



Safer food for traditional markets from a One health perspective

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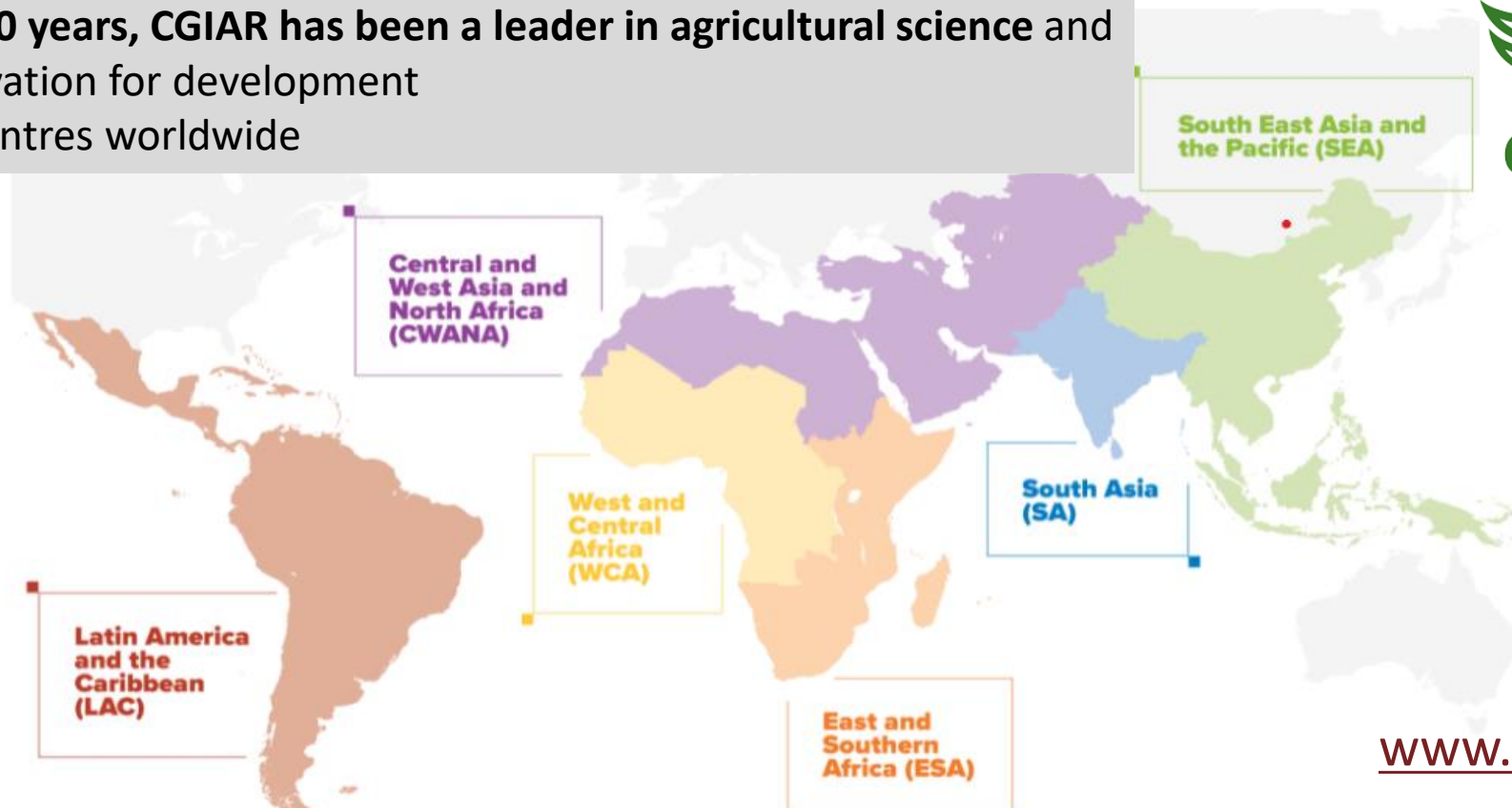
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ILRI is part of CGIAR

For 50 years, CGIAR has been a leader in agricultural science and innovation for development
13 centres worldwide



www.cgiar.org

One CGIAR: New collaborative process of CGIAR established from 2021 onwards
Aiming for: More synergies among centres, joint resources & higher impact
One voice with partners
Regional scope: 6 regions worldwide (as in the map)
ILRI: The only CG institute with **main focus on livestock**; HQ in Addis Ababa and Nairobi

CGIAR's 2030 Research and Innovation Strategy



CGIAR 2030

RESEARCH AND
INNOVATION
STRATEGY

Transforming food,
land, and water systems
in a climate crisis

Vision

A world with sustainable and resilient food, land and water systems that deliver diverse, healthy, safe, sufficient and affordable diets, and ensure improved livelihoods and greater social equality, within planetary and regional environmental boundaries.

