditions when slaughtering are very simple and unsecured, but they still do it without any competent management.'

Female poultry seller, Vietnam.

So meat is freshly slaughtered, and to avoid the high costs of formal slaughterhouses, makeshift slaughterhouses are arranged near market premises. These are usually small shacks with simple feather pluckers and pots of water to wash the poultry after slaughter. In these informal slaughterhouses, poultry are slaughtered directly on the floor. By-products after slaughter are put in open containers and sold to fish farmers. Wastewater from the slaughtering process is not treated and discharged into temporary ditches to irrigate adjacent agricultural fields.

Punitive and harmful consequences of market rules

The differences between institutional policies and real-world conditions were believed to create uncertain policy actions, contributing to inconsistent bans and excessive punishments. These conditions were ultimately viewed as harmful, especially for smallholder farmers and the informal food sector.

In Kenya, these differences meant many vendors did not support government policies. This distrust and conflict was believed to have negative effects on food safety. Some civil society groups such as World Animal Protection do conduct some consumer education about food safety. However there was believed to be little or no education, facilitation or engagement with market stakeholders. Kenyan stakeholders believed these factors combined to reduce compliance and drive illegal activities in the livestock value chain.

'Unfortunately, some of the strategies that come out are "let's ban what the vendors are doing" without providing practical alternatives. The private actors claim that if there are no incentives, they are not willing to innovate and adopt. This is the mindset we need to change so that we don't focus only on the law but on incentives, e.g. the poultry farmers slaughter at night when there are no inspectors and then they transport the meat at 3am to the markets. So we will continue to play that hide and seek game.'

Male key informant, international organisation, Kenya.

'People know that is it prohibited to trade threatened species. [...] Heightened enforcement will only serve to bring it underground. True, it's already underground now anyway in major areas.'

Male key informant, policy specialist, international organisation, Philippines.

This also extends to the unlawful sale of wildlife on the 'black market' or 'shadow selling'. This was widely acknowledged in Kenya, where the sale of wildlife meat (zebra and impala in Nairobi) occurs mostly in informal settlements and is related to poverty.

In the Philippines, the wildlife trade at Rio Tuba is similarly conducted in 'the shadows'. Vendors hide wild boar meat among the beef at their stalls to disguise it from regulating authorities. Poachers receive orders from their *parokvano* (loyal customers) or from consortia through middlemen. A wildlife law enforcer with the Department of Environment and Natural Resources Philippine Operations Group on Ivory and Illegal Wildlife Trade also reported that poachers also use social media, including Facebook marketplace, to sell their products (Enano, 2019).

Wildlife rarely ends up at wet markets in the study countries. There is a general awareness among the population that the indiscriminate trading of wild animals and wildlife is prohibited.

'Although you don't see it in the wet markets of Palawan, it is happening. It is happening by text, by cellphone, by word of mouth within the province.'

Male key informant, Council for Sustainable Development official, the Philippines.

'Wet markets are not places to sell wildlife meat [but] people still purchase it because it is cheaper. This value chain was affected [by the lockdowns] but as long as the demand is there people will find a way to sell their wild meat. People will communicate and do it in the black market. Health risks are even increased when people go underground.'

Female key informant, researcher, international institution, Kenya.

Threats to market culture and competition

The building renovations that helped improve market cleanliness and biosecurity were viewed, by some market sellers and workers, as 'both a blessing and a curse'. They coincided with the new urban malls and supermarkets which compete with the traditional market economy. These were seen as a threat to markets as symbols of cultural heritage. This caused anxieties, fears and uncertainty about the future.

In many local contexts, markets have a unique role in social life where culture (recipes, health advice and religious practice) is preserved and performed. Markets are sites for jobs, the exchange of money and friendships. They are often at the historic centre of a town, city or village. These sentiments were used to explain the threat of modernisation – it draws customers

away from the markets and threatens the traditional social bonds that link vendors to their clients and supply chains.

There were fears about nepotism and monopolies through market relocations and renovations, especially in stall allocations for new markets. New technologies, such as automated systems and digital payments were also discussed. They could offer new ways to reduce contact between carcasses, customers and workers in biosecurity terms. However it was also mentioned technology could:

- exclude some market stakeholders
- create greater barriers to the informal sector earning a living within boundary areas outside surveillance and monitoring.

Local collective action and political forces

Market vendors engaged in various types of political negotiation at the local level to protect their interests. For example, a popular policy in Batangas City, the Philippines, banned the sale of stalls to individuals. The intention was to rent them out to other vendors, preventing middlemen from dominating stall rental opportunities.

In response to fears that their market could be closed by authorities, traders in Kenya organised themselves to address market cleanliness and hygiene. They noted this was done because the county governments did such a poor job of garbage collection.

Markets also have internal issues to address. For example, in Vietnam there were conflicts between market vendors and the informal vendors who sell their goods at the front gate of a market. The latter often attract many customers but do not pay fees and present a challenging situation for management boards.

In the context of decentralisation reforms in all 3 countries, local government plays a pivotal role in market management and regulating services and facilities. In the Philippines, local governments are the main regulatory body for wet markets. Market masters receive memos from city hall and explain local ordinances to the vendors. Decentralisation of agricultural policy to the local level also resulted in the LGU being 'overwhelmed' and overly influenced by local 'political considerations'. For example, not filling agricultural positions to provide 'savings'.

In Kenya, key informants also stressed that market reforms often did not consult experts and communities well enough.

'There is funding for the construction of new markets, but we were not consulted when they were designed so the design of the markets was not optimal. The departments do not know their roles and because they are many and we don't have a platform for sharing what we do it is hard to solve issues and work well together.'

Male key informant, public health official, Busia, Kenya.

'In terms of infrastructure, the new market that is under construction is small. The new market can only be good for retailers and not wholesalers because there is no parking place for vehicles.'

Informal interview with fish traders, fish market, Busia, Kenya.

Wet market reforms also intersected with local political interests. Politicians vying for positions of power and leadership at the national and local level visit the wet markets to woo the potential voters who congregate there. Politicians often control the budget allocations and use issues related to wet markets for political mileage. New mayors were mentioned as turning points in the cleanliness of a market.

Local politicians can also interfere with efforts to close an unhygienic market to gain support from the public. In Nairobi, for example, there had been plans to build a modern poultry slaughterhouse since 2015. This has not happened due to bureaucratic roadblocks, funds mismanagement and a lack of proper coordination across sectors. The constant changes and political interference of county officials in Nairobi also contributed to these delays. Every officer wants to start his or her own project for political gain.

'For example, in 2015 we lobbied for the construction of a modern hygienic slaughterhouse for chicken, land was allocated but we have never been showed the land. We don't know if the land was grabbed or if it is still available. We even had proposed a public-private partnership for the construction and management of the slaughterhouse but this has never moved forward due to administrative challenges.'

Male Key informant, public official, Nairobi County, Kenya.

Politicians also have an interest in maintaining the status quo to avoid destabilising market vendor interests. This often involves opposing market closures directed by veterinary disease policy and regulations. In some counties in Kenya, veterinarians have ordered the closure of slaughterhouses due to a disease outbreak. Then county elected officials reopen them to gain political advantage, addressing popular anger and concern about livelihood and food security.

‘Conflicts between stakeholders are always political, e.g. the county director of veterinary services is the one supposed to institute a ban or declare an outbreak and close a wet market but when he does it as per the law the political class who are his seniors try to overturn the decision or want to close the market themselves for clout so we are always balancing the politics and the profession. Going against the politicians can even lead to loss of employment and transfer from one station to another and in some cases redesignation or indictment. When markets are closed due to disease threats vendors will hold demonstrations and often the political class will listen to them so such tensions do exist’.

Male key informant, veterinary officer, Busia, Kenya.

5.2 Social narratives influence stakeholder responses

Findings show 3 competing social narratives shape biosecurity reforms at wet markets in Kenya, the Philippines and Vietnam:

- Health risks
- Modernisation
- Local livelihoods

The future of biosecurity investments and policy may be influenced by stakeholder groups’ different reasons for and experiences with these narratives.

This project was developed to respond to global policy rhetoric in early 2020 that called for:

- the banning and rapid reform of wet markets
- greater restrictions in the wildlife trade.

Many scientists, international agencies and governments framed this as an urgent priority to ‘prevent pandemics’ (Aguirre et al. 2020; Lynteris and Fearnley 2020; Sape 2020). However, the research team found no evidence that these calls had any impact in the 3 case study countries. This is not surprising since policy concerns focused on controlling rising COVID-19 cases. Many governments (for example, Vietnam and the Philippines) continued strict non-pharmaceutical interventions and focused on scaling-up large vaccination programs starting in mid-2021.

There was a bio-securitised framing of wet markets as ‘petri dishes’ of novel viruses in need of urgent sanitisation reform, even bans and closures. This conflicted with the everyday lived experience and cultural meaning associated with wet markets – a conflict found through:

- key informant interviews
- rapid ethnographic fieldwork.

