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Demographic/socio-economic status and KAP of meat processing personnel in Udumalpet region of Tamil Nadu

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Abstract

A cross-sectional study assessed the demographic, socio-economic and knowledge-attitude-practice profile of meat processing personnel in Udumalpet, Tamil Nadu. Seventy-two respondents from primary processing units, further processing units, retail meat shops and online meat markets were surveyed using a structured questionnaire. Most respondents (38.9%) were aged 31–40 years, had secondary education (34.7%) and 5–10 years of experience (37.5%), earning Rs.10,000–20,000 monthly (45.8%), with a near-equal split between permanent (52.8%) and temporary (47.2%) employment. Overall, 72.2% possessed adequate hygiene knowledge and 76.4% were aware of occupational hazards, though only moderate compliance with hygienic practices was observed across sectors. About 62.6% reported occasional health issues, indicating gaps in occupational safety. Educational level was significantly associated with hygiene knowledge. The findings reveal a clear knowledge-practice gap shaped by socio-economic conditions, education and infrastructure, underscoring the need for targeted training, improved working conditions and stricter regulatory enforcement to improve meat safety and worker welfare.

Keywords: Demographic, socio-economics, meat processing personnel, occupational hazard, meat hygiene

1. Introduction

Meat hygiene and safety are critical components in ensuring public health, particularly in developing countries where informal meat processing systems are prevalent. The role of meat handlers is pivotal, as their knowledge, attitude, and practices directly influence microbial contamination, meat quality, and occupational safety.

Previous studies have reported that inadequate hygiene practices among meat handlers significantly contribute to foodborne diseases^{1,2}. In India, considerable variation exists between organized and unorganized meat processing sectors, with the latter often characterized by limited infrastructure, lack of formal training, and poor regulatory oversight³. These differences are further influenced by the demographic and socio-economic profile of workers, including age, education level, work experience, and income status, which play a crucial role in shaping their awareness and adoption of hygienic practices.

Workers with lower educational attainment and income levels are often more prevalent in informal sectors such as retail meat shops, where hygienic standards and occupational safety measures are less strictly enforced. In contrast, personnel in organized processing units generally benefit from better working conditions, structured training programs, and improved compliance with food safety regulations.

Udumalpet region of Tamil Nadu represents a heterogeneous meat processing system comprising primary processing units, further processing units, traditional retail meat shops, and emerging online meat markets. This diversity provides an ideal setting to evaluate not only the knowledge, attitude and practices (KAP) status of meat processing personnel, but also the influence of demographic and socio-economic factors on their knowledge levels, attitudes toward hygiene, and actual practices. Therefore, the present study was undertaken to assess the

demographic and socio-economic characteristics, along with the KAP of meat processing personnel in Udumalpet region, with the objective of identifying critical gaps and suggesting appropriate interventions for improving meat safety and worker welfare.

2. Materials and Methods

2.1 Study Area and Sampling

The study was conducted in Udumalpet, Tamil Nadu. A total of 72 meat processing personnel were randomly selected from different sectors such as primary processing, further processing unit, retail meat shops and online meat markets.

2.2 Data Collection Tool

A structured and pre-tested questionnaire was used to collect data on Knowledge (hygiene, hazards), Attitude (perception toward safety) and Practices (hygiene behavior, health monitoring).

2.3 Statistical Analysis

Data were analyzed using descriptive statistics (percentage, frequency), chi-square test for association and regression analysis. Significance level was set at 5 per cent.

3. Results and Discussion

Knowledge levels of meat processing personnel varied significantly across different sectors, with respondents from primary processing units demonstrating comparatively higher levels of awareness than those working in retail meat shops and online meat markets ($p < 0.05$). This difference can be attributed to the structured operational environment in primary processing units, where workers are more likely to be

exposed to standardized protocols, supervision, and occasional training programs related to meat hygiene and safety. In contrast, personnel in retail and online sectors often operate under informal conditions with limited access to formal training and regulatory oversight, which may contribute to lower knowledge levels.

