



RESEARCH ARTICLE

Current Trends of Chicken Processing in Different Wet Marketplaces of Dhaka City: A Food Safety and Public Health Concern

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Abstract

Objective: This study aimed to characterize the meat-processing practices employed by butcher shops in Dhaka city and to assess the associated microbial contamination that may pose public health risks.

Materials and Methods: A standardized questionnaire was administered in 27 butcher shops located within several wet markets across Dhaka. In addition, raw chicken breast muscle samples were collected to determine microbial loads.

Results: A variety of live chicken breeds were available for sale in the wet markets; however, the facilities for hygienic slaughter and processing were generally inadequate. Although multiple types of poultry were present, live birds were not provided directly to customers. The majority of customers (90%) preferred skinless processed chicken, while only 10% purchased dressed chicken. Microbiological analyses revealed that the Total Coliform Count (TCC) ranged from 2.69 to 3.37 log CFU/mL, whereas the Total Viable Count (TVC) ranged from 3.73 to 4.61 log CFU/mL. Although these values fall within permitted limits, the detection of these microorganisms in meat products raises concerns regarding food safety.

Conclusion: The prevailing chicken processing practices in Dhaka's wet markets pose potential public health risks due to inadequate hygiene and the presence of microbial contaminants.

INTRODUCTION

Chicken meat is an excellent source of high-quality animal protein. It contains all essential amino acids as well as low-

lipid, high-biological-value unsaturated fatty acids that are important for maintaining a balanced diet¹. Its widespread consumption is attributed to its relatively low cost compared with other meat types, ease of preparation and high levels of

B-complex vitamins, phosphorus and other minerals. In Bangladesh, poultry production has expanded substantially over the past two decades due to the country's dense population and increasing consumer demand. Approximately one million chickens are slaughtered daily in Dhaka city, the nation's largest center for poultry marketing².

In wet markets, most chickens are sold either live or freshly slaughtered and dressed. For many people in developing countries, wet markets serve as the primary source of daily food supplies. These markets are therefore essential for providing local communities with fresh fruits, vegetables, fish and meat³. Raw commodities-particularly fruits and vegetables-are routinely sprayed with water to maintain a fresh appearance and water is also used to clean market floors⁴. Such moist environments facilitate microbial growth, microcolony formation and biofilm development. Moreover, food products are displayed openly and sold at ambient temperatures. Wet markets, typically located in residential areas, remain major hubs for fresh food distribution⁵.

The majority of poultry meat in Bangladesh originates from unorganized wet markets, with only 5-10% supplied by formal processing facilities⁶. In these traditional markets, poultry is slaughtered and processed in open spaces, often using unsanitary tools and without proper hygiene measures. Additionally, no standardized system exists for the disposal of slaughter waste. Such practices elevate the risk of foodborne pathogens being transmitted among vendors, processors and consumers. Consequently, wet markets are critical points for the dissemination and contamination of foodborne pathogens. Globally, numerous zoonotic foodborne diseases are associated with poultry meat and studies indicate that broiler meat in Bangladesh exhibits a high microbial load capable of causing foodborne illness⁷.

Ensuring food safety has become increasingly important at both national and international levels. Therefore, this study was undertaken to highlight the prevailing conditions of poultry slaughtering, processing and by-product management in Dhaka's wet markets. The study also aimed to evaluate the extent of microbial contamination that may compromise public health.

MATERIALS AND METHODS

Study design: The survey was conducted in selected meat-selling centers across Dhaka city to document poultry meat processing practices in various wet markets. The primary study locations included Mirpur-2 Kachabazar, Mirpur-6 Kachabazar and Battola Kachabazar, Uttara. A total of 27 shop owners and their assistants participated. The suppliers were interviewed in person during regular business hours without prior

notification to avoid influencing their routine practices. Before administering the questionnaire, respondents were informed about the purpose of the study and assured of the confidentiality of their responses. The interviewer read the questionnaire aloud in the participants' native language and recorded their answers. Adequate time was provided for respondents to complete all items.

Data collection: Data were obtained through face-to-face interviews. Prior to each interview, the study objectives were clearly explained and participants were encouraged to provide accurate information. The questionnaire items were simple and direct, with clarifications offered when necessary.