Mission

To deliver science and innovation that advance transformation of food, land and water systems in a climate crisis.

Impact

CGIAR is targeting multiple SDG benefits across five Impact Areas, with collective global targets for transformation of food, land and water systems across local, regional and global levels.

ILRI priority research areas in East and SE Asia

- **One Health**
 - ✓ Food safety, zoonoses, AMR, COVID-19
- **Animal Health**
- **Livestock value chains (beef, pork and chicken)**
- **Animal welfare**
- **Genetics (chicken)**



Agenda 2030's Sustainable Development Goals

Livestock contribute to all 17 of the SDGs and directly to at least 8 of the goals.



Contents

1. Food system changes from animal sourced food perspective and food safety challenges
2. Traditional food chains, perspectives and challenges
3. Food safety performance & interventions
 - Evidence from Vietnam & Cambodia
4. One health and food safety
5. Way forward

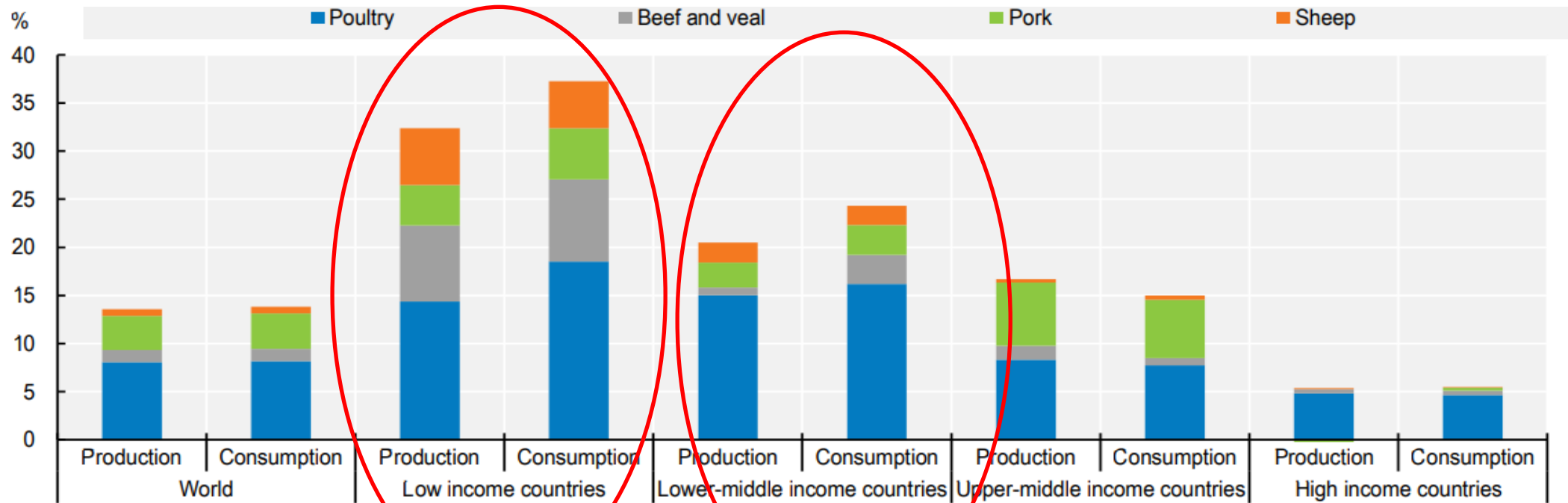


1. Food system changes from an animal sourced food perspective and food safety challenges

Population grow & urbanization

- World population was estimated at **6.8 billion in 2009**, with 5.6 billion living in the less developed regions (UN, 2009)
- Sep 2022, **nearly 8 billion**
- Current estimates are that the population **will grow to 9.7 billion in 2050**, with most of the growth occurring in developing countries ([World Population Prospects: The 2019 Revision](#))
- **Population living in urban areas is projected to rise** from 3.3 billion in 2007 to **6.4 billion 2050** ([World Urbanization Prospect](#))

