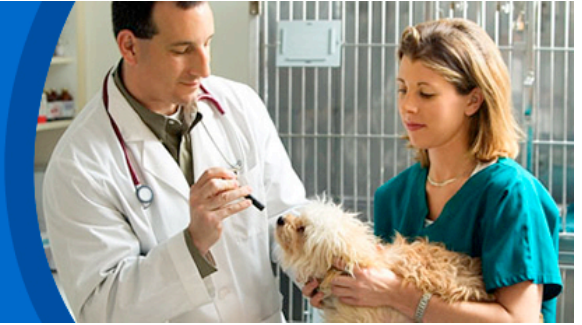




International Journal of Veterinary Sciences and Animal Husbandry



ISSN Online: 2456-2912
NAAS Rating (2026): 4.61
IJVSAH 2026; SP-11(9): 169-176
www.veterinarypaper.com
Received: 16-06-2026
Accepted: 03-08-2026
Published: 25-09-2026

The names and affiliations of all authors are provided below, following the references.

Assessment of hygiene and food safety practices in retail chicken meat shops of Kadapa district, Andhra Pradesh, India

BV Vivekananda Reddy¹, P Karthikeya Dhinakar², Shaik Adam Safiullah³, G Bhuvan Chandra⁴, E Naga Mallika⁵, R Sai Dilip Gupta⁶, Ch. Raja Thimma Reddy⁷

DOI: <https://www.doi.org/10.22271/veterinary.2026.v11.i9Sc.3793>

ABSTRACT

The present study was conducted to assess hygiene and food safety practices in retail chicken meat shops of Kadapa district, Andhra Pradesh, India. A cross-sectional survey was carried out in 200 randomly selected retail chicken meat shops located in Kadapa and Proddatur municipalities using a structured questionnaire comprising 20 questions, supplemented by direct observation of facilities and practices. Data were expressed as frequencies and percentages, and differences in response distributions were evaluated using the chi-square goodness-of-fit test. The study revealed that 92% of butchers had not received food-safety or hygiene training, while 54% were aware of zoonotic diseases and 52% of shops had FSSAI registration. Pest-proof screens and separation of dry and wet areas were absent in 94% and 78% of shops, respectively. Only 6% of butchers used gloves or aprons, 62% used water alone for hand sanitization, and 94% performed hand sanitization only at the end of slaughter. Although 82% used detergent for cleaning knives, 96% sanitized knives only at the end of slaughter. Chilling facilities were available in only 8% of shops, and 94% of dressed carcasses were maintained at room temperature. Stunning was not practiced in any of the surveyed shops, whereas ante-mortem/post-mortem examination was reported in 74% of shops. Overall, the findings demonstrate important deficiencies in food-safety awareness, personal hygiene, sanitation, infrastructure, and cold-chain management in retail chicken meat shops. Strengthening butcher training, hygienic handling and sanitation practices, regulatory compliance, and chilling facilities is therefore warranted. The findings provide baseline information for future studies incorporating microbiological assessment of chicken meat and the retail processing environment.

Keywords: Retail chicken meat, Food safety, Meat hygiene, Poultry butchers, Hygienic practices, FSSAI, Kadapa

Introduction

Chicken meat constitutes an important source of high-quality animal protein and has become one of the most preferred meats in India because of its affordability, availability and wider socio-cultural acceptability. Recent literature indicates that chicken accounts for approximately 50% of the total meat production in India (Nanda *et al.*, 2025) [1]. The Indian poultry sector has undergone rapid expansion during the past few decades, with considerable growth and integration in breeding, hatchery operations, feed production and commercial broiler farming. However, despite the increasing organization of poultry production, retail marketing and slaughter of poultry continue to be predominantly associated with traditional fresh-meat and wet-market systems. Gulati *et al.* (2023) [2] observed that poultry meat retailing in India is largely an informal wet-market activity and also highlighted inadequate freezing infrastructure across the poultry value chain. Retail chicken meat shops represent an important terminal point in the poultry meat production and marketing chain, where slaughtering, dressing, handling and sale of meat frequently occur within the same premises. Consequently, hygienic practices adopted at the retail level have a direct bearing on the microbiological quality and safety of chicken offered to consumers. Previous investigations of retail poultry shops in India have identified deficiencies related to shop infrastructure, sanitation, pest control, personal hygiene, equipment cleanliness and meat-handling practices. In Nagpur, Mundhe *et al.* (2022) [3] reported inadequate training among meat handlers, poor hand hygiene and limited provision of fly-proofing in retail poultry shops. More recently, Nanda *et al.* (2025) [1] documented unhygienic practices in retail poultry shops in Bareilly, including dirty meat-cutting surfaces, unhygienic handling of meat and offal, presence of flies and poor cleanliness of live birds.

Corresponding Author:
BV Vivekananda Reddy
Department of Livestock
Products Technology,
College of Veterinary
Science, Proddatur, Andhra
Pradesh, India

Chicken meat is highly susceptible to microbial contamination during slaughter, dressing, handling, storage and retailing. Contamination may originate from the birds themselves or may be introduced through contact with intestinal contents, contaminated water, equipment and utensils, knives, working surfaces, handlers and the surrounding environment. The absence of adequate cleaning and sanitation procedures can further facilitate cross-contamination during retail processing. Islam *et al.* (2022) [4] emphasized the importance of hand washing, protective clothing, cleaning and sanitization of equipment and utensils, hygienic transportation and appropriate low-temperature storage in reducing contamination and deterioration of meat. The Food Safety and Standards Authority of India (FSSAI) similarly prescribes sanitary and hygienic requirements for retail meat shops and emphasizes personnel cleanliness, suitable protective clothing and hygienic handling of meat.

