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Current status of retail broiler meat supply chain in Salem and Kallakurichi districts of Tamil Nadu

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Abstract

A survey was conducted at 60 retail broiler meat outlets in the Salem and Kallakurichi districts of Tamil Nadu, India, to assess hygienic conditions and meat handling practices. Majority of these shops operate as roadside stalls and house birds in basic wire cages. Only 5% of the establishments use portioning machines for meat cutting. Approximately 50% had galvanized iron sheet roofing, while 66.5% had feature cement concrete flooring. Live birds were primarily sourced from wholesale suppliers (86.5%). 76.5% of the shops provided only drinking water upon arrival and 48.5% neglect the feed withdrawal protocols. Additionally, 35% allowed rest period for birds prior to slaughter. Hygiene standards were generally poor, with 75% of staff wearing aprons, limited use of gloves and head coverings were observed. Plastic bags were commonly used for packaging and carcass washing was minimal due to limited water availability. 8.5% of the shops had access to tap water and others relied on bucket washing, often reusing a single bucket for 5 to 12 birds. Refrigeration facilities were present in 18.5% of the outlets. Waste disposal practices were inadequate and routine cleaning was rarely observed. To improve sanitary conditions and ensure safe meat handling, regular inspections and organized training programs for meat handlers are essential. These measures will help promote adherence to proper hygiene protocols across retail poultry outlets.

Keywords: Basic facilities, meat handler hygiene, retail shops status, food safety

1. Introduction

Poultry industry in India has experienced consistent and significant growth in both egg and meat production over the past decade, highlighting its increasing role in meeting the nation's protein requirements. Characterized by its self-reliant and technology driven nature, the industry is particularly well-established in the southern states of India. According to the Department of Animal Husbandry and Dairying's annual report (2022-23), poultry meat contributed 51.14% of the country's total meat production of 9.77 million tonnes. With an estimated annual production of around 5 million tonnes, broiler meat production is currently witnessing an annual growth of 4.95% (BAHS, 2024) ^[1].

Poultry meat is the most popular choice among consumers due to its affordability and the absence of religious taboos associated with its consumption. Commercial broilers account for 85-90% of all chicken meat in India, with the remaining 10-15% sourced from native local chickens sold in unorganized markets (Rajkumar *et al.*, 2016) ^[2]. Chicken meat is also widely recognized as a healthier alternative to red meat, being lower in fat and cholesterol while possessing a high biological value and net protein utility (Muthulakshmi *et al.*, 2021) ^[3]. The sustained increase in demand for broiler meat is driven by these shifting consumer preferences and its competitive pricing compared to other meat types.

Despite this robust growth, the supply chain for broiler meat, especially in developing countries, faces significant challenges related to hygiene and sanitation. In many regions, fresh meat is distributed through traditional markets or small stalls where licensing, inspection and supervision were not routinely practiced.

This lack of oversight, combined with traditional meat processing and handling practices, can lead to poor meat quality and increased risk of foodborne illnesses (Gurmu *et al.*, 2013) [4]. Diseases originating from animals can spread to humans through direct contact, environmental exposure, or unhygienically processed meat consumption (Chlebicz and Slizewska 2018) [5].

Several bacterial pathogens, including *E. coli*, *Salmonella* and *Listeria monocytogenes*, can cause meat-borne diseases by infecting animals or contaminating meat during processing (Bintsis, 2017) [6]. Contamination can occur at various stages, from processing plants to retail outlets, through contact with equipment, human handlers and environmental sources like air and water (Lyu *et al.*, 2021) [7]. Meat is a major source of food-borne diseases, it is crucial to evaluate the sanitary conditions throughout the production and distribution chain to develop effective preventive strategies and control measures. Several factors, including improper food handling, inadequate food safety laws, poor regulatory systems and a lack of awareness among butchers and consumers, contribute to the deterioration of meat quality (Guo *et al.*, 2017; Tagar and Ahmed, 2021) [8, 9]. With this concern, study was planned to assess the current status of the retail broiler meat supply chain in the Salem and Kallakurichi districts of Tamil Nadu, India. Specifically, the research aims to evaluate the infrastructure, facility design, water availability, cleaning and sanitation practices, personal hygiene and waste disposal systems in local retail poultry meat shops. This information will serve as essential baseline data for understanding and improving meat safety standards in the region.