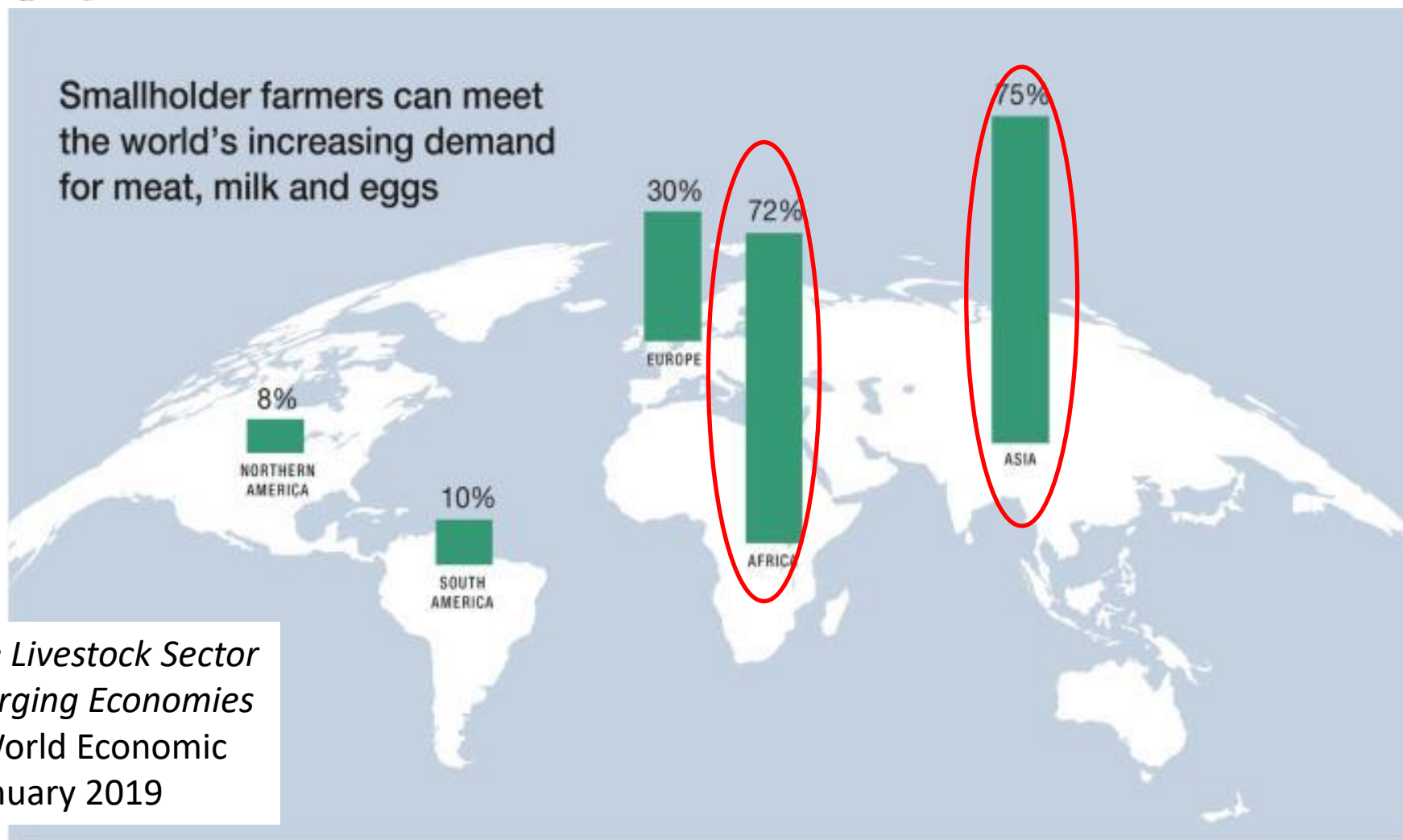
Projected grow in meat production and consumption on a protein bases, 2021-2030



Note: The 38 individual countries and 11 regional aggregates in the baseline are classified into the four income groups according to their respective per-capita income in 2018. The applied thresholds are: low: < USD 1 550, lower-middle: < USD 3 895, upper-middle: < USD 13 000, high > USD 13 000.

Source: OECD/FAO (2021), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), <http://dx.doi.org/10.1787/agr-outl-data-en>.