This fits with the work of other scholars. Some argue universal calls to remove wet markets will change diverse socioeconomic systems used by billions of people around the world. It will distract from real solutions to multifaceted problems in the agricultural sector (Barnett and Fournie, 2021; Chuvileva et al. 2020).

The research team found that wet markets were not viewed as risky places that may cause a ‘global’ pandemic. They were viewed as sources of local health, food, livelihood and social connection. Health concerns with wet markets were talked about in terms of meat safety and food-borne disease. They related mostly to gaps in basic infrastructure that stopped sanitised slaughter and food hygiene. As found with other studies (Bukachi et al. 2021; Zhong et al. 2020), health risks were evaluated based on notions of freshness, such as:

- inspection timestamps
- on-site slaughter
- local production
- colour and texture
- past food consumption experience.

Rather than viewing markets as sites where novel pathogen come from, government officials and national scientists in the study countries were more concerned about:

- local endemic food-borne diseases
- trans-boundary animal diseases such as African swine fever and avian influenza.

This echoes findings from Scoones (2010), Hinchliffe et al. (2021), Bardosh (2016), Mwacalimba and Green (2015) and others. They argued that international agencies may over-emphasise pandemic concerns at the expense of other endemic health priorities. This hides the lived reality of small-scale producers and the informal sector.

National media also appear to over-emphasise the fear of global health crises while local health issues appear to get less media attention. Policies and capacity to improve local disease management priorities in the animal sector was believed to be blocked by fragmentation and lack of funds. Also causing problems was confusion about specific priorities and the role of different agencies. Similar findings have emerged from other policy analysis studies (Okello et al. 2015; McPake et al. 2022; Lee and Brumme, 2013). Key informants called for ‘more One Health’ to address this but it was not always clear what this meant in practical terms.

Those advocating for wet market bans and reforms to mitigate pandemic risk talk about specific risk practices that should be targeted related to:

- animal species
- hygiene conditions
- length of the value chain (Grange et al. 2021; Lin et al. 2021; Wegner et al. 2022).

The term ‘wet market’ was originally linked to the melting ice used to preserve and wash floors from slaughter. It is a diverse category (Lin et al. 2021). Diversity is found within and between different markets, areas of a single market and different stakeholders across the formal and informal value chain. Greater care must be taken when working out the exact nature of high-risk practices to avoid uniform and misleading risk assessments.

Debate continues on the need for, and feasibility and consequences of, wildlife trade bans for conservation and pandemic prevention (D’Cruze et al. 2020; Eskew and Carlson 2020; Thuy et al. 2022; Wegner et al. 2022). This research was exploratory. It had only a limited focus on the wildlife trade. However the resulting data show that:

- reform efforts to limit exotic animals at formal markets have taken place over the last few decades
- consumers are more aware of existing wildlife laws.

This suggests that the global rhetoric about the dangers of the wildlife trade and the need for blanket policies for pandemic risk may be overstated. From a novel pathogen standpoint, there is a need to better:

- define ‘high-risk activities’
- anticipate the unintended consequences of stricter biosecurity reforms
- consider what type of risk mitigation is possible given the inherent uncertainty in predicting disease dynamics for a low-probability ‘pandemic’ event.

Interestingly, the research team found that wildlife rarely ends up being openly sold at many wet markets. Some study locations were well-known nodes in the sale of live wildlife but very few wild were seen for sale. That said, unlawful sales are still reported to occur. Only a small number of markets were sampled. It was also clear that a transition is happening: from catching wildlife in the wild to intensive farming of exotic animals. Intensive exotic animal farming is an emerging industry, especially in Vietnam but also in the Philippines, with limited controls and law and veterinary oversight (Thuy et al. 2022).

Freshness was the main lens through which market stakeholders viewed and interpreted health. Cleanliness was the main lens used to understand infrastructural improvement. In this sense, cleanliness helped ensure freshness. Markets reflected a local process of historical and socioeconomic modernisation. The research team found that most markets had undergone recent improvements in slaughter, transport and waste collection. The framing of markets as sites of modernisation raised a different set of primary concerns about risk. These were about security and economy risks rather than biological and health risks.

Market hygiene was thought about as cleanliness and space – both linked to the geographical location and physical characteristics of a market (Bardosh et al. 2016). Costs and business forces were used to explain infrastructure gaps since large capital investments were required. Improving biosecurity was not separate to general infrastructure and management improvements. These were viewed as part of environmental sanitation and alongside responsibilities of fire prevention and security.

When asked what improvements they would prioritise, most local market stakeholders emphasised building and spatial reorganisations as the main priority. This finding fits within some organisations' recommendations for wildlife and livestock to be separated as part of a pandemic prevention strategy (Lin et al. 2021). However there is a history of past market reforms done in ways that were not always favourable to market stakeholders. This should provide some caution, otherwise rapidly-organised interventions could cause negative outcomes and not be sustainable.

Many past reforms involved moving markets out of crowded traditional areas and installing fences, security, new stalls and cement. All of these make traditional markets look and feel more like a supermarket. This study showed how modernisation – viewed as 'both a blessing and a curse' – was also associated with economic power and loss of cultural heritage and social bonds.

Market vendors and sellers were worried about an uncertain future as new shopping malls and supermarkets continue to expand. They compete with traditional market economies. Although open-air markets are predicted to continue to be a main source of food in the 3 countries and around the world (Hannah et al. 2022), this conflict will grow in the coming years (Figuie and Moustier, 2009).

Markets are sites of conflict between the interests of local market sellers and traders and the goals of biosecurity and economic modernisation. One important issue found involved laws and regulations banning animal slaughter at wet markets in Vietnam and Kenya. These were strengthened with biosecurity concerns about avian influenza that emerged in the mid-2000s (Nguyen et al. 2017; Connan et al. 2012). There are differences between such policy and what happens in the real-world, for example, the lack of infrastructure for slaughter and the basic nature of the market chain. This creates policy grey areas believed to contribute to local-level:

- punitive bans
- excessive punishments.

A large body of literature has explored the unintended consequences of biosecurity laws and enforcement on the livestock sector, questioning this type of heavy-handed approach (Miewald et al. 2015; Nguyen et al. 2017). Yet there is often a minimisation of the biosecurity risks associated with modernised and sanitised markets and an under-appreciation of how local practices in smaller-scale systems may reduce risk (Miewald et al. 2013; Stuart and Worosz, 2012; Nguyen et al. 2017). One result of this is that vendors concerned with securing their livelihoods have more distrust for veterinary and market authorities concerned with better biosecurity. There is some evidence this may not work as it reduces support for government policies and may drive unlawful activities in the livestock value chain.

Finally, these social conflicts at markets were found to promote forms of popular political action, whether:

- in efforts at self-organisation (for example, to clean markets and maintain payment fees)
- to solicit politicians to interfere in specific policies (for example, animal movement bans and closures).

With decentralisation reforms present in all 3 case study countries, local government plays an increasingly pivotal role in market management and regulation for services and facilities. In this regard, ensuring the health of local food systems, in which wet markets play a central role, is part of a broader struggle between policy ideologies in food systems, for example:

- local vs. the global
- the small-scale vs. the corporate
- fresh vs. packaged.

This is shown in struggles between grassroots activism, government regulations and the economic centralisation of power (Chuengsatiansup, 2008; Laforge et al. 2017).

5.3 The effect of COVID-19 pandemic lockdowns on wet markets and food systems in Kenya, Philippines and Vietnam

The second component of the project explored the COVID-19 pandemic policies in the 3 study countries and their impact on wet markets. This section presents the data on this topic in 4 sections. The first describes the various restrictions that were imposed on wet markets during the first 2 years of the pandemic (2020 and 2021).

The latter 3 sections discuss the effect of these restrictions on food supply and prices, consumer behaviour and market livelihoods respectively. Figure 5 is a visual representation of the interrelationships between:

- pandemic restrictions
- food supply
- demand
- prices
- the health of the wet market economy.

These issues are discussed with a particular focus on animal-sourced foods.