2. Materials and Methods

This study was conducted by descriptive survey based approach to assess the retail broiler meat market in the Salem and Kallakurichi districts of Tamil Nadu. A total of 60 retail broiler shops, 30 from each district were selected using a convenience sampling method to ensure a representative mix of urban and semi-urban retail points. To ensure accurate data collection from shop owners and butchers, a detailed interview schedule with 25 variables was prepared in the local Tamil language. The survey covered key operational aspects, including procurement, slaughter methods, processing, handling, packaging, transport practices and shrinkage loss during transport.

The data obtained from the interview schedule were analyzed using descriptive statistics and findings from the collected data was grouped and presented as frequencies and percentages to provide a clear and comprehensive summary of the current status of the retail broiler meat supply chain of the study area. This methodology was designed to gather essential baseline data on infrastructure, hygiene practices and the overall supply chain to inform future preventive and control strategies.

3. Results and Discussions

Survey on 60 retail broiler meat shops across the Salem and Kallakurichi districts provided a detailed report on current supply chain status, revealing both the established logistical practices and significant gaps in hygiene and infrastructure.

3.1 Operational Status and Infrastructure

The operational status and infrastructure of retail broiler meat shops in Salem and Kallakurichi districts of Tamil Nadu (Table 1) revealed that all retail broiler meat shops operated

on a daily basis (100%), with 80% of shops holding FSSAI licenses. However, the physical infrastructure of these businesses presents a more mixed picture. Majority of shops (60%) were found to be located roadside within town limits and 48% were of medium size (200-300 sq.ft). Similarly, Tagar and Ahmed (2021) [9] also reported that most of the poultry meat in Hyderabad and Jamshoro districts of Pakistan were supplied from small, unlicensed poultry shops that lack proper facilities. These roadside slaughter units often do not follow hygiene standards, making them possible sources for the spread of harmful germs. Further, Das and Biswas (2003) [10] also pointed out that only 10% of birds in India were processed in modern and hygienic facilities. Most poultry is still slaughtered without stunning in local retail market stalls or roadside shops, in front of customers. In the present study, the dominant infrastructure (50%) consisted of GI sheet (galvanized iron sheet) roofs and cement flooring. This combination of formal licensing with basic, often informal, physical setups indicates a market where regulatory compliance exists alongside infrastructural limitations, which could affect hygiene and product quality, especially in a tropical climate.

Table 1: Operational status and infrastructure of retail broiler meat shops in Salem and Kallakurichi districts of Tamil Nadu

Particulars		Status (Total shops: 60)		
		No of Shops	Percentage	
Experience	< 10 years	36	60%	
	11-20 years	12	20%	
	> 20 years	12	20%	
Location	Sandy and road side	2	3%	
	Town and road side	36	60%	
	On road side	22	37%	
Size	Small (< 200 sq.ft.)	6	10%	
	Medium (200-300 sq.ft.)	29	48%	
	Large (> 300 sq.ft.)	25	42%	
FSSAI Registration		48	80%	
Daily based shop		60	100%	
Trainings attended		0	0%	
Infrastructure	Partition		25	42%
	Rooftop	Asbestos	9	15%
		Concrete	7	12%
		Concrete with GI	6	10%
		GI sheet	30	50%
		GI with Coir roof shed	1	1.5%
		Open	1	1.5%
		Steel sheet	5	8.5%
		Tiled roof	1	1.5%
	Water Facility		60	100%
	Floor	Cement	40	66.5%
		Cement and Mud	6	10%
		Only mud	7	11.5%
		Tiles	5	8.5%
Tiles and Cement		2	3.5%	

3.2 Supply chain and transport logistics

The supply chain for live birds and transport logistics of retail broiler meat shops in Salem and Kallakurichi districts of Tamil Nadu is primarily handled by wholesale suppliers, who provide 86.5% of the live birds, typically ranges between 2-3 kgs (Table 2). Similarly, Pandi *et al.* (2012) [11] noted that the broiler industry mainly functions through live bird or wet markets, where chicken were sold live and slaughtered on the spot in front of customers. This practice is influenced by consumer beliefs that freshly slaughtered meat is of better quality, since problems with frozen meat often appear only after it is thawed.