Proportion of livestock-derived foods produced by small farms in 2010



Source: *Options for the Livestock Sector in Developing and Emerging Economies to 2030 and Beyond*. World Economic Forum White Paper January 2019

Farms of less than 20 hectares provide:

Nearly 50% of the world's livestock and cereals, and close to 70% of the livestock and cereals in emerging and developing economies

■ Share of total livestock-derived foods produced by small farms in 2010

Food system change & consequences

- **Food systems are rapidly changing** in many developing countries, e.g., including Vietnam & Cambodia, 4-5 % grow of livestock sector projected
- These transitions are likely to be associated with more **consumption of risky food**
 - Milk, meat, aquatic products and crops
- **Food safety** is an **emerging** public health problem worldwide, but most prominent in low-income countries





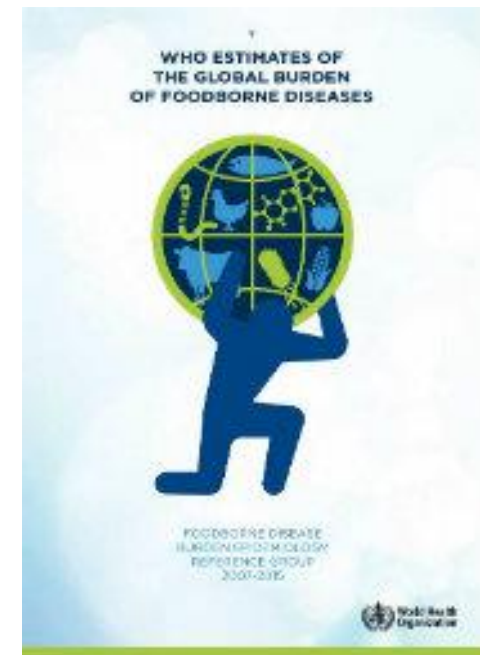
Food safety – global perspective



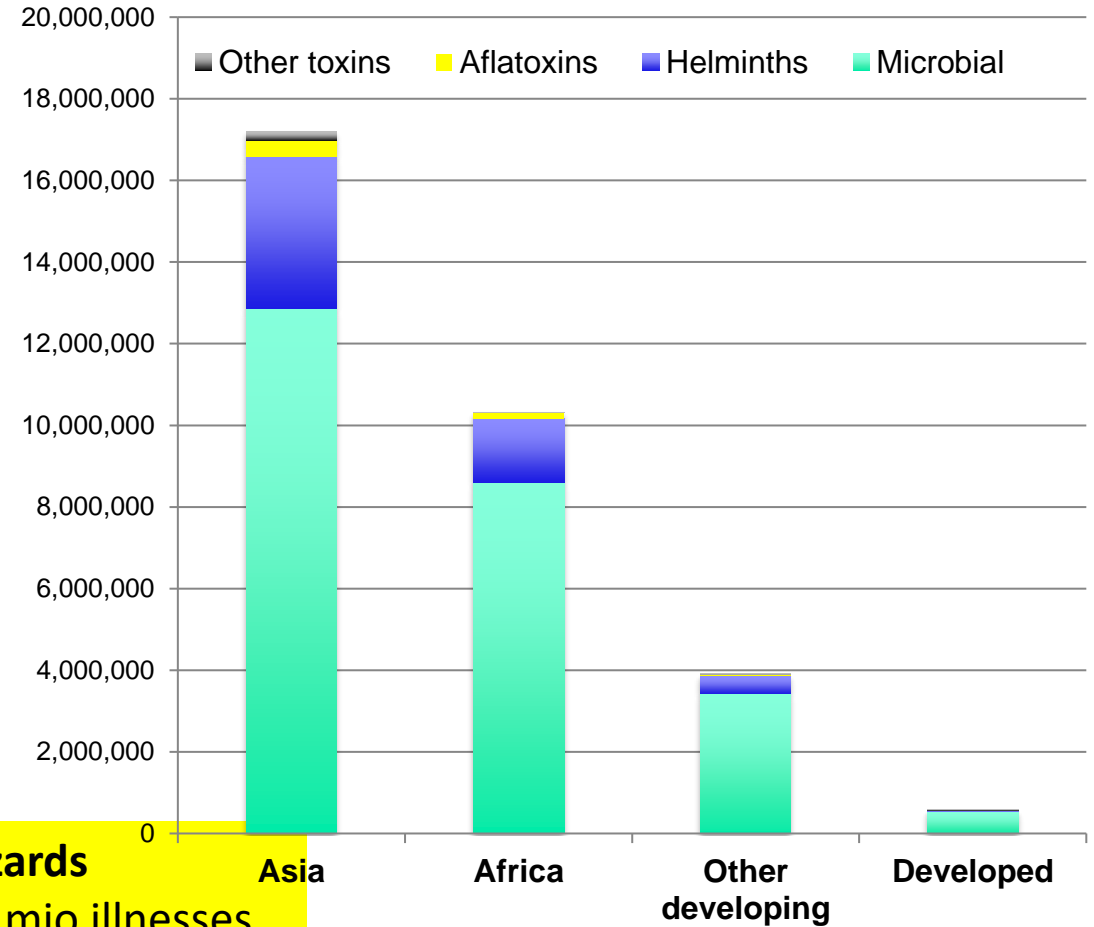
WHO's report: Global estimates of foodborne diseases