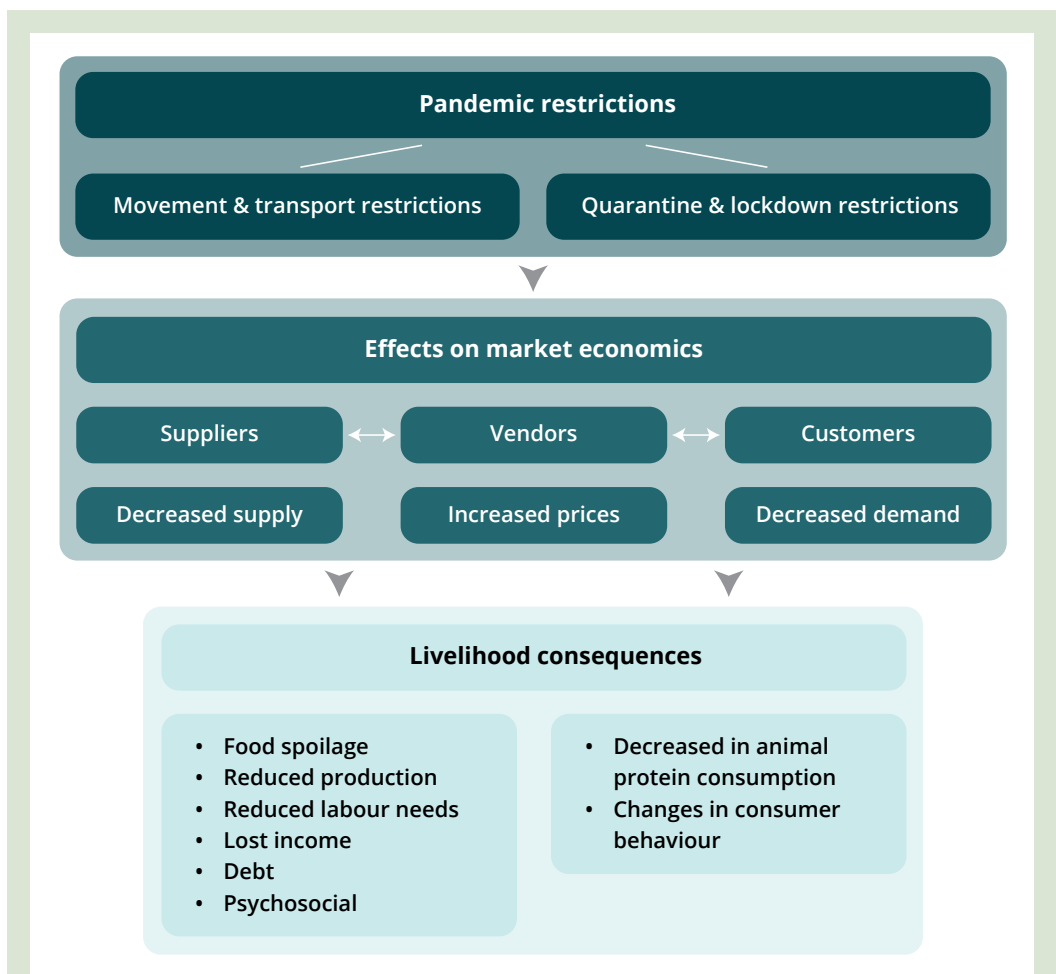


Figure 5 Interrelationships between restrictions, effects on market economics and livelihoods

COVID-19 pandemic restrictions at wet markets

The pandemic restrictions or interventions used in the wet markets that visited in the Philippines, Kenya and Vietnam are summarised in Table 5.6. The research team found that they could be categorised into 3 types:

1. Behavioural restrictions
2. Movement restrictions
3. Quarantines and closures

The analysis focuses on the movement and closure restrictions categories. These were the most important in influencing the socioeconomic impact of the pandemic on market sellers and customers.

Restricted access to markets

Restrictions in 2020 and 2021 placed barriers on peoples' access to markets. In both Vietnam and the Philippines this included:

- a 'one-entry, one-exit' policy
- coding schemes using odd/even numbers or surname letters to allow residents and vendors in specific neighbourhoods to visit a wet market 1 to 2 times a week, on assigned days, for a limited time.

This lasted for more than a year in many places, with some restrictions gradually easing and being removed over time. In some urban areas in Vietnam, food could only be ordered by phone or internet during lockdown in 2020 and again in 2021. No restrictions on market access were implemented in Kenya. The ways in which transport restrictions affected supply and demand are discussed in a later section.

Table 5.6 Pandemic restrictions at wet markets, identified in the 3 case study countries

Type of pandemic restriction	Interventions
Behavioural	Mandatory face masks, face shields, and gloves; washing and disinfecting requirements; mandatory vaccination; no hand shaking; disinfecting sales areas; requiring customers to wash hands; no spitting; more frequent garbage collection.
Movement	Social distancing; curfews; transport restrictions; shopping voucher systems during lockdowns; greater spacing between market stalls; seat arrangements; limit visiting time; avoiding the area if sick; body temperature checks; testing requirements; designated entry and exit points; medical declaration forms.
Closure	Lockdowns; closures if COVID-19 cases are reported; closures if the market does not abide by the pandemic restriction rules.

Closure of markets

In all countries markets were closed during lockdowns, which were more common in Vietnam and the Philippines. In Kenya, a 2-month lockdown occurred from 25 March to 7 July 2020 with a second 1-month lockdown from 26 March to 1 May 2021. In both cases, markets reopened with minimal restrictions in the formal sector.

In Vietnam, an initial lockdown across the whole country occurred from 1 to 30 April 2020, followed by 4 waves of regional lockdowns according to the pandemic situation. All markets were closed in Ho Chi Minh City and most of the southern provinces during the most severe lockdown from May to September 2021. This timing corresponded with the research team's fieldwork. At this time, Hanoi was divided into 4 different risk zones with shifting levels of restrictions depending on local epidemiological data. In April 2020, after roughly one month of lockdown in the Philippines, wet markets were excluded from the complete shutdown regulations and this arrangement continued for more than a year. During this time a skeleton workforce was allowed in wet markets if they adhered to behavioural restrictions. Unlike in Kenya and the Philippines, staff in Vietnam had to be present at the market 24 hours a day during the time of lockdowns.

'During the time of social distancing, our staffs must bring their stuff to stay at the management board's headquarters. We have to split up to guard the market 24/7.'

Market manager, Vietnam.

Market closures in both Vietnam and the Philippines continued in 2021 and 2022. They depended on epidemiological factors such as community transmission thresholds and positive cases identified at the market. Detailed COVID-19 prevention plans were put in place. The police and army were used to inspect, supervise and punish violations of pandemic prevention measures at markets. In Vietnam, an outbreak colour map determined the level of restrictions imposed on a community based on risk profiles. A nation-wide alert system for community quarantine was also implemented in the Philippines in late 2021.

Informal markets and sellers in all 3 countries faced extra difficulties. In Vietnam, temporary markets and sidewalk markets and vendors were forced to close during lockdowns. Informal vendors were not allowed to operate in the Philippines during the early phases of the pandemic. Rolling carts and satellite markets were later welcomed to clear space at wet markets. Most informal markets in Kenya were not closed or targeted for restriction enforcement because of food security concerns, especially for the low-income urban group. Although some livestock trading markets were closed because they failed to meet social distancing standards. Police enforced COVID-19 regulations in the formal market sector, including in butcheries.

Perceptions of pandemic restrictions

While some vendors were concerned about COVID-19, the economic outcomes of restrictions were seen as a far greater danger than the virus itself. There were different levels of scepticism and criticism about pandemic restriction policies. Stakeholders in Kenya (with the lowest case and mortality rates) and the Philippines more vocally critical of government policies than those in Vietnam. Criticisms in the Philippines varied depending on the epidemiological situation and the location of the market. In general, some believed the markets were a COVID-19 risk because of the large crowds. Others stressed that the open air and the various anti-epidemic measures taken made markets a low-risk place.

Compared to Kenya and the Philippines, in Vietnam the government viewed wet markets as a high-risk area for COVID-19 transmission throughout 2020 and 2021. This epidemiological classification meant that lockdowns, closures and social distancing policies were more strictly enforced by local leaders and market managers. They aimed to control the number of infections in the market and surrounding area. Interestingly, market staff in Vietnam believed that markets that remained open were considered to be a 'lucky blessing'. They were not necessarily a result of anti-pandemic efforts. Staff said chance and randomness explained how the virus spread and why some markets were closed and others stayed open.

Many argued that the policy response at wet markets was very sudden. Decisions were made in a top-down manner, often by the national health authorities, with very little involvement from other sectors and market stakeholders. In the Philippines, initial restrictions were largely viewed as inconsiderate to the food system and agriculture situation in the country. A key informant in the Philippines referred to the beginning of the pandemic as the '*wild, wild west...Monday, there would be a wild restriction...Tuesday, suddenly [stores] were allowed to open*'.

Transactions across the value chain eventually became easier as restrictions relaxed. Still stakeholders felt many of the initial challenges and errors could have been avoided with greater communication between:

- national agencies
- local governments
- wet market stakeholders.

Similar criticisms were found in Kenya.

'The closure of livestock markets was mainly for disease control. We need to think about how all our actions are going to affect wet markets holistically so that we don't focus on one thing at the expense of another.'

Female key informant, researcher, international institution, Kenya.

Echoing the views of stakeholders, most media coverage found in the study focused on the effect of market closures on food security and local livelihoods.