Microbiological analysis: Total Viable Count (TVC) and Total Coliform Count (TCC) were determined following the standard procedures recommended by 3M Petrifilm. Briefly, 0.9 mL of chicken breast meat collected from the marketplaces was homogenized and subjected to a tenfold serial dilution using Phosphate-buffered Saline (PBS). Subsequently, 1 mL of the diluted sample was inoculated onto Petrifilm plates and incubated at 37°C for 24 hrs. After incubation, microbial colonies were enumerated and expressed as colony-forming units per milliliter (CFU/mL).

Statistical analysis: Data are presented as Mean \pm standard deviation (SD). Descriptive statistical analyses were performed using Microsoft Excel.

RESULTS AND DISCUSSION

Demographic profile: Table 1 presents the demographic characteristics of the poultry meat sellers involved in the survey. The majority of respondents were male (96.27%), while only 3.73% were female. More than half of the respondents (55.56%) were middle-aged, followed by young adults (26.92%) and older individuals (7.40%). Notably, 11.12% of the respondents were below 18 years of age, indicating the involvement of minors in poultry-related occupations. Most respondents (96.30%) reported poultry selling as their primary occupation. As Bangladesh is a lower-middle-income country, 66.67% of respondents reported an income range of BDT 21,000-50,000 per month from this profession. The sellers had work experience ranging from 1 to 30 years, suggesting long-term engagement in poultry trading, likely due to the rapid expansion of the poultry sector in Bangladesh. In several cases, poultry selling was operated as a family-run business.

Availability of poultry in the market: The availability of poultry species in the surveyed markets is shown in Table 2. Broilers, spent layer birds and Sonali chickens were the

Table 1: Demographical distribution of the respondents

Parameters	Category	Number	Percentage
Sex	Male	26	96.27
	Female	1	3.73
	Others	0	0.00
Occupation type	Primary occupation (Poultry shop)	26	96.30
	Secondary occupation (any)	1	3.70
Owner's Income range (monthly)	Below 10 thousand	0	0.00
	11 to 20 thousand	1	3.70
	21 to 50 thousand	18	66.67
	51 to 99 thousand	5	18.52
	1 to 1.5 lakhs	2	7.40
Age (Years)	1.51 to 2 lakhs	1	3.70
	Children (0-18)	3	11.12
	Young aged (19-30)	7	25.92
	Middle-aged (30-50)	15	55.56
Staff member's salary range	Old aged (>50)	2	7.40
	Below 10 thousand	1	3.70
	11 to 20 thousand	26	96.30
Respondents Experience years	No experience	0	0.00
	Less than one year	2	7.40
	1 to 5 years	7	25.93
	6 to 15 years	10	37.04
	16 to 30 years	7	25.93
	More than 30 years	1	3.70

Table 2: Selling of different poultry birds

Poultry type	Yes (%)	No (%)
Broiler	100.00	0.00
Layer	100.00	0.00
Sonali	100.00	0.00
Indigenous chicken	22.22	77.78
Quail	14.82	85.18
Ducks	29.63	70.37

most commonly available types. These varieties have been selectively bred for enhanced performance at relatively low cost. Sonali chickens, a crossbreed between Rhode Island Red (RIR) and Fayoumi, closely resemble indigenous chickens and require less intensive management, making them well suited to tropical climates. Their texture and flavor also contribute to higher consumer preference compared with broilers.

The national requirement for meat is approximately 120 g/day/head, whereas current availability is estimated at 143 g/day/head¹⁰. Poultry meat serves as the primary contributor to meeting this demand. Because red meat is three to four times more expensive than poultry, chicken remains the most affordable and accessible animal protein source in Bangladesh.

Other poultry species-such as indigenous chicken, quail and duck-showed relatively lower market presence, with availability rates of 22.22, 14.82 and 29.63%, respectively. Vendors typically did not stock these species except in specialized shops, largely due to their higher production costs and lower consumer demand. For example, indigenous chicken is nearly three times more expensive per kilogram than broiler meat, making it inaccessible to many consumers.

Figure 1 indicates that most vendors (40.74%) purchased birds from districts surrounding Dhaka, as farms within the city cannot meet the substantial demand.