Table 2: Supply chain and transport logistics of retail broiler meat shops in Salem and Kallakurichi districts of Tamil Nadu

Particulars		Status (Total shops: 60)	
		No of Shops	Percentage
Pre slaughter weight	< 2 kg	5	8.5%
	2-3 kg	55	91.5%
	> 3 kg	0	0%
Source	Wholesale supplier	52	86.5%
	Own wholesale distributor	6	10%
	Own/ integrated farm	2	3.5%
Time taken for transport	< 1 hr	9	15%
	1-2 hrs	11	18.5%
	3-4 hrs	30	50%
	> 4 hrs	10	16.5%
Mode of transport	LMV	36	60%
	HMV	24	40%

The survey results (Table 2) indicates that all shops utilized portable electronic weighing balance for measuring bird and

meat, implying a standardized approach to sales. The transport of live birds was found to be relatively efficient; 50% of shops reported a supply time of 3-4 hours from farm to the retail outlet as clearly emphasized by Kannan *et al.* (1997) ^[18] where broilers were placed in crates (nine birds per crate) and transported for three hours to the processing plant. The most common transport method (60%) was light motor vehicles (LMVs) carrying approximately 900-960 birds in 60 cages. These findings indicates well established and streamlined logistical network for the movement of live birds within the region.

3.3 Bird handling and pre slaughter practices

While 76.5% of retailers provided water for stress relief, a rest period of 3-6 hours was given by 35% of shops (Table 3), which is generally insufficient for proper stress recovery. Previous studies on poultry transport stress suggested that birds required adequate rest and rehydration to recover before slaughter (Rajkumar *et al.*, 2016) ^[12].

Table 3: Bird handling and pre slaughter practices of retail broiler meat shops in Salem and Kallakurichi districts of Tamil Nadu

Particulars		Status (Total shops: 60)	
		No of Shops	Percentage
Stress relieving method	Only drinking water	46	76.5%
	Drinking water with fan	6	10%
	Drinking water and Sprinkling water with fan	1	1.5%
	Drinking water and Sprinkling water	1	1.5%
	No water and others	6	10%
Resting place	Only cages	35	58%
	Cages with deep litter system	14	23%
	Only deep litter system	11	19%
Aware of pre and post-harvest losses	Weight Loss	0	0%
	Weep loss	0	0%
	Quality loss	0	0%
	Fabrication loss	0	0%

Furthermore, feed withdrawal was not followed in 48.5% of the shops (Table 3). These inadequate practices can increase bird stress, potentially compromising meat quality, leading to higher shrinkage loss. A critical finding was that retailers had no awareness on pre and post-harvest losses, which directly impacts their business and the final product quality.

3.4 Hygienic practices

From the present study, 50% were found to be aware of hygienic meat production, 75% of butchers were using aprons during slaughter and the aprons were not cleaned regularly (Table 4). For carcass washing, 55% of shops used a bucket of water for a minimum of five birds (Table 4). Mehta and Nambiar (2008) ^[12] reported that in India, about 95% of chicken were being butchered by retailers under poor hygienic conditions. This trend continues mainly because of consumer preference for live or freshly slaughtered poultry and market demand. Similarly, Muthukumar *et al.* (2021) ^[17] reported that many retail meat shops lack the basic facilities necessary for clean handling or proper display of meat. Chicken were slaughtered in front of customers and sold in shops located in residential areas. Moreover, this practice is a significant

source of cross-contamination, a well-documented risk factor for the spread of bacteria like *Salmonella* and *E. coli* (Bhaisare *et al.*, 2014; Sharma *et al.* 2019) ^[13, 14].

The survey also revealed that availability of cold storage units was minimal due to a lack of knowledge and compulsory daily sales (Table 4). Majority of meat was supplied fresh, with higher demand on weekend and festival days and minimal supply to hotels. Saran *et al.* (2005) ^[15] noted that India's broiler market mainly functions through the sale of live birds and slaughtered at retail shops for customers. This system exists largely due to the limited availability of cold storage facilities and consumer preference towards freshly slaughtered poultry over chilled or frozen meat.

Results on packaging indicated that 46.5% of shops utilized recycled polythene carry bags for packing raw meat (Table 4), a practice that poses both environmental and food safety concerns. The cleaning methods employed were basic, with shops primarily using phenyl and soap, while chopping boards were only scraped rather than properly cleaned. Gupta *et al.* (2024) ^[16] reported that 80% of retail meat shops used tap water to clean tools and offal after slaughter.