- Estimated global burden these 31 hazards was **33 million DALYs**
 - **Comparable** with burden from **Malaria, HIV and TB**
- Almost **1 in 10 people fall ill** every year from eating contaminated food
- **Causes and impact of FBD** vary widely e.g., by region: *Taenia solium* (Laos), O. V. (Regions in SE Asia), and aflatoxins (Africa).

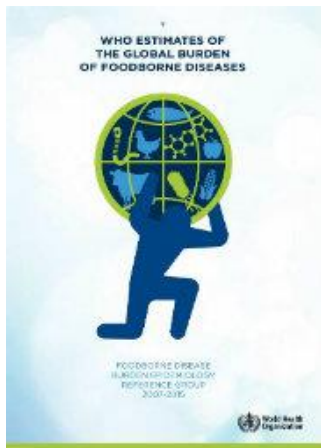
http://www.who.int/foodsafety/publications/foodborne_disease/fergreport/en/



Perceived versus actual risks



Highest risk from microbiological hazards.
What people worry most does not always match actual risks.



31 hazards

- 600 mio illnesses
- 420,000 deaths
- 33 million DALYs

http://www.who.int/foodsafety/publications/foodborne_disease/fergreport/en/

2. Traditional food chains – perspectives and challenges

Traditional food chains – traditional or wet markets

Terminology

- It refers to **traditional markets** which sell mainly fresh foods such as meat, some seafood, fruits and vegetables.
- Usually less regulated
- Consist of different stalls with independent owners
- **Frequent use ice** to keep food fresh and **often wash products** to keep them clean and fresh.



“wet market”



Photo credit: Chea Rortana /ILRI 2020

Formal versus informal retail

- **Formal** retail: supermarkets, convenient stores, “healthy” food shops
- **Informal** retails include:
 - ✓ traditional markets and or ‘wet markets’
 - ✓ Street and /or street food vendors
- **Traditional, wet or ‘informal’** markets **supply >80%** of the food consumed in **sub-Saharan Africa***, but also the region e.g. Vietnam and Cambodia
- Often **escape** structured sanitary **inspection** and lack modern infrastructure and modern management



Photo credit: Chea Rortana, Chi Nguyen /ILRI 2020

*Predicted to still meet **50 to 70 % of consumer demand** for food by **2040**

Why customers prefer traditional/wet markets

- **Accessibility**, numerous in urban areas but often the only source in rural areas
- **Cheaper** than formal/modern retail (opposite to developing countries – “organic” markets – pricy)
- **Addressing specific consumer demands**
 - ✓ Sell of traditional foods (including wildlife)
 - ✓ Vietnam: Certain meat pie, blood pudding
- **Livelihood contribution**
 - ✓ Income for retailers (many are women) & smallholder
- **Consumers associate wet markets with fresh, local, “healthy by nature” foods**
 - ✓ Often more trusted than modern retail (Vietnam)



Photo credit: Unger,
Chi Nguyen /ILRI

Traditional/wet markets are not the same

- Many markets **sell fresh meat** (often from animals killed that morning, from slaughter facilities nearby)
- **Live birds and live aquatic food**, often **killed on spot** or taken home alive
- **Only a minority** of markets **sell wildlife**: may be alive or freshly killed
- Markets **vary from permanent** structures (with electricity, running water and concrete walls and floors) **to wooden structures** with semi thatch covering, or **to food sold on the ground** in the open air
- **Operation time** varies: **daily, some days per week or less**



Photo credit: Chea Rortana, Chi Nguyen /ILRI

Risk at traditional/wet markets

There are both **risk amplifying and mitigating practices** and characteristics in wet markets. Some of these are shown below:

Risk mitigating	Risk amplifying
Separation between types of fresh food (fresh/cooked or intestines and meat)	Direct or indirect contact between intestines and meat, or processed and raw meat
Basic infrastructure: water, electricity, easy to clean surface	Keeping and slaughter live animals
Rapid turnover , selling in small amount	Selling on the ground/floor
Trust in vendor	Lack of effective, risk based inspection
Short value chain	Poor infrastructure: lack of water and electricity

Will modern retail replace traditional/wet markets?