Processing facilities in the market: Table 3 highlights the inadequate hygiene measures and slaughterhouse facilities in the surveyed wet markets, presenting significant public health concerns. Poor hygienic handling is strongly associated with outbreaks of foodborne pathogens. Common pathogens such as *Escherichia coli*, *Salmonella enterica*, *Campylobacter* spp. and *Listeria monocytogenes* are frequently detected in food-producing animals¹¹. High stocking density within shops increases the risk of pathogen spread among birds. Furthermore, the presence of diseases such as avian influenza in layers and *Campylobacter* in broilers poses additional hazards.

Despite growing public awareness of safe livestock management practices¹², poultry sellers in this study lacked essential personal protective equipment. Tools such as aprons, gloves, masks and hair covers were rarely available. Sellers also lacked the institutional support required to implement systematic hygiene protocols¹³. Commonly available tools included knives, chopping boards, funnels, detergents/bleaching powder and basic stockyards. Some vendors had access to dressing machines (62.97%) and hot water (62.97%). However, knives and cutting boards, especially when used repeatedly without proper sanitation, can serve as significant sources of cross-contamination¹⁶.

Insufficient access to hand-washing and sanitization facilities further increases the risk of foodborne illness

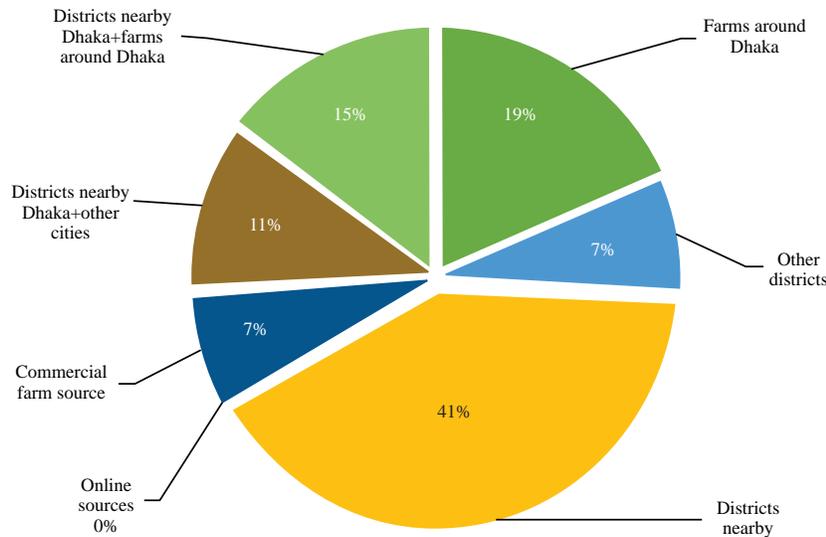


Fig. 1: Purchasing sources of poultry birds

Table 3: Equipment used and common facilities availability in poultry slaughterhouses

Equipment/Facilities	Yes (%)	No (%)
Apron	0.00	100.00
Hand gloves	0.00	100.00
Mask	0.00	100.00
Hair cover	0.00	100.00
Sharp knives	100.00	0.00
Chopping board	96.60	3.40
Dressing machine	62.97	37.03
Funnel	100.00	0.00
Hot water	62.97	37.03
Running tap water	0.00	100.00
Basin with soap	0.00	100.00
Hand sanitizer	0.00	100.00
Bleaching powder/detergents	96.60	3.40
Stockyard	100.00	0.00

transmission. Maintaining personal hygiene is critical in reducing microbial contamination¹⁷. A recent report found that 57.2% of poultry vendors did not follow personal hygiene measures before processing chickens⁶. The lack of proper hygiene not only compromises food safety but may also deteriorate the quality of poultry meat¹⁶.

Chicken processing in the wet market: Figure 2 illustrates consumer preferences for chicken purchasing and processing. Interestingly, none of the consumers opted to purchase live birds. Due to limited space and lack of slaughtering facilities at home, consumers rely on market-based processing. Traditionally, customers select live birds and the seller performs on-site slaughtering, a practice considered safe and trustworthy. Consumers often prefer to witness halal slaughter in compliance with Islamic Shariah¹⁷.