Table 4: Hygienic practices of retail broiler meat shops in Salem and Kallakurichi districts of Tamil Nadu

Particulars			Status (Total shops: 60)	
			No of Shops	Percentage
Awareness of hygienic meat production			30	50%
Hygienic approach followed	Only Aprons (Not washed)		45	75%
	Aprons with Processing table (SS)		1	1.5%
	Aprons with Poultry portioning machine		3	5%
	Gloves and head caps		0	0%
	No approach		11	18.5%
Carcass washing method	Running tap water with mesh like vessel		5	8.5%
	Water in Bucket	< 5 birds	33	55%
		6-10 birds	14	23.5%
		> 11 birds	1	1.5%
	One separate jug or bucket of water/ bird		7	11.5%
Cut-up parts	With Portioning machine		3	5%
	With knife only		29	48.5%
	No cut-ups		28	46.5%
Availability of Refrigerator/Freezer facilities			11	18.5%
Methods of packaging meat	Only Plastic covers		28	46.5%
	Plastic covers and Bulk plastic bags		5	8.5%
	Plastic covers and vessels for bulk		24	40%
	Plastic covers, Bulk plastic bags and vessels for bulk		3	5%
Cleaning / Disinfection of the shop	Floor (Dettol/ Phenyle/ Bleaching powder)		60	100%
	Knife/ Equipment	Hot water with soap	1	1.5%
		Only soap	25	41.5%
		Only water	34	56.5%
	Utensils	Only soap	40	66.5%
		Only water	20	33.5%
	Chopping Wood	Machine scrapping	8	13.5%
		Machine scrapping with turmeric wash	3	5%
		Machine scrapping with chicken skin	1	1.5%
		Hand scrapping	39	65%
Hand scrapping with turmeric wash		9	15%	

3.5 Waste disposal practices

The waste disposal practices emerged as a significant and widespread issue (Table 5). The municipality in Kallakurichi town took care of waste disposal; this service was not provided in other parts of the district, which was a major problem for retailers. These findings support the conclusion that traditional, unorganized retail systems often lack the necessary infrastructure and knowledge to ensure proper food safety (Gurmu *et al.*, 2013) ^[4]. Valuable parts of the dressed carcasses, such as head and feet, were supplied to hotels and

local bars (Table 5). Offals and intestines were sold for use as feed for pigs and fish (Table 5). However, feathers were improperly disposed of in common pit areas, near lakes, and on the outskirts of town (Table 5). This improper disposal, resulting from the lack of designated municipal collection points, poses serious public health and environmental risks by creating breeding grounds for pests and pathogens. Muthukumar *et al.* (2021) ^[17] emphasized that due to inadequate storage and slaughter facilities, a substantial amount of meat and byproducts often goes to waste.

Table 5: Waste disposal practices at retail broiler meat shops in Salem and Kallakurichi districts of Tamil Nadu

Particulars		Status (Total shops: 60)	
		No. of Shops	Percentage
Way of Disposal	Only in Common Garbage Pit	2	3.5%
	Feed for Pigs and Pets and disposed in pits	29	48.5%
	Feed for Fishes and disposed in pits	6	10%
	Feed for pigs, pets, fish and disposed in pits	1	1.5%
	Disposed in Municipality vehicle	17	28.5%
	Disposed in Municipality vehicle and fish feed	2	3.5%
	Any other (Hotels, local bars, etc.)	3	5%

4. Conclusion

The retail broiler meat supply chain in the Salem and Kallakurichi districts features an efficient logistical network, yet it is plagued by significant deficiencies in hygiene, animal welfare, and waste management. While the market's dependence on wholesale suppliers and rapid transportation is strength, the inadequate pre-slaughter handling, poor sanitation, and unhygienic waste disposal practices pose clear risks to public health and environmental sustainability. These findings establish a critical baseline, underscoring the urgent need for targeted education and training programs for

retailers, as well as implementation of standardized sanitation and waste disposal policies by local authorities. The results of this study align with existing literature on the challenges faced by unorganized poultry sectors in developing countries and provide a strong foundation for future interventions aimed at enhancing food safety in the region.

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