Modern retail:

Based on experiences on rapid growth of modern retail from other parts of the world (America, Europe, Australia, South America) the **same was assumed for Africa and Asia.**

But there are crucial differences.

- **Modern retail in Asia and Africa** does **not offer** offered fresh food **at lower cost** than traditional retail
- There is also a strong **preference for “warm fresh meat”** = not chilled or frozen food in Africa and Asia.
- **Selection process** of meat may include even check of consistence /“touching” of meat
- Perception that **modern retail uses more “chemicals”** e.g. grow promoters & consequently different perceived meat quality compared to traditional retail

“premium shops”

Shops specialising in selling “health” fresh food at a premium (rather small outlets)

Co-existence of traditional and modern retail

For richer customers, wet markets and modern retail **may be complementary** rather than competitive

- people buying packaged food in supermarkets and fresh food in wet markets



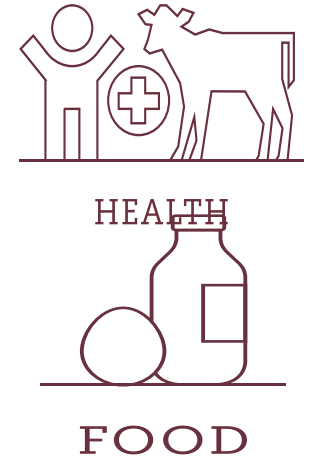
Photo credit: Chi
Nguyen ILRI

Shall we worry about wet markets?

Food safety

Wet markets often lack adequate infrastructure and food safety measures:

- **Hazards can be high, but risks can be low** if post processing involves a reliable control step
- **Evidence from the region suggests that the informal sector is not always dangerous and the formal sector is not always safe.**
- **The formal sector is more vulnerable** to system failures



Transmission of emerging diseases

- **Coronavirus** emergence has also been **associated with** sale of wild animals **in wet markets** but majority wild animals are not sold in wet markets.
- Role of wet markets in the recent pandemic not fully understood

How to reduce risk from wet markets

Attempt and challenges:

- **Improve infrastructure**
 - ✓ But without changing retailers behaviour and practice tends to be unsustainable or not scalable
 - ✓ **Training** retailers helps to improve food safety **but incentives needed**, to make improvements **sustainable**
- **Ban wet markets** have **usually failed** and often had serious un-intended consequences.
- So far there was **limited investment and research** into informal markets

What can be done differently?

Existing regulations sometimes inappropriate or not exist e.g. for small-scale slaughter (majority of slaughter facilities cant receive certification but still operates)

Rather gradual upgrading of existing structure than infrastructure change

- Provide simple technologies to make food safe (e.g. cheap, easy to clean surfaces)

Participatory, risk-based, demand-led approaches seem most promising (not-top down or purely regulatory)

Understanding health risk from informal markets (as opposed to presence of hazards) & **tackling most risky features first**

Implementing and **evaluating potentially scalable** and sustainable interventions



3. Food safety performance & interventions

- Evidence from Vietnam & Cambodia

- **Pork is most important meat** diet for consumers
- Most of this is **produced, slaughtered and sold through traditional value chains**
- **Food safety** has become an increasing **concern** (consumers & policymakers)
- **Little information on the actual risks** or how to manage them.

Evidence on pork safety risks (Vietnam)



Traditional retail



Street food



Canteens



„Boutique“ shops



Supermarket/
convenient shops



Indigenous pigs



Photo source: ILRI Hanoi, 2019

NEW Food safety performance tool (Safety, scalability and societal norms)

Safety:

- **Poor food safety outcomes** (*Salmonella*) across all pork retail types (modern and traditional)
- **1-2 out of 10 pork consumers** estimated to suffer from foodborne disease (*Salmonella*) annually
Estimate cost of hospitalization due to FBD ~ **US\$200 M/year**
- **Low risk from chemical hazards** (growth promoters, antimicrobials) and **pork parasitic zoonoses**
- **Value chain actors incorrectly perceive chemical hazards as most important**
- **VC actors relate “Safe Pork” to not using antibiotics/growth promoters** and less to poor hygiene

Scalability: Traditional markets and slaughter **will continue to provide most pork**

Gender: Women worry more frequently **about foodborne disease** than men.