Personal hygiene and food-safety awareness among poultry butchers are particularly important because handlers can contribute to contamination at several stages of slaughter and retail processing. Nevertheless, studies conducted in different parts of India indicate substantial deficiencies in training and hygienic practices. In Assam, Islam *et al.* (2022) [4] found that none of the surveyed poultry butchers had received formal training in hygienic meat handling, while poor practices related to clothing, hand washing and cleaning of knives were also documented. Similarly, Mundhe *et al.* (2022) [3] reported that 80.6% of workers surveyed in retail poultry meat shops in Nagpur lacked training in meat and equipment handling.

Such deficiencies are particularly relevant from a public-health perspective because raw chicken and its associated retail environments can harbour important foodborne microorganisms. A recent systematic review and meta-analysis of 90 Indian studies reported the occurrence of *Staphylococcus aureus*, *Escherichia coli*, *Clostridium perfringens*, *Klebsiella pneumoniae*, *Salmonella* spp., *Campylobacter* spp. and *Listeria monocytogenes* in retail chicken meat and associated environments in India (Ayoub *et al.*, 2025) [5]. Another recent systematic review identified *E. coli* and *Salmonella* spp. among the frequently reported bacterial contaminants of poultry meat in India and additionally highlighted antimicrobial resistance among bacterial isolates (Sajish *et al.*, 2025) [6]. Thus, deficiencies in hygienic slaughter, handling, sanitation and temperature control at retail level may create opportunities for contamination and cross-contamination, potentially compromising meat safety.

The situation is particularly relevant to Kadapa district, where an earlier survey by Reddy *et al.* (2019) [7] documented deficiencies in licensing, infrastructure, sanitation and hygienic practices among butcher shops. The study reported inadequate sewage, lairage and drainage facilities, limited awareness of meat-borne diseases and occupational hazards, and poor adoption of protective clothing and hygienic handling practices. The study was conducted across several locations of the then YSR Kadapa district and included 208 butcher shops, providing important baseline information regarding retail meat hygiene in the region. However, continued assessment of retail chicken meat shops is necessary to characterize prevailing practices relating to food-safety awareness, regulatory compliance, water and sanitation, pest control, personnel and equipment hygiene, slaughter practices, waste disposal, storage and packaging.

Therefore, the present study was undertaken to assess hygiene and food safety practices in retail chicken meat shops of Kadapa district, Andhra Pradesh, India, with particular emphasis on food-safety awareness and training of poultry butchers, FSSAI licensing/registration, water and sanitation facilities, pest control, personal and equipment hygiene, slaughter and waste-disposal practices, and storage and packaging of chicken meat.

Materials and methods: Study area and study design

A cross-sectional survey was conducted in retail chicken meat shops located in Kadapa district, Andhra Pradesh, India. The survey covered retail chicken meat shops from the two major municipalities of the district, Kadapa and Proddatur. A total of 200 retail chicken meat

shops were selected randomly and included in the study. For the purpose of the study, all surveyed shops were considered collectively as a single study population representing retail chicken meat shops of Kadapa district, and no municipality-wise comparison was made.

Development of questionnaire

A structured questionnaire comprising 20 questions was developed to assess hygiene and food safety practices in retail chicken meat shops. The questionnaire covered major aspects related to food safety and hygienic meat production, including food safety training and awareness, regulatory compliance, water supply and sanitation, pest control, personal hygiene, equipment sanitation, slaughter practices, meat inspection, storage and packaging, and disposal of slaughter waste. Information regarding previous training in food safety and hygiene, awareness of zoonotic diseases and possession of Food Safety and Standards Authority of India (FSSAI) licence/registration was collected. The questionnaire also included information on the source of water, frequency of cleaning of overhead water tanks, presence of pest-entry-proof screens and separation of dry and wet working areas.

Selection of retail chicken meat shops and data collection

The retail chicken meat shops included in the study were selected randomly from Kadapa and Proddatur municipalities. Before collection of information, the purpose of the study was explained to the shop owner or poultry butcher, and verbal consent was obtained for participation in the survey.

Information was collected through interaction with the poultry butchers using the structured questionnaire along with direct observation of the facilities and practices prevailing in the retail chicken meat shops. The observations were recorded during visits to individual shops. Data obtained through the questionnaire and observations were subsequently compiled for analysis.

Assessment of personal hygiene and meat-handling practices

Personal hygiene practices of poultry butchers were assessed based on the method used for cleaning/sanitizing hands during slaughter, frequency of hand sanitation during slaughter operations and use of protective clothing such as gloves and aprons. The questionnaire distinguished between hand cleaning using water alone and use of sanitizer and also recorded whether hand sanitation was performed periodically during slaughter or only after completion of slaughter operations.

Assessment of equipment and work-surface sanitation

Hygienic practices associated with slaughter equipment were assessed by recording the method adopted for cleaning knives and the frequency at which knife sanitation was performed during slaughter operations. The frequency of sanitation of working surfaces was also recorded. These parameters were included to assess routine cleaning and sanitation practices followed during processing and handling of chicken meat at the retail level.

Assessment of slaughter and meat-inspection practices

Slaughter-related practices were assessed with particular reference to the practice of stunning before slaughter, availability of a separate resting area for live birds, and performance of ante-mortem and post-mortem examination. The method adopted for disposal of slaughter waste generated in the retail chicken meat shops was also recorded.

