Strategies to Prevent (STOP) Spillover

Development of Biosecurity and Biosafety-informed Design Principles for Physical Infrastructures of Live Bird Markets of Dhaka City, Bangladesh

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Background

- Live bird markets (LBMs) are considered high-risk interfaces for spreading avian influenza viruses due to inadequate infrastructure and poor biosecurity and biosafety practices.
- We developed context-appropriate design principles for physical infrastructures to ensure improved biosecurity and biosafety practices in LBMs to reduce disease transmission risk.

Methods

Study site: Dhaka, Bangladesh

Study timeline: March to October 2023

Data collection

- Conducted nine stakeholder workshops and meetings with biosecurity experts, veterinarians, anthropologists, architects, mechanical engineers, poultry industry experts, and LBM actors [Figure 1]

Figure 1: Ongoing group works for developing the LBM design

- Participants brainstormed and developed infrastructural designs through consensus of vendors and other stakeholders using bottom-up approach, then elicited feedback during plenary discussions [Figure 2]

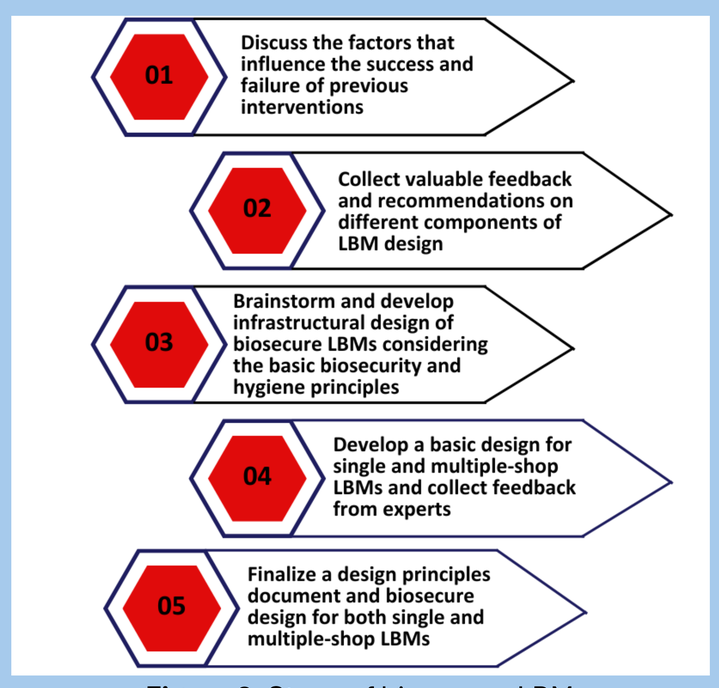

Figure 2: Steps of biosecure LBM infrastructural design development

Results

Three LBM designs have been proposed considering the variation of the LBMs in Dhaka city [Figure 3 and 4]:

- **Design 1:** Design for renovation of existing single-shop LBMs
- **Design 2:** Design for renovation of existing multiple-shop LBMs (manual and semi-automated poultry processing systems)
- **Design 3:** Design for construction of new multiple-shop LBMs

Results (cont..)

Developed biosecurity and biosafety-informed infrastructural designs for single and multiple-shop LBMs based on five safety and quality standards as follows:

1. **Separate slaughtering/processing areas:** separated by transparent glass or blinds to ensure visibility and transparency; accessible for workers only; adequate slaughtering and processing equipment [Figure 3, 4 and Figure 6-8]