The results of this study are similar to Alam *et al.* [1] who reported that a majority of meat operatives were middle aged (30–40 years), which is likely to have more exposure to occupational hazards than younger age. A similar result was reported by Tolera *et al.* [9] that respondents aged greater than 30 years have more risk of developing occupational related problems compared to those less than 30 years of age.

A majority of respondents (38.9%) had secondary level education (34.7%). Furthermore, educational status showed a strong positive association with knowledge of hygienic practices, indicating that literacy plays a crucial role in enhancing awareness and understanding of food safety measures. Respondents with secondary and higher levels of education demonstrated better comprehension of critical aspects such as personal hygiene, sanitation, and occupational hazards compared to those with primary or no formal education. Wambui *et al.* [10] also reported that most of the meat handlers in slaughterhouses had only a primary level of education. This finding highlights the importance of education as a key determinant in shaping the knowledge base of meat handlers. The observed association between education and knowledge is in agreement with previous studies, which have emphasized that individuals with higher educational attainment are more receptive to training and better able to implement scientific handling practices.

Table 1: Demographic and income profile of meat processing personnel (n = 72)

Parameter	Category	Number (n)	Percentage (%)
Age (years)	20–30	18	25.0
	31–40	28	38.9
	41–50	17	23.6
	>50	9	12.5
Education level	Illiterate	12	16.7
	Primary	20	27.8
	Secondary	25	34.7
	Higher secondary & above	15	20.8
Work experience (years)	<5	19	26.4
	5–10	27	37.5
	>10	26	36.1
Monthly income (INR)	<10,000	21	29.2
	10,000–20,000	33	45.8
	>20,000	18	25.0
Type of employment	Permanent	38	52.8
	Temporary	34	47.2

3.1 Knowledge of Meat Processing Personnel

The present study revealed that 72.2% of respondents possessed adequate knowledge of hygienic meat handling practices. This is comparable to findings by Kumar and Rao [7], who reported 70–75% awareness among trained meat handlers. Awareness of occupational hazards (76.4%) was relatively high, indicating exposure to risk-related information. However, the remaining 23.6% lacking awareness poses a significant concern for workplace safety. Slaughterhouse workers were not specialized, had no control

over their tasks, and may not be aware of the factors that can affect their health. Similar results were observed by Tavolaro *et al.* [8]. Workers in primary processing units showed significantly higher knowledge (87.9%) compared to retail meat shop workers (55.6%) ($p < 0.05$). This aligns with the findings of Grace *et al.* [5], who highlighted better compliance in regulated environments. Educational status had a significant positive association with knowledge ($p < 0.01$), confirming that literacy plays a crucial role in food safety awareness.

Table 2: Knowledge of meat processing personnel across different sectors

Parameter	Primary Processing (%)	Further Processing (%)	Retail (%)	Online (%)	χ^2 Value	p-value
Adequate hygiene knowledge	87.9	73.3	55.6	33.3	12.84	<0.05
Awareness of occupational hazards	90.9	80.0	61.1	66.7	11.26	<0.05

3.2 Attitude of Meat Processing Personnel

The majority of respondents exhibited a positive attitude towards hygiene and safety practices, which is a favorable indicator for behavioral interventions. Workers expressed a preference for improved slaughter facilities, reflecting awareness of the relationship between environment and efficiency.

However, despite positive attitudes, actual implementation remained suboptimal. This observation is consistent with reports by FAO ^[4], which state that attitude alone does not guarantee behavioral change without supportive infrastructure. Significant variation ($p < 0.05$) was observed between organized and unorganized sectors, suggesting that workplace exposure influences attitudinal development.