Assessment of storage and packaging practices

The availability of chilling facilities in retail chicken meat shops was recorded. Information was also collected regarding the method of holding or storing dressed/unsold chicken meat, including storage at room temperature, chilling or freezing. Packaging practices adopted by the retail chicken meat shops were assessed based on the type of packaging material or packaging system used for chicken meat.

Data compilation

The responses and observations obtained from all 200 retail chicken meat shops were entered, classified according to the respective questionnaire parameters and pooled for analysis. Data from Kadapa and

Proddatur municipalities were analyzed collectively as Kadapa district, without attempting municipality-wise comparisons. The study therefore focused on describing the overall status of hygiene and food safety practices among the surveyed retail chicken meat shops of the district.

Statistical analysis

The collected data were compiled, tabulated, and expressed as frequencies and percentages. Differences in the distribution of responses within each questionnaire item were evaluated using the chi-square goodness-of-fit test. For questions with two response categories, equal expected frequencies (50:50) were assumed under the null hypothesis, whereas for questions with three response categories, equal expected proportions among the categories were considered. The calculated chi-square (χ^2) values were used to determine the statistical significance of differences among the observed response frequencies. A P -value < 0.05 was considered statistically significant, while $P \geq 0.05$ was considered non-significant (NS).

Results and discussion

Food safety awareness, training and regulatory compliance

The present study revealed a substantial deficiency in formal food-safety education among poultry butchers, with only 8% having received training in food safety and hygiene, while 92% were untrained. This finding is consistent with reports from other parts of India. Mundhe *et al.* (2022) [3] reported that 80.6% of workers in retail poultry meat shops in Nagpur lacked training in meat and equipment handling. Similarly, Islam *et al.* (2022) [4] observed that none of the 60 poultry butchers surveyed in two municipalities of Assam had undergone formal training in hygienic meat handling. A subsequent hygiene-rating study of 160 retail poultry shops in Nagpur also emphasized the need for regular monitoring and formal training of meat handlers to improve hygienic practices and sanitary conditions. Collectively, these findings indicate that inadequate formal training continues to be an important weakness in the traditional poultry retail sector. This is particularly relevant because FSSAI hygiene-rating requirements for meat retail establishments specifically include hygiene training of butchers and meat handlers.

Awareness regarding zoonotic diseases was comparatively better in the present study, with 54% of respondents being aware of zoonotic diseases, although a substantial proportion (46%) remained unaware. The present level of awareness is considerably higher than that reported in the earlier study from YSR Kadapa district by Reddy *et al.* (2019) [7], in which only 12.01% of the surveyed butchers were aware of meat-borne diseases. However, the two findings should be compared cautiously because the earlier investigation covered a different sampling frame and assessed awareness of “meat-borne diseases,” whereas the present survey specifically assessed awareness of zoonotic diseases. Nevertheless, the persistence of a sizeable group of unaware butchers in the present study is of food-safety concern, since poultry handlers occupy an important position at the interface between live birds, raw meat and consumers. Strengthening targeted education on zoonoses, routes of contamination and hygienic meat handling may therefore help translate general awareness into safer day-to-day practices.

With regard to regulatory compliance, 52% of the retail chicken meat shops possessed FSSAI licence/registration, whereas 48% did not. This contrasts markedly with the earlier survey in YSR Kadapa district by Reddy *et al.* (2019) [7], where 95% of the surveyed butcher shops reportedly did not possess a government licence. The higher proportion of licensed/registered establishments observed in the present survey may indicate greater regulatory coverage among the shops studied; however, it should not be interpreted as a direct temporal improvement, because differences in study locations, sampling and the specific definition of licence/registration limit direct comparison. In the Assam study, Islam *et al.* (2022) [4] reported that 70% of poultry butchers possessed a trade licence issued by their respective

municipal boards, although a municipal trade licence is not equivalent to FSSAI licence/registration.

The finding that nearly half of the surveyed shops lacked FSSAI licence/registration remains important because regulatory registration provides a formal mechanism through which food businesses can be brought within food-safety oversight. FSSAI's meat-retail hygiene checklist requires the FSSAI licence/registration to be displayed prominently and includes requirements concerning hygienic facilities, safe handling, sanitation, personal hygiene and training. FSSAI also advises consumers to purchase meat from registered/licensed establishments and to consider the licensing status and hygienic condition of meat outlets. Thus, the findings of the present study demonstrate a dual need for greater access to structured food-safety training and strengthening of regulatory compliance, while the moderate level of zoonotic-disease awareness provides a basis upon which further food-safety education can be developed.

Water supply, sanitation and infrastructural facilities

Adequate water supply and appropriate sanitation infrastructure are fundamental requirements for hygienic poultry slaughter and meat handling because water is repeatedly required for washing carcasses, hands, equipment and working surfaces. In the present study, 62% of retail chicken meat shops used tap water, whereas 38% depended on borewell water. The earlier study conducted in YSR Kadapa district by Reddy *et al.* (2019) [7] reported adequate availability of potable drinking water in 86.53% of butcher shops, indicating that access to water was generally satisfactory, although the source and microbiological quality of water were not necessarily established by availability alone. The Nagpur hygiene-rating study similarly reported compliance with clean potable/hot-water supply requirements in 88.8% of surveyed poultry shops. The source of water itself, however, should not be interpreted as an indicator of safety unless its potability is established. This is particularly important for borewell water, for which FSSAI requirements specify appropriate treatment to render the water potable where necessary. Therefore, periodic assessment of the microbiological quality of water used in retail poultry shops would provide a more direct measure of its suitability for slaughter and sanitation purposes.