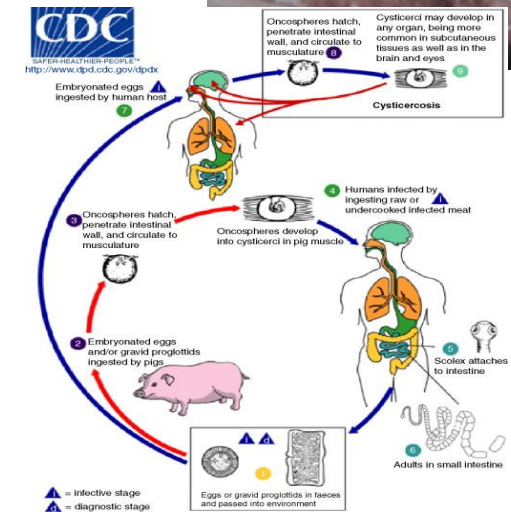
Evidence on food safety risks (Cambodia)



- **Presence of Salmonella** (moderate to high) in **chicken and pork** across **modern and traditional** retail (survey across all provinces)
- **Health risk assessment** – 1-2 consumers/10 of pork and chicken salad estimate to suffer from FBD due to Salmonellosis
- **Cross-contamination** at household important (e.g., same cutting board used for vegies and meat)
- **Low risk from pork parasitic zoonoses** (taenia spp., cysticercosis & trichinella spp.)



Photo source: ILRI SFFF Cambodia, 2019



Evidence from pork safety intervention (Vietnam)

Food Safety Interventions at slaughter (300-1000 USD)



Inox grid, separate clean/dirty zones, cleaning & disinfection, and training, certification (as incentive)

Significant hygienic improvement (hygienic indicator)

Food Safety Interventions at retail (40 USD)



Hygienic cutting board, separate meat/intestines/cooked products, cleaning & disinfection, training, scoring system for best retailers

Moderate hygienic improvement (hygienic indicator)

Food safety risk communication

Manuals, poster

Introduction of food safety nudges & guidelines

Training > 600 VC actors trained so far & > 40 media representatives



Food auction/willingness to pay

Consumer tend to **pay 16% more** for the intervened pork

COVID delayed interventions but helped to improve retailer compliance (e.g. us of disinfectant)



Evidence from pork safety interventions

(Cambodia)



កម្រាលដែលងាយសម្អាត អាចត្រូវបានផលិតក្នុងស្រុក និងមានតម្លៃទាប

Intervention package: Cost about 25.0 \$

- Training
- Frequent washing and disinfection
- Easy to clean surface & separation (fresh/cooked...)
- Hygienic cutting board
- Recognition (banner, certificates)



កម្រាលដែលពិបាកសម្អាត (ដូចជា ក្រដាសកាតុង ឬស្បូវ) អាចធ្វើឲ្យបាក់តេរីលូតហែស

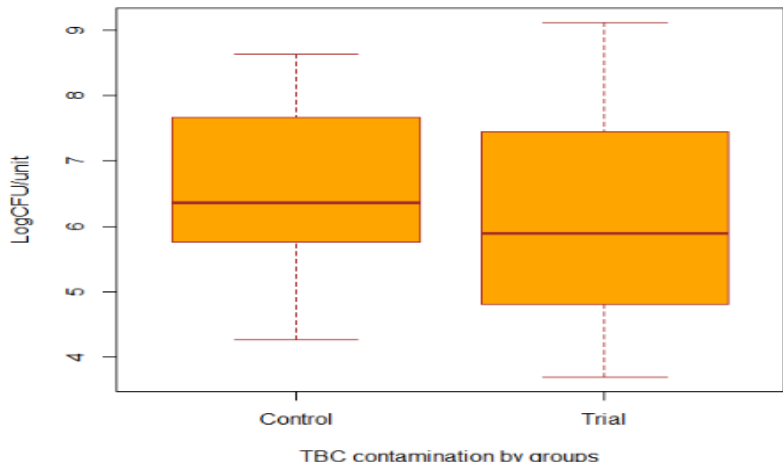


Photo source: ILRI SFFF Cambodia, 2020

Intervention package tested across 6 provinces and 360 retailers using RCT design (1st time ever)

- Improved food safety outcomes in intervention group

4. One Health and food safety

One Health perspective

One Health teams:

Vietnam:

Public health, vets, animal science, social science, economist, M&E experts, gender, animal welfare and behavior economist

Cambodia:

Public health, vets, animal science, M&E experts, gender, and behavior economist

But lack of private sector involvement!