Supply chains, transport and prices

Lockdowns caused a ripple effect across the food supply chain. This was more severe in Vietnam compared to the Philippines and Kenya. In Vietnam many suppliers and slaughterhouses had to hold production or apply the '3-on-site' model (eating, sleeping and producing at the market). This created major challenges for drivers transporting their goods. Goods had to be quarantined and disinfected before entering the market. Many traders withdrew because it was hard to move between provinces. Labour shortages made this effect worse as workers returned to their rural hometowns.

To address this, the 'green channel' system was established in July 2021 for inter-provincial and inter-regional transport in Vietnam. However it was not clear what were and were not 'essential goods', leading to business confusion about licensing conditions.

The Hanoi Department of Transport got 24,572 'green channel' applications. It rejected 78% of them and 8,579 were still pending in late 2021. This caused a shortage of essential goods, especially food.

Some localities also set a 14-day medical isolation period for people returning from areas with high case numbers. This led to a shortage of truck drivers. Transport chains were also impeded by traffic checkpoints and changing local regulations. For example, in Can Tho province testing requirements demanded transporters change drivers or unload goods to another vehicle with a license to circulate in the city. They had to comply even if they had a negative COVID-19 test result. This cumbersome process caused traffic jams and congestion of goods being transported in and out of the city.

Text Box 3: Food supplies and the closure of Long Bien wholesale market, Hanoi, Vietnam

Long Bien market is the largest market in Vietnam, functioning as a wholesale and trans-shipment market to other retailers in Hanoi and the neighbouring provinces. It is home to about 1,108 business premises that carry thousands of products, mainly vegetables, fruits, seafood and dried agricultural products. It normally operates 24 hours a day, 7 days a week and is located at the gateway to the centre of Hanoi City, the capital of Vietnam.

The Long Bien market was closed for nearly 2 months in 2021 because of 2 cases of COVID-19 infection identified at the market. Under the direction of the People's Committee of Ba Dinh district and with the professional advice of the Center for Disease Control Hanoi, the market management board helped traders to move their goods out of the locked market. All people, vehicles and goods entering and leaving the market were sprayed with disinfectant. The market management board also issued referrals to traders so that they could switch to other markets to do business while the Long Bien market was closed. However, because the closure of the market occurred very suddenly, vendors were forced to sell their products cheaply, sometimes at the roadways and sidewalks in residential areas.

The Philippines had disruptions to the food system. They were not as severe as those in Vietnam. Early community quarantine guidelines stated that the movement of delivery trucks would be unhampered. At the same time a Department of Agriculture memorandum established the 'Foodlane' system to support the guidelines. The system ensured the seamless movement of agri-fishery products through:

- truck ban exemptions
- ease of passage at checkpoints
- Foodlane routes
- assistance during product delivery.

Transport restrictions were much less strict in Kenya. However curfews and movement rules disrupted the ability of some animal traders to transport animals for slaughter in early 2020 and again during the second lockdown in mid-2021.

Transport issues were widely considered to have been the primary reason why producers faced production losses in all 3 countries. There were reports that while delivery trucks were prevented from bringing products to market:

- animals grew too old to sell
- vegetables rotted at the farms.

In Dong Nai and Binh Duong provinces in Vietnam, there were 500,000 surplus quail eggs every day during lockdown and millions of chicken eggs. A workshop organised by *The Labour* newspaper on 14 September 2021, attended by researchers, found that, 'In Dong Nai province, for livestock, the total number of chickens is 20 million and currently there is a backlog of 200,000 white broiler chickens, 80,000 ducks, 6,000 goats.'

During the 2021 lockdown in Vietnam, market stakeholders reported the price of fresh food items increased by 2 to 3 times in many places on meat, fish and green vegetables.

Similar challenges happened in the Philippines, as explained by a labour group representative, 'There were LGUs that...permitted [the farmers to sell their products] but most of the people were confused and there was nothing else they could do, so a lot of the crops died.'

Rules in the Philippines at the beginning of the pandemic stated that only a single member of a family could leave the household at any given time. This made it hard for farmers and sellers like the local hog raisers, particularly the women, who could not transport their livestock to the market alone. They were either forced to:

- sell their animals at lower prices, as they could no longer afford the overhead expenses of keeping the animals at their farms for longer periods
- donate them as part of the relief goods to be distributed to the community.

PHP94.3 million (approximately USD1.9 million) was lost from the agriculture sector with unsold produce in the Philippines during the first enhanced community quarantine. This was shown in data from the National Economic and Development Authority which covered mid-March to the end of May 2020 (Unpublished data).

Food prices, however, were affected by:

- transport and supply challenges
- the higher price of commodities such as oil and feed
- the overall reduction in demand.

In the Philippines a devastating epidemic of African swine fever happened at the same time, also influencing food prices. This is described in Text Box 4.

Text Box 4: African swine fever and the impact of lockdowns on the pork sector in the Philippines

In the Philippines, COVID-19 lockdowns were implemented at the same time as animal lockdowns, specifically in piggeries. This was to address the African swine fever epidemic that started in September of 2019, 6 months before the declaration of the pandemic. This devastated large and smallholder farmers alike. It was believed to be the most influential factor in the rising prices of animal protein. Pork was the most consumed protein in Filipino households. Its price rise alongside the rise in prices of oil and feed caused a chain reaction leading to higher prices of chicken and fish.

As African swine fever spread, the government increased imported frozen meats in wet markets and food retailers across the country. The aim was to compensate for the lower production of livestock. This was opposed by the local producers' representative organisations, such as the Samahang Industriya ng Agrikultura (Rivas, 2021).

The lockdowns at first made recovery harder for the pork sector in early 2020. In June 2020, Iloilo City in the Western Visayas region of the Philippines was only able to ship around 1,000 head of live hogs to the island of Luzon but by November, they were already able to ship around 16,000 heads (Sornito, 2020).

The impacts of the African swine fever epidemic and supply consequences from the pandemic restrictions were still being felt in 2021, with pork and chicken prices continuing to rise. However, in January 2022, the country's food prices remained steady despite the spike in oil prices and weather disturbances.

During the 2020 and 2021 lockdowns, food trade in formal and informal markets in Kenya was impacted by:

- transport challenges
- movement restrictions
- closure of schools, hotels and bars.

The sale of meat took place in the evenings in bars and restaurants, both for commercial and home use. When curfews were in place people stayed at home. Many traders could not sell their normal quantity of stock. Traders reported that excess stock either went to waste or was sold at a much lower price. Despite these difficulties, the traders did not want to increase the prices because of low demand. In some cases in Nairobi the prices went down from KES350.00/kg to KES280.00/kg because of very low consumer demand.

Availability of new livestock supplies was also affected.

'Farmers at some point could not access day old chicks and with that, farmers were not able to restock their farms. Hotels were not operating so farmers lost market for their poultry. It became a challenge all around for the farmers and all were affected.'

Male key Informant, international organisation, Kenya.

The research suggests pandemic lockdowns may have affected the supply and transport of wildlife and wild meats in the Philippines, but not in Vietnam and Kenya. A report by PanNature (Phan et al. 2021) found no change in wildlife trading and selling in Vietnam during the pandemic. The fieldwork echoed this result.

However in the Philippines vendors in remote Palawan Island noted that tighter restrictions at the market led to a decrease in the sale of wildlife. Changes in city administration and a stronger national government push against wildlife trading also contributed. According to staff and vendors at Arranque in Manila, the mayor imposed stricter punishments for those caught engaging in the sale or trade of wildlife, which was also reported in media reports. There were also rumours out locals in the province of Mindoro Oriental, outside the study locations. Rumours said the financial strain of lockdowns led some, whose livelihoods depended on tourism, to resort to poaching and illegally selling tamaraw (Mindoro dwarf buffalo) meat.

Demand and consumer behaviour

The pandemic changed consumer behaviour by limiting access to wet markets, especially the cumbersome system of entering markets in Vietnam and in the Philippines. These impacts were experienced differently based on socioeconomic status.

Many people would rather stop at roadside stores, satellite markets, or supermarkets. They were afraid or reluctant to go into formal wet markets because of rules to:

- sign a medical declaration
- take temperature readings
- disinfect their hands.

Erratic opening times also contributed to this behavioural change. Many markets in Vietnam only open for 2 hours in the early morning or evening. This reduction in demand was still showing when the research team went back to markets at the end of 2021. It was clear that the ongoing restrictions continued to influence the way people shopped.

'I still go to the market to buy food every day, but only at the stores near my house. I just buy foods I need and come back home quickly, not spend time talking to other people when buying like before.'

Female shopper, Hanoi, Vietnam.

'The people who patronise our wet market are now very limited, because they put up fences around the wet market.'

Female key informant, vendor, the Philippines.

Customer behaviour was shaped by the nature of pandemic restrictions and whether wet markets were deemed to be an 'essential service'. In the Philippines, local government kept markets open when supermarket chains and malls were closed. The Omnibus Guideline on the Implementation of the Community Quarantine issued by the Inter-Agency Task Force for the Management of Emerging Infectious Diseases indicated that wet markets were essential services, according to interview participants.