Maintenance of stored water is equally important. In the present investigation, overhead water tanks were cleaned monthly in 52%, quarterly in 36% and annually in 12% of the shops. Although monthly cleaning was the most common practice, the presence of shops with prolonged intervals between cleaning indicates variability in sanitation practices. Water-storage systems that are inadequately maintained may compromise the hygienic quality of water subsequently used for washing hands, utensils, working surfaces and carcasses. Thus, regular cleaning of water-storage facilities, together with monitoring of water quality, should form part of routine hygiene management in retail chicken meat shops.

A major infrastructural deficiency observed in the present study was the absence of pest-entry-proof screens in 94% of shops, with only 6% having such protection. Similar deficiencies have been documented elsewhere in India, although the magnitude varied considerably. Mundhe *et al.* (2022) [3] reported that only 27.5% of retail poultry meat shops in Nagpur had fly-proof windows. More recently, Nanda *et al.* (2025) [1] reported poor ventilation and absence of fly traps in 66.67% of retail poultry shops in Bareilly, while consumers also reported the presence of flies on meat surfaces. FSSAI requirements for meat shops emphasize protection against pest entry and recommend fly-proofing measures such as insect-proof screens, air curtains or fly traps. The very low prevalence of pest-proofing observed in the present study is therefore an important food-safety concern because flies and other pests can act as mechanical carriers of microorganisms and facilitate contamination of carcasses, equipment and food-contact surfaces.

Another important observation was that 78% of shops lacked separation between dry and wet working areas, whereas only 22% maintained such separation. The absence of adequate segregation within

small retail poultry shops may facilitate movement of water, blood, feathers, intestinal contents and other waste from slaughter and dressing areas towards cleaner meat-handling areas, thereby increasing opportunities for cross-contamination. This finding is broadly consistent with structural deficiencies reported in other Indian poultry retail systems. Mundhe *et al.* (2022) [3] found that 83.7% of poultry meat shops in Nagpur lacked separate docks for edible and inedible products, while Vaithiyanathan *et al.* (2017) [8] reported that retail poultry-

processing units surveyed in Hyderabad operated under wet-processing conditions and lacked several facilities required for hygienic processing. FSSAI hygiene requirements similarly emphasize an appropriate layout and unidirectional movement of personnel and materials to minimize cross-contamination. Hence, improved physical or operational segregation of dirty slaughter activities from cleaner carcass-handling areas should be encouraged, even where space constraints make complete structural separation difficult.

Table 1. Food safety awareness, training and regulatory compliance among retail chicken meat shops of Kadapa district ($n = 200$)

Parameter	Response	No. (n)	Percentage (%)	χ^2 value	P value
Food safety/hygiene training	Yes	16	8	141.12	< 0.001
	No	184	92		
Awareness of zoonotic diseases	Yes	108	54	1.28	0.258 NS
	No	92	46		
FSSAI licence/registration	Yes	104	52	0.32	0.572 NS
	No	96	48		

In contrast to these infrastructural deficiencies, 88% of the surveyed shops had a separate resting area for live birds, while only 12% lacked such a facility. This represents a comparatively favourable finding because separation of live birds from slaughter and dressed-meat handling areas can help reduce direct contact between live-bird contaminants and processed carcasses. Nevertheless, the presence of a resting area alone does not ensure adequate hygiene; its cleanliness, stocking density, ventilation and separation from meat-processing areas are also important. A recent study of poultry butchers in Chennai similarly emphasized shop-level biosecurity and cage hygiene and reported that 60% of surveyed shops had litter-free cages.

Overall, the findings demonstrate a mixed infrastructural hygiene profile in the surveyed retail chicken meat shops. Availability of a separate resting area for birds and relatively frequent overhead-tank cleaning were favourable observations, whereas the widespread absence of pest-proof screens and inadequate separation of dry and wet processing areas represent important deficiencies. Improvements in pest exclusion, hygienic shop layout, water-storage sanitation and verification of water potability could substantially strengthen hygienic control at the retail level.

Table 2. Water supply, sanitation and infrastructural facilities in retail chicken meat shops ($n = 200$)

Parameter	Response	No. (n)	Percentage (%)	χ^2 value	P value
Source of water	Tap water	124	62	11.52	< 0.001
	Borewell	76	38		
Overhead tank cleaning	Monthly	104	52	48.64	< 0.001
	Quarterly	72	36		
	Annually	24	12		
Pest-entry-proof screens	Present	12	6	154.88	< 0.001
	Absent	188	94		
Separation of dry/wet areas	Present	44	22	62.72	< 0.001
	Absent	156	78		
Separate resting area for birds	Present	176	88	115.52	< 0.001
	Absent	24	12		

Slaughter, meat-inspection and waste-disposal practices

Ante-mortem and post-mortem examination constitute important components of meat-safety assurance, as they facilitate the identification of birds or carcasses showing abnormalities that may render them unsuitable for human consumption. In the present study, 74% of the surveyed retail chicken meat shops reported ante-mortem/post-mortem examination, whereas 26% did not follow this practice. Although the relatively high proportion reporting examination is encouraging, the absence of such examination in approximately one-fourth of the shops indicates an important gap in meat-safety practices. Food Safety and Standards Authority of India (FSSAI) requirements emphasize ante-mortem and post-mortem inspection as important components of hygienic meat production. Therefore, greater involvement of veterinary and municipal authorities in routine meat inspection could strengthen food-safety assurance in retail poultry slaughter.