In this study, 90% of consumers preferred skinless chicken, produced by removing feathers, skin and visceral

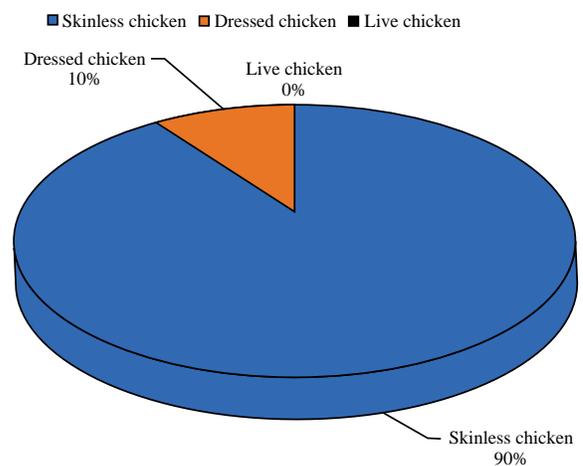


Fig. 2: Processed chicken taken by the customers

organs after slaughter. This preference may be linked to lower fat content, perceived cleanliness and greater culinary versatility¹⁸. Chicken skin typically contains 8-12% protein and 30-40% fat¹⁹ and is rich in collagen types I and III, which have beneficial biological functions¹⁹. In the wet market, vendors commonly immerse carcasses in hot water before defeathering and evisceration. However, many consumers avoid this practice due to concerns over hygiene and safety. Such post-slaughter handling increases the likelihood of microbial contamination and foodborne illness²¹.

Additionally, workers in poultry processing environments are at risk of exposure to drug-resistant strains of *Enterococcus*, *Staphylococcus aureus* and *Escherichia coli*^{22,23}. According to the survey, only 10% of consumers purchased dressed chickens.

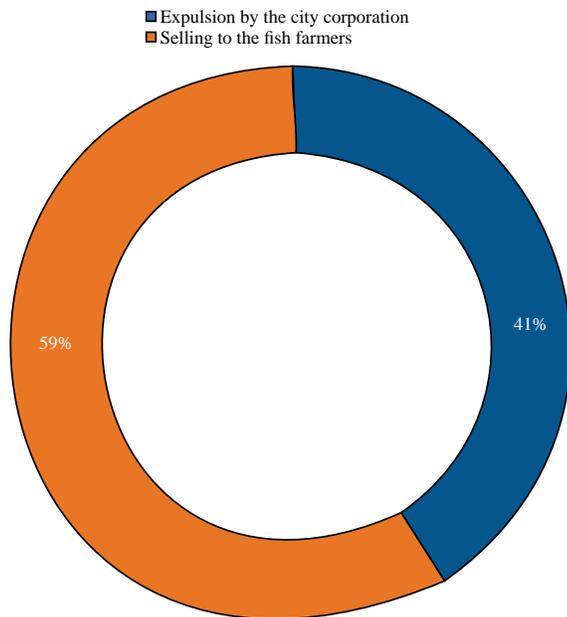


Fig. 3: Utilization of inedible by-products

By-product management: Poultry processing generates various wastes, including excreta, feathers, carcass remains, feed and water spills, dead birds, broken eggs, wastewater and bedding materials²⁴. These by-products can be valuable raw materials for producing feather meal, biodiesel, biodegradable plastics, fertilizer and manure²⁵. In the surveyed markets, most poultry by-products (59%) were sold to fish farmers, while the remainder was disposed of by the Dhaka City Corporation (Fig.3). Previous reports indicate similar practices, where vendors retain offal and other usable components but discard solid wastes and feathers in municipal waste bins¹⁶.

Utilization of nonpreferred edible chicken parts: The growing demand for chicken meat leads to the generation of substantial quantities of slaughter by-products, including the kidneys, liver, heart, spleen, skin and abdominal fat. These by-products constitute more than 37% of the live weight of broiler chickens²⁷. In addition to the primary meat cuts, some consumers also obtain edible by-products such as the gizzard, shank, head, liver and heart, typically without incurring additional costs. In many Asian countries, these edible by-products are commonly consumed as part of traditional diets²⁸.