KEY STEPS AND STAKEHOLDERS TO ENSURE GOOD IMPLEMENTATION

Steps/processes:

- Theory of change for retailers
- Participatory risk assessment
- Participatory diagnostic
- Formative research (e.g. cross-contamination at household)
- Interventions trial

Policy level/local support:

- Stronger in Cambodia than in Vietnam
- Concluded in large scale intervention for Cambodia

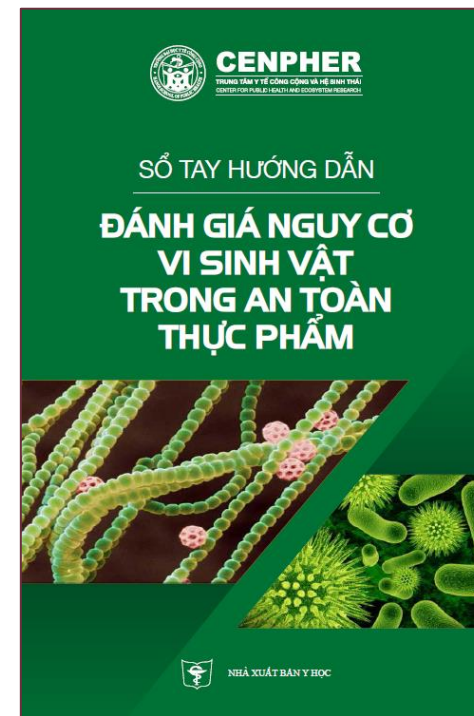
Stakeholders:

- National MARD/Sub DAH & GDAHP
- Provincial animal health workers
- Market managers
- Slaughterers & retailers
- Community members
- Media
- ...



Aligned capacity building to promote next generation food safety workers and risk communicators

- Meat inspection training in Vietnam, Laos, Cambodia
- Risk communicators
- Risk assessment guidelines on food safety related to biological and chemical hazards
- Food safety curriculum developments
- PhD and MCs



Higher level policy impact

- Landmark report on Food safety risk management report & recognised by high level (DPM of Vietnam)
- Contributions to UNFSS dialogues and summit, AT 1 & NAP for Food System Transformation
- Vietnam Food Safety Working Group (ILRI current chair)
- Vietnam Taskforce for FS Risk Assessment
- Food safety taskforce established (Cambodia)



Way forward & learnings

- ✓ Food system changes need to **address food safety risks**
- ✓ **Traditional retail plays an important role** and will remain to do so
- ✓ The **informal sector is not always dangerous as the formal sector is not always safe**
- ✓ Low-costs **interventions** at traditional slaughter & retail can **work, but suitable motivation and scaling needed** (will be addressed in larger food safety initiatives across seven provinces of Vietnam)
- ✓ **Ensure involvement of private sector**
- ✓ **Aligned capacity building:** trainings at different levels are key
- ✓ Interventions should be grounded by a **Theory of change** and **incentivised**

Way forward

One Health approach can help to:

- ✓ Ensure relevant expertise (in the team but also animal health workers, market managers, retailers) and a participatory processes
- ✓ Facilitate strong engagement of high level 'taskforce' e.g., through the Vietnam One Health Partnership (OHP)
- ✓ Facilitate an adequate community involvement and participatory approach



Photo credit: Chi Nguyen/Unger ILRI 2020-2022

Further readings:

Video: <https://www.youtube.com/watch?v=-CZVyxCG8Zk>

<https://www.worldbank.org/en/country/vietnam/publication/food-safety-risk-management-in-vietnam-challenges-and-opportunities>

<https://doi.org/10.1016/j.ijfoodmicro.2021.109163>

<https://link.springer.com/article/10.1007%2Fs00038-016-0921-x>

<https://doi.org/10.1007/s00038-016-0912-y>

<https://pubmed.ncbi.nlm.nih.gov/34064354/>


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<http://documents.worldbank.org/curated/en/415551490718806138/technical-working-paper>

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