An important concern observed in the present investigation was the complete absence of stunning, with none of the 200 surveyed shops practicing stunning before slaughter. Traditional Indian retail poultry outlets commonly undertake slaughter manually. Janarthanan *et al.* (2026) [9], in a study involving 375 poultry butchers in Chennai, described the surveyed poultry retail shops as small-scale units where the slaughtering process was carried out manually. FSSAI guidance for poultry slaughter includes stunning as a processing step and specifies appropriate stunning procedures before slaughter. The complete absence of stunning in the present survey therefore indicates a marked difference between the practices prevailing in traditional retail outlets and those recommended for organized poultry slaughter and processing systems. Nevertheless, this finding should primarily be interpreted as a slaughter-practice and animal-welfare issue rather than assuming that the absence of stunning directly resulted in microbial contamination of meat, since microbiological assessment was not undertaken in the present study.

Management of slaughter waste is another important component of retail poultry hygiene because feathers, blood, offal and other waste generated during slaughter and dressing may contribute to environmental contamination and attract flies and other pests when inadequately handled. In the present investigation, 56% of shops reported utilizing slaughter waste as a by-product, whereas 44% disposed of it through municipal dumping. In comparison, Mundhe *et al.* (2022) [3] reported that 25% of retail poultry meat shops surveyed in Nagpur had no proper arrangement for waste disposal, indicating deficiencies in waste management in traditional poultry retailing. Similarly, Nanda *et al.* (2025) [1] reported inadequate waste-management practices in retail poultry meat shops in Bareilly, including the absence of suitable facilities for disposal of waste and offal in a considerable proportion of shops. These observations indicate that management of poultry slaughter waste remains an important hygiene issue across traditional retail poultry systems in India.

The utilization of slaughter waste as a by-product, as observed in 56% of shops in the present study, could provide a useful alternative to indiscriminate disposal when waste is properly segregated, collected

and transferred through an appropriate utilization or rendering pathway. However, the present questionnaire recorded only the broad method of waste disposal and did not determine the nature of the by-products produced or evaluate the hygienic conditions under which the waste was collected, stored or transported. Therefore, the present findings should not be interpreted as demonstrating that by-product utilization was necessarily hygienic. Janarthanan *et al.* (2026) [9] also emphasized the importance of appropriate segregation of poultry waste at retail shops to reduce opportunities for contamination.

Overall, the present findings demonstrate contrasting features of slaughter management in retail chicken meat shops of Kadapa district. Ante-mortem/post-mortem examination was reported by the majority of respondents, and more than half of the shops reported utilization of slaughter waste as a by-product; however, stunning before slaughter was completely absent. Strengthening veterinary meat inspection, promoting hygienic segregation and disposal or utilization of slaughter waste, and improving adherence to scientifically recommended slaughter practices could contribute to better hygiene and food-safety management in retail poultry shops.

Table 3. Slaughter, meat-inspection and waste-disposal practices ($n = 200$)

Parameter	Response	No. (n)	Percentage (%)	χ^2 value	P value
Ante-/post-mortem examination	Yes	148	74	46.08	< 0.001
	No	52	26		
Stunning practiced	Yes	0	0	200.00	< 0.001
	No	200	100		
Slaughter-waste disposal	Municipal dumping	88	44	2.88	0.090 NS
	Used as by-product	112	56		

Personal hygiene practices among poultry butchers

Personal hygiene of poultry butchers is an important component of food safety because handlers remain in frequent contact with live birds, carcasses, equipment and working surfaces during slaughter and dressing operations. In the present study, the use of personal protective clothing was very poor, with only 6% of poultry butchers using gloves/aprons, while 94% did not use them. Similar deficiencies have been reported from other parts of India. In Assam, only 11.67% of poultry butchers used protective clothing such as face masks, headgear, hand gloves and aprons, whereas 88.33% did not use such protective measures (Islam *et al.*, 2022) [4]. Likewise, none of the poultry butchers surveyed in retail poultry meat shops of Bareilly were found to use hand gloves or headgear (Nanda *et al.*, 2025) [1]. These observations indicate that poor adoption of personal protective clothing remains common in traditional retail poultry operations. Protective clothing, when appropriately used and regularly cleaned, can reduce direct contact between the handler and meat and can contribute to minimizing opportunities for contamination during slaughter and carcass handling.

Hand hygiene practices also showed considerable deficiencies in the present study. A majority (62%) of poultry butchers cleaned their hands using water alone, whereas only 38% used sanitizer. Cleaning hands with water alone may remove visible dirt but is less appropriate for controlling microbial contamination than effective hand washing using soap and potable water followed, where appropriate, by hand sanitization. Similar shortcomings have been documented in earlier Indian studies. Islam *et al.* (2022) [4] reported that only 28.33% of poultry butcheries surveyed in Assam had provision for soap, while 71.67% lacked such a facility. The authors also referred to earlier observations that the majority of butchers used only water for washing purposes (Islam *et al.*, 2022) [4]. More recently, Nanda *et al.* (2025) [1] observed that none of the poultry retailers surveyed in Bareilly used hand sanitizer. Thus, the predominant use of water alone observed in the present study indicates the need to improve access to ap-

propriate hand-washing facilities and to promote correct hand-hygiene procedures among poultry butchers.

The frequency of hand sanitation was an additional concern. In the present investigation, only 6% of poultry butchers practiced hand sanitation periodically during slaughter, whereas 94% performed it only at the end of slaughter operations. Such infrequent hand hygiene during continuous handling of live birds, carcasses, viscera, equipment and other materials may facilitate transfer of contaminants between successive operations. In Assam, 65% of poultry butchers did not wash their hands before and after meat handling, while only 35% followed this practice (Islam *et al.*, 2022) [4]. Similarly, intermittent hand washing was practiced by only 44.44% of poultry retailers surveyed in Bareilly (Nanda *et al.*, 2025) [1]. In contrast, a recent study involving 375 poultry butchers in Chennai reported comparatively better hand-hygiene practices: 79% recognized that washing hands before slaughter activities could reduce the risk of meat contamination, 94% reported washing their hands after returning from a break and 86% reported washing after touching raw meat (Janarthanan *et al.*, 2026) [9]. These differences demonstrate considerable variation in hand-hygiene practices among retail poultry systems in different regions of India.