Wet markets were allowed to operate in the Philippines even during times of enhanced community quarantine – the strictest classification of community quarantine. As a result, wet markets attracted a larger share of the food purchases. There was however an overall reduction in meat purchasing because of the pandemic economic impacts.

'Instead of buying one kilo of fresh meat, they just buy half a kilo, but still, fresh meat.'

Male key informant, labour group representative, the Philippines.

In Vietnam this situation was reversed. Supermarkets were kept open while wet markets were closed. Many people were not allowed to leave their homes during the various regional lockdowns and had no income. This lasted for 2 months during the harsher lockdowns in Hanoi and Ho Ming Minh in late 2021. Markets that reopened after lockdowns lost many traders and customers. For example, some big businesses refused to come back to trade at the Long Bien market, which affected the market's revenue.

In Kenya both supermarkets and informal markets were kept open, with restrictions limited to hygiene and social distancing measures.

The study found wet markets in all 3 countries were believed to cater to all socioeconomic groups. They were especially important for those of lower socioeconomic status. Consumers prefer wet markets because they value:

- fresh products (especially meat)
- the ability to choose specific products (for example find a specific cut of meat at 'pocket friendly prices')
- because they are places where social networks intersect with livelihoods and business.

Text Box 5 describes an example of the suki system in the Philippines.

Socioeconomic status also shaped consumer behaviours during the pandemic. In all 3 study countries, middle and wealthier classes reduced their consumption of fresh products. They moved towards buying more dried and frozen products in supermarkets.

Text Box 5: Cultural norms and economic practices at wet markets in the Philippines

Buying fresh meat at wet markets is considered a 'daily routine' for many Filipinos, especially those in lower-income households. Wet markets are viewed as a 'pillar of the local community' (on par with churches, schools, and recreational areas). They are the local symbol of cultural identities and a place to enact social relationships, unique to informal food retail and built on trust through personal ties.

One such relationship that is prevalent in the Philippines is the suki system. The suki system is a concept referring to the loyal relationship between the vendor and customer, the vendor and the supplier, or between two vendors who exchange products within the wet market. It is good for customers as they can easily bargain for better prices. They can be assured that the products are high-quality and safe for consumption. One informant said, 'there's that trust that what you are buying is not double-dead, hot meat, rancid, spoiled, putrid.' However the pandemic created challenges for customers. This system was affected by the one-entry, one-exit policy and the odd-even scheme set up to govern market access during. Customers who could not talk with their regular vendors chose to buy from others on the days they were allowed to visit the market, especially if their needs were urgent. This meant some vendors lost their suki or regular customers or had challenges keeping them.

This was facilitated by a shift to online shopping through large establishments like supermarkets but also, in some cases, through social media.

'Everything is online now. When you buy online, you just click, order, then they deliver directly to your house. This is what I've also been doing for the past year.'

Female key informant, vendor, the Philippines.

'Online shopping was enhanced and people were selling, buying and delivering animal sourced foods... 'non-contact market' through sending 'boda boda' (motorbike) riders. They would advertise on online platforms and sell it there to their friends and neighbours.'

Male key informant, male, international organisation, Kenya.

'Some of the customers did not want to get into the market. They call us or order goods via the Zalo app. We deliver to them either at home or the market's gate'

Market vendor, Vietnam.

Most small-scale producers and market vendors lacked the capacity and access to digital infrastructure to adapt to online sales and e-commerce. Large producers were believed to have had:

- more means to weather the pandemic conditions
- the capacity to adapt to new sales methods.

Key informants in all 3 countries believed that the pattern of online shopping was likely to continue beyond the pandemic. However, many informants felt that these online services were not direct competitors to wet markets. They felt online services were usually for ready-to-eat, finished food products from restaurants, not fresh ingredients.

Impact on livelihoods and psychosocial wellbeing

The research found that pandemic mitigation efforts had very negative effects on the livelihoods and psychosocial wellbeing of:

- market vendors and sellers
- transporters, traders, butchers, day labourers, and the farmers who depended on them.

Many were deprived of their main or only source of income for many months. They lost their savings and business assets, were laid off from their causal jobs and suffered stress from uncertainty about when businesses could reopen.

In Vietnam, most traders interviewed in late 2021 said the amount of goods they sold had decreased by 40% to 50% compared to the time before COVID-19. For example, the owner of a cow slaughterhouse in Dong Anh, Vietnam, said before the pandemic his slaughterhouse sold an average of 20 to 25 cows each day. In late 2021, his slaughterhouse only sold 5 to 7 cows each day.

In Busia, Kenya, one butchery owner explained that before COVID-19 he could sell more than 40 kg of meat a day at his butchery. During the second lockdown in 2021 he sold less than 15 kg a day. Some of the meat ended up going bad due to the reduced sales, and his business was affected negatively. The pandemic also affected the animal trade network. **Text Box 6** discusses the impact in Kenya.

Text Box 6: The effect of movement restrictions on livestock traders in Kenya

In Kenya, a lot of people from all socioeconomic classes do livestock trade. This includes animal producers, animal traders, vendors, transporters, butchers, flayers and cleaners in the slaughterhouses. Animals for slaughter are purchased and moved across the entire country, often at night. During the COVID-19 pandemic movement restrictions were instituted, including curfews and lockdowns. The first lockdown occurred from 25 March to 7 July 2020 and the second was from 26 March to 1 May 2021. These lockdowns affected the sale and production of animals and meat all over the country. Animal traders were unable to transport animals for slaughter. This caused many to close their businesses and jobs were lost. Animal traders are often middle class while others like flayers (those who strip off the skin of animals), off-loaders (workers who load animals from vehicles), and cleaners are in the lower socioeconomic class. They were also badly affected. Many traders sold animal products to large establishments including bars, schools and hotels and they lost business as a result of pandemic restrictions. Since there was no warning that movement restrictions and other measures would be put in place, traders were caught unaware. They could not pay back loans and had to lay off their staff.

The haphazard and unpredictable nature of these restrictions meant all the actors were impacted continually over an extended period. It would take them a long time to recover. These impacts were felt in both the formal and informal sectors since the suppliers are the same to markets and the supermarkets. With all these challenges the traders could not increase the price of meat, as demand was also low. All were affected including meat inspectors who got paid depending on the number of animals slaughtered.

The study found that pandemic restrictions impacted people differently depending on their socioeconomic status. The informal sector makes up the vast majority of the agricultural sector in all 3 study countries. This sector was often targeted with immediate closures. It was less likely to seek exemptions to allow businesses to remain open. This included:

- street and transient ‘flea market’ style vendors that congregated around formal markets to sell food or put their wares on wooden pallets on the ground
- small-time fishermen who were banned from fishing and selling.

Backyard raisers who butcher their animals and sell the meat to earn back the money spent on raising animals were disadvantaged compared to bigger businesses. Bigger businesses had access to industrial refrigerators and could stock up and keep selling during the pandemic. Many day labourers, including staff at slaughterhouses, were laid off with lower demand and economic activity.

Some market stakeholders viewed effects of the pandemic on restaurants and hotels, many of which purchased products from wet markets, as particularly important. In the Philippines, an informant from a private wet market chain said sales to businesses such as restaurants comprised around 50% of the earnings of vendors at their markets before the pandemic. A meat vendor in Nairobi, who specialised in selling a kind of sausage called mutura mainly sold to bar patrons, said that he lost his customers once bars were closed. His daily sales reduced to 5 kg from 20 kg. Another trader stated:

‘COVID-19 has affected our operations deeply. Our main customers are hotels and restaurants, their closure meant that we lost a lot of customers and businesses went down. Given that there were restrictions on livestock movement, it was hard for me because I get sheep from Narok county. However, we never stopped coming to the slaughterhouse, it is our source of income. When I slaughter sheep and I don’t sell on that day, it losses weight and quality when I sell it the next day. That is a big challenge we face as meat suppliers. Some people even closed business during the pandemic.’

Female meat trader, Kenya.

There were times when local government and market vendors sought to adapt rigid lockdown restrictions to lessen their harm on food security and local livelihoods. In the Philippines, they set up mobile palengkes (rolling stores) and talipapa (temporary satellite markets), particularly in densely-populated centres. In Arranque Market, vendors were allowed to display cages of animals for sale on the sidewalks of Manila to attract attention from passers-by and increase business for the market. A small number of market traders benefited from pandemic restrictions with new market conditions. Others could not offset financial losses by setting up a stall in front of their house. Others actively broke laws and rules out of desperation. For example, some travelled through checkpoints at night.

‘There are a lot of people opening up their own stalls...our highways are full of these newly opened stalls...it’s just like a satellite market. And it’s complete. There’s pork, chicken, fish, beef.’

Female key informant, vendor, Philippines.