As illustrated in Fig. 4, the liver and shank were the most frequently selected by-products (40%), whereas the head and heart were the least selected (5%). The consumption of poultry by-products varies widely across regions and is shaped by cultural norms, religious beliefs and consumer preferences. In

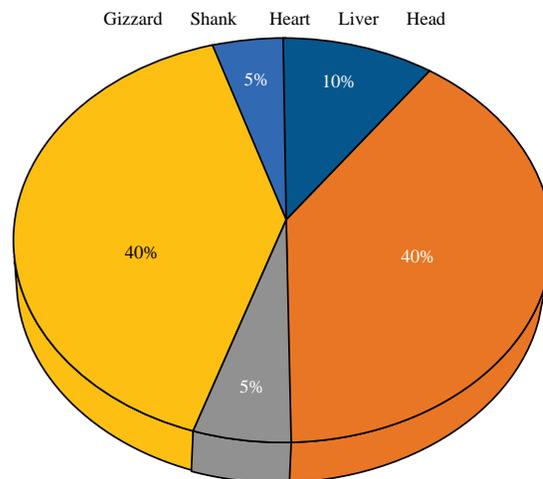


Fig.4: Taking nonpreferred edible chicken parts by the customers

certain regions, specific by-products are considered valuable and nutritious, while in others they are regarded as undesirable or inedible²⁹. Although, poultry by-products offer significant nutritional benefits, misconceptions about their safety persist among some consumers. Proper education on hygienic processing and handling is essential to ensure their safe consumption. With the continued expansion of poultry production and processing systems, the availability and utilization of edible by-products are expected to increase correspondingly³⁰.

Impact of poultry processing on public health: In many developed countries, the processing of live chickens in open public spaces is uncommon due to the associated health risks. Following the emergence of the H7N9 avian influenza subtype in 2013, numerous Chinese cities temporarily closed live poultry markets and imposed restrictions on live bird trade to mitigate viral transmission³¹. Several countries have since implemented regulatory measures promoting the consumption of chilled and frozen poultry meat³². Chilled chicken is processed and rapidly cooled to maintain an internal carcass temperature of 0-4°C and is subsequently marketed as “fresh” chicken³³.

In contrast, the conditions observed in the present study indicate a highly unsafe environment with significant public health implications. Processing practices in wet markets facilitate the transmission of microbial agents and zoonotic infections. These markets often serve as reservoirs for pathogens because numerous vendors selling meat, fish and vegetables operate in close proximity, enabling cross-contamination. Additionally, the methods used for packaging

Table 4: Microbial count (\log_{10} CFU/mL) (Mean \pm SD)

Phase	TVC	TCC
	(Mean \pm SD)	
1	4.61 \pm 0.031	3.37 \pm 0.073
2	3.97 \pm 0.045	2.83 \pm 0.128
3	3.73 \pm 0.079	2.69 \pm 0.088

processed meat in wet markets further compromise food safety. Consequently, poultry workers and consumers face increased health risks from improper processing and handling.

Microbiological analysis: Table 4 summarizes the microbial load of poultry meat based on Total Viable Count (TVC) and Total Coliform Count (TCC). Food contamination remains a major global public health concern and contamination can occur at any stage of the production and distribution chain³⁴. TVC is an important indicator of hygiene conditions during slaughter and processing. In the present study, the highest mean TVC was 4.61 log CFU/mL, while the lowest was 3.73 log CFU/mL, values that fall within acceptable microbial limits. Previous studies have reported both higher TVC values (e.g., 8.46 log CFU/mL in raw chicken meat) and lower values than those observed in this study³⁵⁻³⁷.

Elevated coliform counts in broiler meat in live bird markets are typically linked to fecal contamination during slaughter, improper evisceration and inadequate personal hygiene among handlers³⁸. The acceptable upper limit for fecal coliforms in fresh poultry meat is 4 log CFU/mL³⁹. As shown in Table 4, the highest mean TCC recorded in this study was 3.37 log CFU/mL, which is consistent with previous findings from research conducted in Dhaka³⁵.

CONCLUSION

In Bangladesh, most poultry are slaughtered in roadside or densely populated marketplace facilities that often lack adequate water supplies for handwashing and for cleaning knives and other equipment. In addition, slaughterhouse workers typically receive insufficient training in sanitary procedures and personal hygiene, contributing to microbial contamination of poultry carcasses. Consequently, poultry eat is exposed to microbial hazards at multiple stages of the wet-market processing chain, posing significant concerns for food safety and public health. Further research is warranted to assess the prevalence and levels of contamination by *Salmonella* spp. and coliform bacteria across broader geographical regions of Bangladesh, as such information is essential for developing evidence-based and effective control strategies.

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