The combination of poor use of protective clothing, predominant reliance on water alone for hand cleaning and infrequent hand sanitation during slaughter observed in the present investigation indicates important deficiencies in personal hygiene among poultry butchers in Kadapa district. These findings are particularly relevant because effective hand hygiene is necessary to minimize transfer of contamination during meat handling. Regular food-safety training should therefore emphasize proper hand washing with soap and potable water, appropriate use of hand sanitizers where required, repeated hand hygiene at critical stages of slaughter and dressing, and correct use and maintenance of clean protective clothing. Improvements in these relatively simple practices could contribute substantially to strengthening hygienic meat handling at the retail level.

Table 4. Personal hygiene practices among poultry butchers ($n = 200$)

Parameter	Response	No. (n)	Percentage (%)	χ^2 value	P value
Use of gloves/apron	Yes	12	6	154.88	< 0.001
	No	188	94		
Method of hand cleaning	Water alone	124	62	11.52	< 0.001
	Sanitizer	76	38		
Frequency of hand sanitation	Periodically during slaughter	12	6	154.88	< 0.001
	At end of slaughter	188	94		

Equipment and work-surface hygiene practices

Equipment and work surfaces used during poultry slaughter and dressing can act as important sources of cross-contamination when they are inadequately cleaned and sanitized. In the present study, 82% of the poultry butchers reported cleaning knives with detergent, whereas 18% used water alone. The relatively high use of detergent is a favourable observation compared with findings reported from some other retail poultry systems. In Assam, only 20% of poultry butchers used soap and clean water for washing equipment, while 80% did not follow this practice (Islam *et al.*, 2022) [4]. The same study reported that although 88.33% of shops possessed clean and rust-free knives, only 11.67% of butchers washed their knives before and after cutting meat (Islam *et al.*, 2022) [4]. Thus, although detergent use was comparatively common in the present study, appropriate cleaning agents should be combined with adequate cleaning frequency to minimize the potential for cross-contamination during continuous slaughter and meat handling.

The frequency of knife sanitization was a major concern in the present investigation. Only 4% of the surveyed poultry butchers sanitized knives periodically during slaughter, whereas 96% performed knife sanitization only at the end of slaughter operations. Similar deficiencies have been reported in other Indian retail poultry shops. Islam *et al.* (2022) [4] observed that 88.33% of poultry butchers did not wash knives before and after cutting meat. Likewise, Nanda *et al.* (2025) [1] reported that knives and meat-cutting logs were cleaned only once at the end of the working day by 83.34% of poultry retailers in Bareilly. These findings are broadly consistent with the present observations and indicate that infrequent cleaning and sanitization of knives remains an important weakness in traditional retail poultry processing systems.

Infrequent knife sanitization is particularly relevant because the same knife may be repeatedly used during slaughter, evisceration, carcass dressing and cutting operations. Under such circumstances, contamination acquired during one operation may subsequently be transferred

to other carcasses or meat portions. Retail poultry shops represent an important point for controlling such cross-contamination, and adequate cleaning and sanitation of meat-contact equipment are therefore essential components of hygienic meat handling (Mundhe *et al.*, 2022) [3]. The finding that most butchers in the present study sanitized knives only after completion of slaughter operations suggests that greater emphasis should be placed on periodic sanitation during processing rather than relying solely on end-of-operation cleaning.

With regard to work-surface hygiene, 82% of the surveyed shops reported sanitizing working surfaces twice daily, whereas 18% performed sanitation once daily. Although twice-daily sanitation was more common, the adequacy of this practice depends not only on the number of cleaning events but also on the method used, the cleaning and sanitizing agents employed and the extent of contamination generated between sanitation intervals. Nanda *et al.* (2025) [1] reported poor work-surface hygiene in retail poultry shops in Bareilly, where consumers consistently identified dirty working surfaces and dirty wiping cloths as hygiene concerns, and none of the surveyed retailers used surface sanitizer. Similarly, Islam *et al.* (2022) [4] reported that only 61.67% of poultry butcheries had clean cutting slabs. These findings demonstrate that meat-contact surfaces remain an important area requiring attention in retail poultry hygiene.

Overall, the present findings indicate a mixed pattern of equipment hygiene in retail chicken meat shops of Kadapa district. The use of detergent for cleaning knives by 82% of butchers and twice-daily sanitation of working surfaces by 82% of shops are relatively favourable practices. However, the fact that 96% of butchers sanitized their knives only at the end of slaughter represents an important deficiency. Therefore, food-safety interventions should emphasize not only the use of suitable cleaning and sanitizing agents but also their application at appropriate intervals during slaughter and meat handling. Regular sanitation of knives and food-contact surfaces during processing, together with appropriate training of poultry butchers, could help reduce opportunities for cross-contamination at the retail level.