'During social distancing, only people in Ha Vi village can sell poultry at the Ha Vi poultry market. Traders from other communes could not come there to trade. Many families have an income of VND4–500 million per month. They not only sell at the market but also deliver poultry at the highway to their familiar customers who cannot have adequate required papers to enter the market.'

Vendor, Vietnam.

'People who were well known and connected benefited from this crisis. They would take many orders and supply meat to many butcheries and enjoyed the power of monopoly. Some people bought about 50 carcasses that weren't sold the previous day and sold them at high prices in butcheries and thus obtained good profits'

Male meat inspector, Kenya.

Some vendors were concerned about COVID-19. But the economic consequences of restrictions were seen as a far greater danger than the virus itself. In general, the difficulties in procuring supplies combined with lower sales brought huge financial blows to vendors at wet markets. Vendors at Arranque Market said they faced difficulties from less traffic at the market. Some could not make a single sale on certain days. During the fieldwork in late 2021, vendors remained stressed about whether customer numbers would recover. The research team observed low customer numbers on the days when they visited in late 2021. In Kenya, researchers heard reports of traders closing their businesses. Some fell into mental illness or hid because of loans they could not repay. One animal trader said:

'There was a woman here who we know well and used to be a butcher. She owed people a lot of money because when COVID-19 hit she was not paid by the supermarkets she used to supply meat to. This money was in millions of Kenya shillings. She became mentally sick and the last I heard her husband told people that she had relocated to their rural home.'

Male animal trader, meat market, Nairobi.

A vendors' association representative in the Philippines was brought to tears while describing the difficulties vendors went through during the pandemic. She expressed thanks that she could save money before the pandemic hit. Others emphasised that they had barely earned enough to get by at the height of the pandemic restrictions. Most market stakeholders felt the recovery from the pandemic had not yet occurred and customers had still not recovered – see **Text Box 7**. They worried about the future of their livelihood and business.

'I tried to get the customers back, inform the regular customers that I have come back. During the COVID-19 outbreaks, goods are sluggish, but the fees are still the same, so our Trader Union are applying for support from the Government to reduce tax and rental fee. If you don't sit, you will lose capital, it's too hard.'

Seafood trader, Long Biên market, Vietnam.

Text Box 7: The perspective of market vendors at Arranque Market, Philippines

Registered and informal vendors alike did not favour the effects of the pandemic restrictions on the wet market in the Philippines. Herlan, a pet shop trader, stressed that sales remained slow in late 2021 compared to pre-pandemic levels. There were days when he could not make a single sale. Herlan said, with sadness, 'Malaki ang pinagkaiba [there is a huge difference] dati, siksikan ditto [it was so crowded here before]'. Another trader, Nanay, had similar thoughts, stating that vendors at the meat section lost out on a lot of sales due to the pandemic.

During the exchange, an individual in a blue uniform approached Nanay, who promptly handed over a hundred-peso bill from her box of earnings. The individual explained she was a representative from one of the vendors' cooperatives at Arranque market. As a member, Nanay deposits her extra earnings from her stall in a savings fund collected by representatives of the cooperative. At the height of the pandemic, however, she recalled being unable to set aside any savings as she made just enough for her living expenses and nothing more. For stallholders such as Nanay and Herlan, whose families often depend solely on their earning at the market, the pandemic was a huge financial blow.

5.4 Effect of pandemic lockdowns on wet markets and food systems

This research found that pandemic lockdowns and restrictions aimed at COVID-19 infection control had big impacts on wet markets and food systems. The analysis of these unintended consequences was divided into 3 categories:

1. Supply chains, transport and prices
2. Demand and consumer behaviour
3. Impact on livelihoods and psychosocial wellbeing

The study found that, in general, people see the social and economic consequences of restrictions as a far greater danger than the virus itself. This fits with a large body of survey-based data showing substantial, negative impacts from restrictions on household food security and food

system actors in low-income and middle-income countries (Bundervoet et al. 2022; Hammond et al. 2022; Egger et al. 2021; Maredia et al. 2022; Stephens et al. 2022; Picchioni et al. 2021).

Stakeholders from Kenya (with the lowest case and mortality rate) and the Philippines were more vocally critical of their governments' policies compared to Vietnam. This was especially the case in the early days of the 2020 lockdowns. Many argued that the policy response at wet markets was sudden and top-down, lead exclusively by the ministries of health. Studies of government advisory groups support these findings, showing how expert groups are limited when they do not include social, economic and policy experts from non-biomedical backgrounds (Rajan et al. 2020). Many stakeholders felt that initial challenges and errors could have been avoided with greater collaboration and participation.

Pandemic restrictions in 2020 and 2021 influenced market chains for more than a year in areas of Vietnam and the Philippines. They lasted only a few months in Kenya in 2020 and again in 2021. A media analysis by Birner et al. (2021) found that widespread concerns about the negative impacts of lockdown on food security in Africa – including in Kenya – played a major role in public policy debates that influenced the harshness of infection control policies.

The Philippines got through one of the longest and strictest national pandemic lockdowns (Hapal, 2021; Lavado et al. 2022). Despite this the country appears to have limited direct disruptions to food systems by recognising wet markets as 'essential services' in early 2020. While the Philippines kept wet markets open when supermarkets and shopping malls were closed, the opposite occurred in Vietnam. Transportation was a major bottleneck in Vietnam. The Philippines avoided this to some degree with the Foodlane system, which exempted trucks from onerous movement restrictions.

Local government and market vendors also tried to adapt to lockdowns and restrictions at times to minimise harms on food security and local livelihoods. In the Philippines, they established palengkes and talipapa particularly in densely populated centres. Vendors also began selling from their homes. Others worked around restrictions to maintain their incomes. In this regard, and as reported by Picchioni et al. (2021), traditional agricultural stakeholders reliant on shorter value chains may have been more resilient to pandemic disruptions. This was echoed in a review by Dixon et al. (2021) of Asian farming systems. It found that hill-mixed systems were much more resilient during the pandemic compared to irrigated wheat-based systems due to diversification and shorter market chains.

Emergency planning should consider food transportation systems more carefully and ensure equal status of wet markets with supermarkets. There also appears to be a greater need for decentralised planning and local adaptation. This allows local government to address specific complaints raised by market stakeholders and the agricultural sector.

Vietnam classified wet markets as a high-risk area for COVID-19 transmission. This was not the case in Kenya nor the Philippines. This classification in Vietnam meant closures and social distancing policies continued to be strictly enforced by local leaders and market managers in late 2021. Anti-epidemic measures aimed to control the number of infections in the market and surrounding area. This classification does not appear to be strongly associated with the epidemiological data on COVID-19. For example, data suggests that outdoor transmission is negligible when compared to overall community spread (Bulfone et al. 2021).

Unsurprisingly, the study found that lockdowns had ripple effects across food supply chains that increased prices and led to food spoilage, especially with eggs. The nature of lockdowns and their socioeconomic effects meant that demand for animal products from wet markets was negatively affected. Many market stakeholders reported that demand stayed below pre-pandemic levels during the rapid ethnographic fieldwork at the end of 2021.

Going to a wet market was often hard. Consumers in Vietnam and the Philippines had to get tickets or vouchers that were only good for a few hours on certain days of the week and were for one person per family. The same types of restrictions were done in supermarkets during general lockdowns.

Wet markets in all 3 countries were believed to cater to all socioeconomic groups but were especially important for those of lower socioeconomic status. A general trend was reported: during the pandemic, middle and high-income groups moved towards more:

- dried and frozen products bought at supermarkets
- ready-to-eat, finished food products from restaurants bought online.

These findings fit with the results of a recent systematic review. It found that eating behaviours during the pandemic moved to ultra-processed food. Consumption of fruits, vegetables and fresh food decreased (Gonzalez-Monroy et al. 2021). A second review found some groups were much more likely to suffer from reduced diet quality, nutrition and food security during the pandemic (Picchioni et al. 2021), including:

- women
- individuals with a low socioeconomic status
- informal workers
- young adults that rely on a daily wage.

Key informants believed the pattern of online shopping was likely to continue even after the pandemic in all 3 countries. In their global review, Bene et al. (2021) also noted that many formal groceries, retailers and supermarkets benefited from pandemic restrictions in 2020, as did e-commerce platforms. Small-scale and informal stakeholders in food systems reported much greater financial losses and were not, in many countries, able to access social or financial supports. When comparing Vietnam, Kenya and the Philippines, the declaration of food system actors as 'essential services' was a critical component of inequities in the economic consequences between food system stakeholders.

This study adds to the evidence base showing that pandemic restrictions had negative impacts on socioeconomic development in the informal economy and agricultural sector in low-income and middle-income countries (Hammond et al. 2022; Egger et al. 2021; Maredia et al. 2022; Stephens et al. 2022; Picchioni et al. 2021). A survey study with smallholder farmers from 7 low- and middle-income countries found that COVID-19 containment measures were believed to be severe and widespread. They impacted food purchase, sale of farm produce, off-farm income and crop input access (Hammond et al. 2022). Roughly half to three-quarters of respondents reported farm sale losses. Losses were worse in locations with greater restrictions.