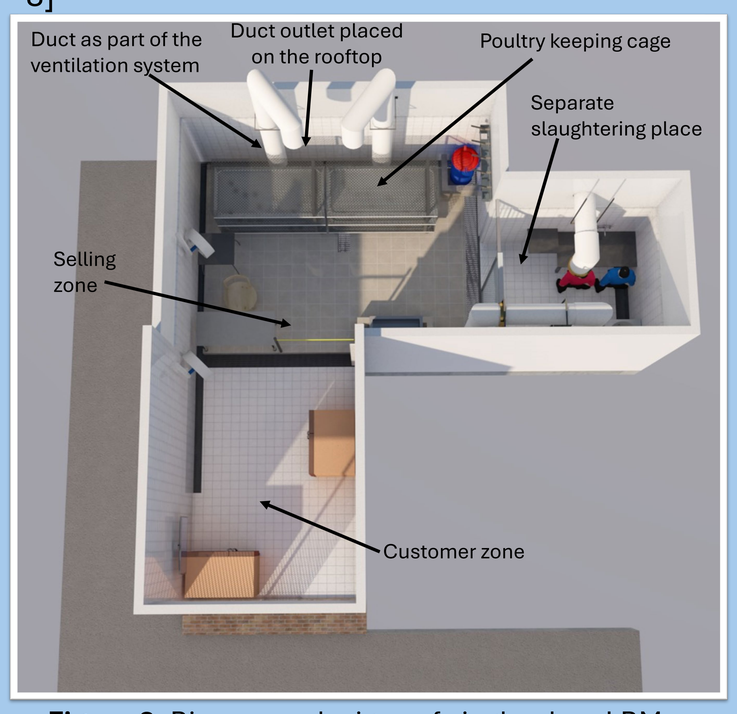

Figure 3: Biosecure designs of single-shop LBMs

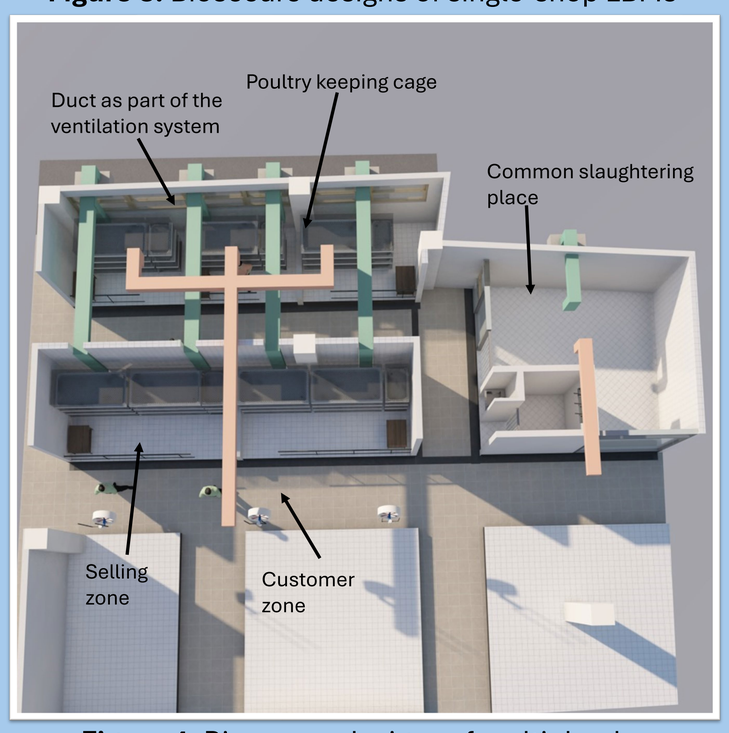

Figure 4: Biosecure designs of multiple-shop LBMs

2. **Improved ventilation:** unidirectional airflow from human to poultry to outside the shop; ensure air circulation for thermal comfort of poultry; easy duct and fan cleaning process [Figure 3 and 4]

Figure 5: High platform and drainage system

Results (cont..)

3. **Washable surfaces and implements:** non-slippery tile or flooring material; stainless steel or zinc-coated iron for cage and processing implements; multilayer metal cages with trays underneath each layer [Figure 5-8]

Figure 6: Poultry keeping cage

Figure 7: Processing table with handwashing facility and offal bin

Figure 8: Slaughtering cone, scalding arrangement, and defeathering machine with the lid

4. **Improved drainage:** concealed drain under floor, connected to central sewerage; sloped floor for smooth flow of wastewater [Figure 5]
5. **Sufficient water supply:** reserve tank with backup for sufficient water supply; hot water arrangement at the processing area [Figure 8]

Conclusions

- These designs are important for reducing pathogen persistence and aerosolization in LBM environments, to protect vendors and consumer health.
- Designs will be transferred to authorities for future renovations and new constructions of biosafety-informed LBMs.

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