Table 5. Equipment and work-surface hygiene practices ($n = 200$)

Parameter	Response	No. (n)	Percentage (%)	χ^2 value	P value
Method of knife cleaning	Water alone	36	18	81.92	< 0.001
	Detergent	164	82		
Frequency of knife sanitation	Periodically during slaughter	8	4	169.28	< 0.001
	At end of slaughter	192	96		
Work-surface sanitation	Once daily	36	18	81.92	< 0.001
	Twice daily	164	82		

Chilling, storage and packaging practices

Maintenance of an appropriate cold chain is an important component of poultry meat safety because refrigeration restricts microbial multiplication and delays deterioration of meat quality. In the present study, only 8% of the surveyed retail chicken meat shops had a chilling facility, whereas 92% lacked such a facility. Similar deficiencies in refrigeration infrastructure have been reported from other retail

poultry systems. Mundhe *et al.* (2023) [10], while assessing retail poultry meat shops in Nagpur using the FSSAI hygiene-rating system, reported that 68.7% of the shops were not equipped with chilling/freezing facilities. The authors emphasized the importance of cold-storage facilities for maintaining the quality and safety of poultry meat (Mundhe *et al.*, 2023) [10]. The predominance of shops without chilling facilities observed in the present study therefore indicates an

important infrastructural limitation in maintaining temperature control at the retail level.

The lack of chilling infrastructure was also reflected in the manner in which dressed carcasses were handled. In the present investigation, 94% of dressed chicken carcasses were maintained at room temperature, while only 6% were kept under chilled conditions. This practice is of particular food-safety concern because poultry meat is highly perishable and prolonged exposure to ambient temperature can favour microbial multiplication. FSSAI guidelines recommend that dressed poultry carcasses should be chilled below 4 °C within four hours of slaughter and that chilled poultry meat should subsequently be maintained at or below 4 °C (FSSAI, 2018) [11]. FSSAI further specifies that poultry meat intended for short-term storage should be maintained at 4 °C, whereas frozen poultry meat should be stored at –18 °C or below (FSSAI, 2021) [12]. Therefore, the predominance of room-temperature holding observed in the present study demonstrates an important gap between prevailing retail practices and recommended temperature-control measures.

The combination of limited chilling facilities and widespread room-temperature holding of dressed carcasses may have important implications for the microbiological safety and keeping quality of chicken meat. Temperature control is particularly important after slaughter because contamination introduced during dressing, evisceration, cutting or handling may subsequently multiply if meat is held under favourable temperature conditions. FSSAI recommends maintaining chilled poultry meat at or below 4 °C throughout storage, distribution and retail merchandising (FSSAI, 2020) [13]. Thus, provision of suitable refrigeration or chilling facilities at retail chicken meat shops should be considered an important intervention for strengthening food-safety management. Where immediate installation of sophisticated cold-chain infrastructure is impractical, measures that minimize the duration of room-temperature exposure and facilitate rapid sale or transfer to refrigerated storage should be encouraged.

With regard to packaging, polypropylene covers were used by 92% of the surveyed retail chicken meat shops, while 8% used LDPE pouches and none used HDPE pouches. The predominance of simple retail packaging is consistent with the traditional fresh-meat marketing system in India, where poultry meat is commonly slaughtered and sold directly to consumers rather than marketed through an integrated chilled or frozen chain. Gulati *et al.* (2023) [2] described poultry meat retailing in India as being largely dominated by wet markets and the informal sector, with inadequate freezing infrastructure across the poultry value chain. Packaging can protect meat from direct environmental exposure and contamination during handling and transportation; however, the protective effect depends on the hygienic condition and food-grade suitability of the packaging material and on appropriate temperature control. Packaging alone cannot compensate for inadequate refrigeration of a highly perishable product such as fresh chicken meat.

Overall, the findings of the present study demonstrate that cold-chain management represents one of the major deficiencies in the surveyed retail chicken meat shops of Kadapa district. The absence of chilling facilities in 92% of shops, together with maintenance of 94% of dressed carcasses at room temperature, indicates inadequate temperature control during retail handling. Although almost all shops used some form of packaging material, effective food-safety control requires appropriate packaging to be combined with hygienic handling and adequate temperature management. Provision of affordable chilling facilities, minimizing the duration of room-temperature exposure, use of clean food-grade packaging materials and greater awareness among poultry retailers regarding recommended storage temperatures could substantially improve the safety and keeping quality of chicken meat at the retail level (FSSAI, 2018; FSSAI, 2020; FSSAI, 2021) [11, 13, 12].

Table 6. Chilling, storage and packaging practices in retail chicken meat shops (n = 200)

Parameter	Response	No. (n)	Percentage (%)	χ^2 value	P value
Chilling facility available	Yes	16	8	141.12	< 0.001
	No	184	92		
Holding/storage of dressed carcasses	Room temperature	188	94	154.88	< 0.001
	Chilling	12	6		
Packaging material	Polypropylene covers	184	92	311.68	< 0.001
	LDPE pouches	16	8		
	HDPE pouches	0	0		

Footnote: n = 200; χ^2 = chi-square goodness-of-fit statistic; NS = non-significant. P < 0.05 was considered statistically significant. For binary variables, expected frequencies under the null hypothesis were 100:100; for three-category variables, equal expected frequencies were assumed.

Conclusion

The present study revealed that the awareness of poultry butchers regarding hygiene and food safety in retail chicken meat shops of Kadapa district was below the desired standard, particularly with respect to formal food-safety training. Most retail shops demonstrated insufficient adherence to recommended hygienic practices and adequate maintenance of essential facilities, indicating the need for greater attention to sanitary conditions at the retail level. Personal hygiene and equipment sanitation practices, especially the use of protective clothing, hand sanitization, and periodic sanitation of knives and food-contact surfaces, require further improvement to align with recommended food-safety standards. The limited availability of chilling facilities and the predominant practice of keeping dressed carcasses at room temperature emphasize the need for adequate refrigeration and appropriate temperature control to minimize microbial growth and spoilage of meat. Strengthening food-safety training, regulatory compliance, hygienic handling practices, sanitation procedures, and cold-

chain infrastructure could contribute to safer retail chicken meat handling. The findings of the present study provide useful baseline information on prevailing hygiene and food-safety practices and may serve as a basis for future investigations incorporating microbiological assessment of chicken meat, equipment, food-contact surfaces, and the retail environment.