Bene et al. (2021) found that access to and cost of food were greatly impacted in low- and middle-income countries from a combination of:

- job loss
- decrease in household income
- changes in the food system due to disruptions caused by lockdowns and social distancing policies.

The study found that pandemic control measures impacted the livelihoods and psychosocial wellbeing of:

- market vendors
- sellers, transporters, traders, butchers, day labourers, and the farmers who depend on them.

Other studies found similar trends in the livestock sector (Abu Hatab et al. 2021), with:

- small-scale farmers (Hammond et al. 2022)
- low-income urban dwellers (Onyango et al. 2021)
- pastoralists (Griffith et al. 2021; Ilukor et al. 2022).

Individuals were deprived of their main or only source of income for many months.

The uncertainty of when businesses could reopen or when demand for products would return to pre-pandemic levels meant they:

- lost their savings and business assets
- took out large loans
- were laid off their causal jobs
- suffered stress and depression.

These impacts were multifaceted. They impacted people differently depending on their social capital and socioeconomic status (Bundervoet et al. 2022). In general, the study found that impacts were believed to be greater for those working in the informal sector such as street vendors, small-scale fishermen, backyard farmers and small-scale butchers.

Rising prices happened at the same time as the increase in commodity prices (gas/oil and feed) and the reduction in demand brought about during the pandemic. This was especially the case in the Philippines, where African swine fever had already started to devastate the pork market before the pandemic started (Cooper et al. 2021). It highlights the challenges of untangling the multiple effects of different kinds of shock to food systems.

This study also suggested that pandemic lockdowns might have had both positive and negative effects on wildlife trading and hunting, although this should be taken as preliminary data. As found by Thuy et al. (2022) in Vietnam, pandemic policies may have helped strengthen some wildlife laws and reduce wildlife farming. However they also provided incentives for more poaching where the local tourism economy had collapsed.

6 Conclusions and recommendations



6 Conclusions and recommendations

The conclusions and recommendations are in 2 sections, based on the 2 sets of results described above.

6.1 Recommendations: social narratives

- Greater research on specific pathogen spillover risk at wet markets and the wildlife value chain is needed to better understand what specific biosecurity measures could feasibly prevent zoonotic spillovers.
- This type of research should weigh the benefits of interventions with the costs of greater biosecurity reform for local livelihoods and the agricultural system in the short and long term.
- Longer-term participatory research is needed to understand specific policy pathways that balance biosecurity with livelihoods and how these can be linked to national and local disease priorities for food-borne diseases and trans-boundary animal diseases.
- Larger, more focused studies are needed to understand the emergence of intensive animal farming of exotic animals and the health and biosecurity implications of this industry.
- Further research should explore the policy process of 'modernising' wet markets and the specific costs associated with infrastructural improvements. From a health perspective, ranking priorities with the least cost and the most benefit would be helpful.
- The modernisation of wet markets, in some instances, is associated with the consolidation of economic power and deterioration in cultural heritage and social bonds, including competition from new shopping malls and supermarkets. Efforts should be made by local and national government to ensure the cultural preservation of traditional wet markets.
- Greater research is needed on how to improve or tailor specific policies to prevent the development of distrust between market stakeholders and veterinary and market authorities.
- There is a need to better understand the ways in which local government, within the context of decentralisation reforms, can strengthen market management and biosecurity in ways that enhance the agency of market stakeholders and strengthen local livelihoods and food security.

6.2 Recommendations: effect of lockdown restrictions

- Greater representation from non-biomedical experts (social, economic and policy domains) in government advisory groups is needed during health emergencies and disasters to ensure wet markets and other parts of the food system are deemed to be 'essential services'.
 - Emergency planning should consider food transportation systems more carefully and ensure equal status of wet markets with supermarkets.
 - There is a need for better decentralised planning and local adaptive capacity to help local governments address specific complaints raised by market stakeholders and the agricultural sector during crises, rather than relying solely on top-down regulations and restrictions.
 - Our study suggests that the pandemic has changed consumer behaviour, with reduced demand for products from wet markets (especially in Vietnam and the Philippines) and a shift in consumer behaviour in middle and higher-income groups preferring more shopping at supermarkets and online platforms. These qualitative findings should be followed-up in more long-term research to evaluate if they represent a durable change.
 - Pandemic lockdowns and restrictions have negative impacts on the informal economy and agricultural sector in low-income and middle-income countries and these costs should be carefully considered by policymakers as they weigh the costs and benefits of large-scale, disruptive non-pharmaceutical interventions.
- Further, longitudinal research on the impacts of pandemic restrictions on the food system is needed, as are social policies to address and mitigate social harms associated with business closures and the accumulation of debt.
 - It is unclear how the pandemic has affected wildlife trading and hunting and further research is needed to understand how the collapse of tourism has impacted animal conservation efforts and poaching.
 - There is a need for participatory after-action reviews to systematically evaluate the impact of the pandemic on food systems by directly engaging a wide variety of experts and stakeholders through dialogue and debate. This exploratory study can serve as a point of departure for greater policy-orientated reflection and analysis by country stakeholders.

This research found that wet market biosecurity strategies occur in the context of 3 contrasting narratives that emphasise different aspects of health and risk. This is reflective of different worldviews and interests of the social groups that are dependent on, regulate and supervise market activities. Policy reform efforts should take these different narratives into account to avoid negatively impacting local livelihoods, culture and food security.

This study also found that lockdowns and other pandemic restrictions negatively impacted the availability and affordability of animal-sourced food products in Kenya, the Philippines and Vietnam. At the same time they had harmful consequences for those dependent on the market value chain for their livelihoods. Future health crisis management needs to consider the impact of lockdown policies on food systems, agricultural producers, market vendors and customers, especially those working in the informal sector.