Table 3: Attitude of meat processing personnel across different sectors

Parameter	Primary Processing (%)	Further Processing (%)	Retail (%)	Online (%)	χ^2 Value	p-value
Positive attitude toward hygiene	90.9	80.0	61.1	66.7	10.21	<0.05
Preference for better facilities	93.9	86.7	66.7	83.3	9.88	<0.05
Awareness of safety importance	87.9	80.0	61.1	66.7	10.02	<0.05

3.3 Practices of Meat Processing Personnel

Although 69.4% of respondents reported practicing basic hygiene, detailed observation indicated inconsistencies, particularly in PPE usage (only 47.2% regular compliance). The high percentage (75%) of workers undergoing only annual medical examinations indicates inadequate health monitoring. Moreover, 62.6% reporting health issues suggests poor occupational safety conditions. This result was similar to Cook *et al.* ^[2] who reported that only 34 per cent of

employees in slaughter houses were aware of zoonotic illness and 36 per cent of butchers were aware of the dangers of pollution. These findings are in agreement with earlier studies⁹, which reported poor compliance with hygienic practices in informal meat sectors. Workers in organized units demonstrated significantly better practices ($p < 0.05$) compared to retail workers, emphasizing the role of regulation and supervision.

Table 4: Practices of meat processing personnel across different sectors

Parameter	Primary Processing (%)	Further Processing (%)	Retail (%)	Online (%)	χ^2 Value	p-value
Practicing basic hygiene	84.8	73.3	50.0	66.7	13.45	<0.05
Regular PPE usage	63.6	53.3	27.8	33.3	14.67	<0.05
Annual medical check-up	78.8	73.3	72.2	66.7	4.12	>0.05
Reporting health issues	57.6	60.0	72.2	66.7	6.35	>0.05

3.4 Relationship Between Knowledge, Attitude and Practices

Regression analysis indicated that Knowledge $\rightarrow$ Practice ($R^2 \approx 0.48$) and Attitude $\rightarrow$ Practice ($R^2 \approx 0.41$). This suggests that knowledge and attitude moderately influence practices, but external factors such as infrastructure and economic constraints play a major role. This is comparable to Dembe ^[3]

who reported that injuries, illnesses or health issues may have considerable economic consequences when they are of higher intensity. The knowledge–practice gap observed in this study is consistent with previous reports¹, highlighting that awareness alone is insufficient without enforcement and facilities.

Table 5: Relationship between knowledge, attitude and practices of meat processing personnel

Variable	Relationship	B (Unstd. Coeff.)	SE	β (Std. Coeff.)	t-value	p-value
Constant	Intercept	12.845	3.276	—	3.921	0.000
X1	Knowledge $\rightarrow$ Practice	0.582	0.124	0.692	4.694	0.000*
X2	Attitude $\rightarrow$ Practice	0.431	0.138	0.518	3.123	0.003

4. Conclusion

The present study highlights significant variations in the knowledge, attitude, and practices (KAP) of meat processing personnel across different processing sectors in Udumalpet region of Tamil Nadu. Personnel working in primary and further processing units demonstrated comparatively higher levels of knowledge and more positive attitudes toward hygiene and occupational safety than those in retail meat shops and online meat markets. This can be attributed to better infrastructure, supervision, and exposure to standardized protocols in organized sectors. However, despite the relatively satisfactory knowledge levels (72.2%) and awareness of occupational hazards (76.4%), the implementation of hygienic practices remained inconsistent, particularly in unorganized sectors. Similar observations have been reported by Grace *et al.* ^[5], who emphasized that knowledge alone does not guarantee safe practices without adequate institutional support.

The study also revealed that demographic and socio-economic factors, especially education level and income status,

significantly influenced the knowledge and attitude of workers, which is in agreement with the findings of Kumar and Rao ^[7]. Workers with higher educational attainment demonstrated better awareness and understanding of hygiene practices, whereas those in lower income groups and informal employment settings exhibited comparatively poor compliance. Furthermore, the high prevalence of reported health issues (62.6%) and limited frequency of medical check-ups reflect inadequate occupational health management, as also noted by Komba *et al.* ^[6] in similar informal meat processing environments.

Overall, the findings clearly demonstrate a persistent knowledge–practice gap, where awareness and positive attitudes are not effectively translated into safe handling practices due to constraints such as lack of infrastructure, limited training opportunities, and weak enforcement of food safety regulations². Therefore, it is essential to implement sector-specific training programs, improve working conditions, and strengthen regulatory frameworks to enhance both food safety and worker welfare. Addressing these gaps

will contribute significantly to reducing contamination risks and improving public health outcomes.

Conflict of Interest

Not available

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