References

1. Nanda I, Talukder S. Assessment of hygiene practices in the retail poultry meat shops in Bareilly city. *The Indian Journal of Animal Sciences.* 2025;95(7):588-595.
2. Gulati A, Juneja R. Poultry Revolution in India: Lessons for Smallholder Production Systems. ZEF Working Paper Series No. 225. Center for Development Research (ZEF), University of Bonn, Bonn, Germany; 2023.
3. Mundhe BL, Rathod KS, Badhe SR. Hygiene status and meat handling practices in retail poultry meat shops of Nagpur City of Maharashtra. *Journal of Meat Science.* 2022;17(2):15-21.

4. Islam R, Islam S, Rahman M. Assessment of hygienic and sanitation practices among poultry butchers in selected Municipality areas of Assam (India). *Journal of Veterinary and Animal Sciences*. 2022;53(2):269-278.
5. Ayoub H, Kumar MS, Dubal ZB, Bhilegaonkar KN, Nguyen-Viet H, Grace D, Thapliyal S, Sanjumon ES, Sneha ENP, Premkumar D, Rajendran VKO, Dekka RP. Systematic review and *meta-analysis* on prevalence and antimicrobial resistance patterns of important foodborne pathogens isolated from retail chicken meat and associated environments in India. *Foods*. 2025;14(4):555.
6. Sajish VP, Uzzaman N, Aramvalathan N, Asaduzzaman M. Prevalence, distribution and antimicrobial resistance profiles in poultry meat samples from India: a systematic review. *Frontiers in Veterinary Science*. 2025;12:1672628.
7. Reddy CVS, Sujitha B, Maheswara Reddy D, Vani S. Awareness and practices followed by the butchers in hygienic meat production chain in YSR Kadapa district of Andhra Pradesh. *The Pharma Innovation Journal*. 2019;8(10):140-145.
8. Vaithyanathan S, Kondaiah N. A survey on the facilities and practices of retail poultry processing units in Hyderabad. *Indian Journal of Poultry Science*. 2017;52(1):124-127.
9. Janarthanan G, Paramasivam V, Papaiyan K, Parthiban ABR, Fournié G, Blake DP, Tomley FM, *et al.* Assessment of food safety knowledge and hygiene practices among poultry butchers in Chennai and its public health implications. *Discover Public Health*. 2026;23:1097.
10. Mundhe BL, Rathod KS, Landge SP, Badhe SR. Hygiene rating of retail poultry meat shops in Nagpur. *Journal of Animal Research*. 2023;13(2):235-242.
11. Food Safety and Standards Authority of India (FSSAI). Guidance Document: Food Safety Management System (FSMS) Guidance Document for Poultry Slaughtering and Processing Sector. Food Safety and Standards Authority of India, Ministry of Health and Family Welfare, Government of India, New Delhi; 2018.
12. Food Safety and Standards Authority of India (FSSAI). Safety and Quality of Meat and Poultry: Guidance Note. Food Safety and Standards Authority of India, Ministry of Health and Family Welfare, Government of India, New Delhi; 2021.
13. Food Safety and Standards Authority of India (FSSAI). Guidance Document: Food Safety Management System (FSMS) Guidance Document for Poultry Slaughtering and Processing Sector. Food Safety and Standards Authority of India, Ministry of Health and Family Welfare, Government of India, New Delhi; 2020.
14. Food Safety and Standards Authority of India (FSSAI). Food Safety and Standards (Licensing and Registration of Food Businesses) Regulations, 2011. Schedule 4: General hygienic and sanitary practices to be followed by food business operators. Food Safety and Standards Authority of India, New Delhi, India; 2011.
15. Food Safety and Standards Authority of India (FSSAI). Hygiene Rating Checklist for Meat Retail. Food Safety and Standards Authority of India, Ministry of Health and Family Welfare, Government of India, New Delhi.

How to cite this article: Reddy BV, Dhinakar PK, Safiullah SA, Chandra GB, Mallika EN, Gupta RSD, *et al.* Assessment of hygiene and food safety practices in retail chicken meat shops of Kadapa district, Andhra Pradesh, India. *International Journal of Veterinary Sciences and Animal Husbandry*. 2026;SP-11(9):169-176. doi: <https://www.doi.org/10.22271/veterinary.2026.v11.i9S.c.3793>

Authors

BV Vivekananda Reddy

Department of Livestock Products Technology, College of Veterinary Science, Proddatur, Andhra Pradesh, India

P Karthikeya Dhinakar

Department of Livestock Products Technology, College of Veterinary Science, Proddatur, Andhra Pradesh, India

Shaik Adam Safiullah

Department of Livestock Products Technology, College of Veterinary Science, Proddatur, Andhra Pradesh, India

G Bhuvan Chandra

Department of Livestock Products Technology, College of Veterinary Science, Proddatur, Andhra Pradesh, India

E Naga Mallika

Department of Livestock Products Technology, College of Veterinary Science, Proddatur, Andhra Pradesh, India

R Sai Dilip Gupta

Department of Livestock Products Technology, College of Veterinary Science, Proddatur, Andhra Pradesh, India

Ch. Raja Thimma Reddy

Department of Livestock Products Technology, College of Veterinary Science, Proddatur, Andhra Pradesh, India