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Appendices

Appendix 1: Philippines stakeholder map

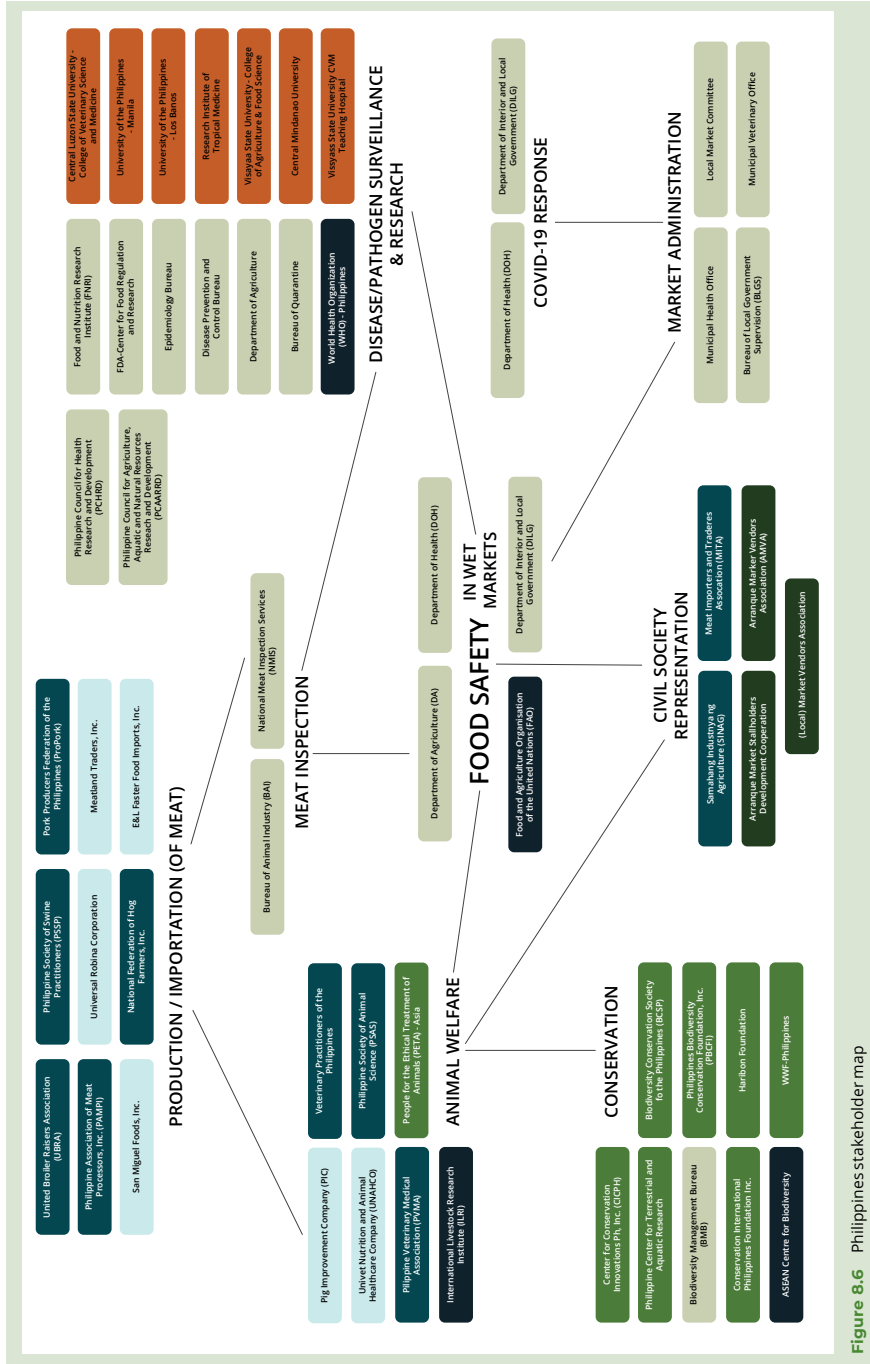


Figure 8.6 Philippines stakeholder map

Appendix 2: Vietnam stakeholder map

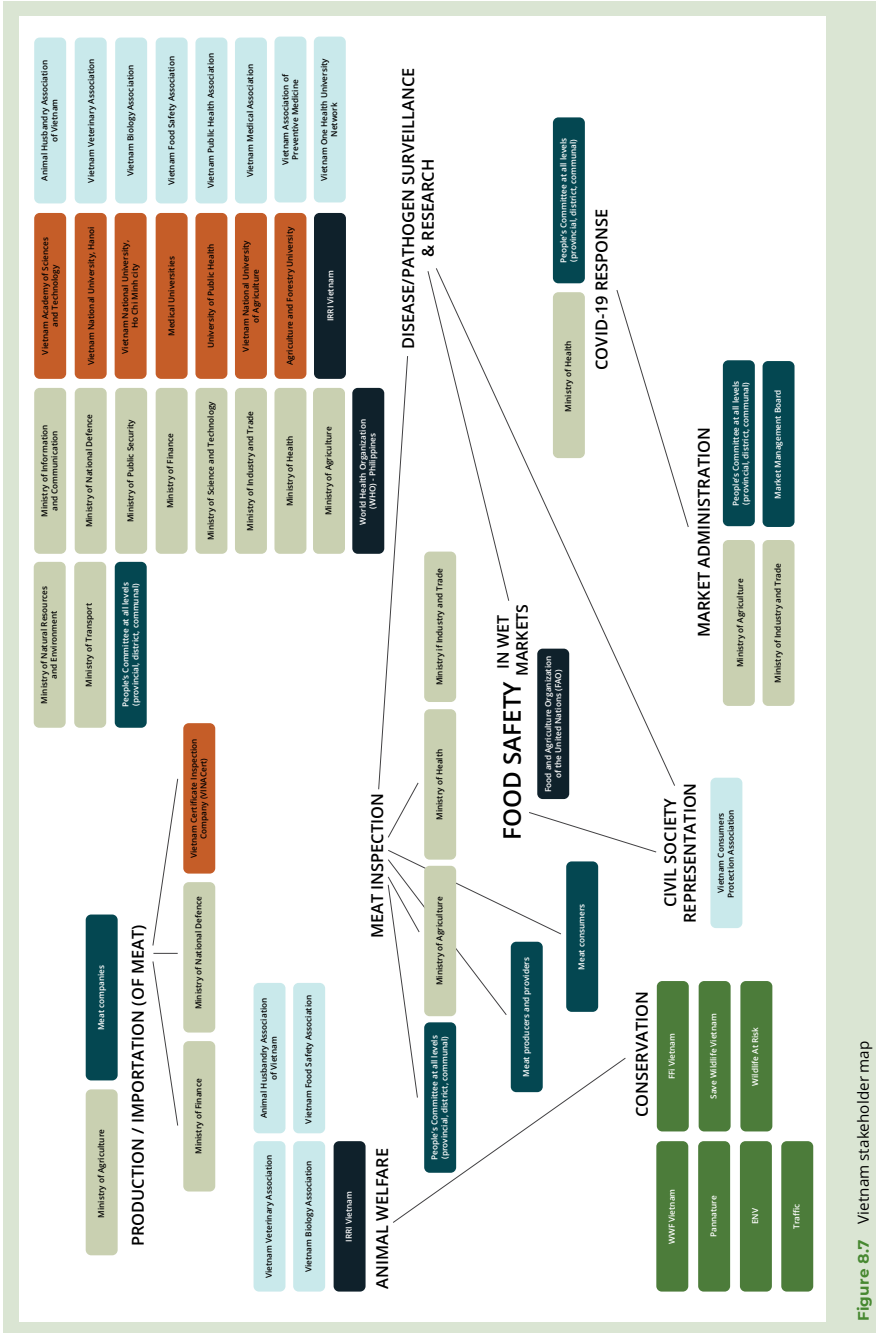


Figure 8.7 Vietnam stakeholder map

Appendix 3: Kenya stakeholder map

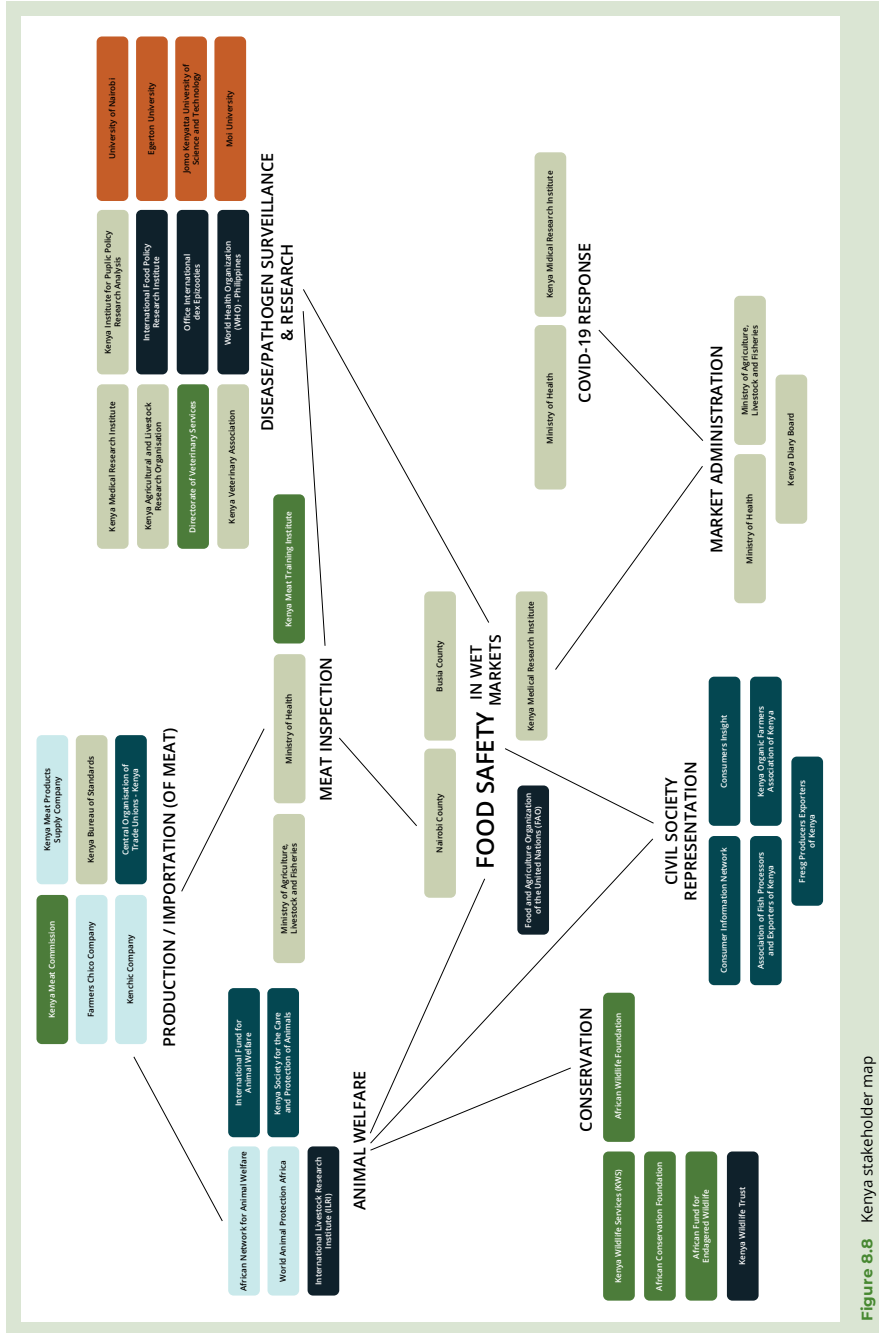


Figure 8.8 Kenya stakeholder map



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