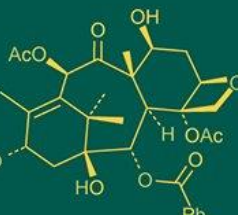
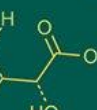
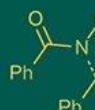


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## Cognitive barriers to food safety: A cross-sectional assessment of knowledge and attitudes among meat handlers in Jammu & Kashmir

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### Abstract

**Aim:** To evaluate the baseline knowledge and attitudinal tendencies of meat handlers in Jammu and Kashmir regarding food safety, and to determine the sociodemographic factors influencing these cognitive domains.

**Methodology:** A cross-sectional survey was conducted involving 200 meat handlers across five districts (Jammu, Udhampur, Rajouri, Kathua, and Samba). A structured questionnaire was utilized to assess sociodemographic profiles, sources of learning, and specific knowledge and attitudes toward meat hygiene. Data were analyzed using Pearson's Chi-square test to identify significant associations.

**Results:** The study revealed a moderate overall knowledge score (62.6%), with significant gaps in understanding microbial risks; only 12.5% of handlers were aware that microbial contamination could cause serious illness. While general attitudes were positive (75-85% agreement on equipment cleanliness), "hidden" hygiene aspects like personal protective gear and jewelry usage showed poor attitudinal scores (37.5-49.5%). Educational background and media exposure significantly influenced these scores ( $p < 0.05$ ).

**Interpretation:** There is a critical dissonance between general safety awareness and specific technical knowledge among meat handlers. Interventions must move beyond basic training to address the specific cognitive gaps regarding microbial pathogenesis and personal hygiene.

**Keywords:** Food safety, knowledge assessment, meat handlers, public health, zoonosis

### 1. Introduction

Food safety remains a critical global health challenge, particularly in developing economies where informal markets dominate the meat supply chain. The hygienic status of meat is directly contingent upon the competency of the personnel handling it. Recent studies highlight that the "human factor"—specifically the knowledge and attitude of food handlers—is the first line of defense against foodborne outbreaks (Abdullahi *et al.*, 2016; Akabanda *et al.*, 2017; Ansari-Lari *et al.*, 2010; Dagne *et al.*, 2019) <sup>[1, 2, 3, 4]</sup>. In the specific context of Jammu and Kashmir (J&K), meat production is not only an economic activity but a cultural staple. However, the sector is characterized by traditional butchery practices that often evade rigorous sanitary oversight.

While literature exists on the prevalence of pathogens in meat, there is a paucity of data regarding the *cognitive* landscape of the workforce—specifically, what they know and how they perceive risk. Misconceptions regarding microbial spoilage, carrier states, and cross-contamination can render even the best infrastructure useless. This study aims to fill this gap by providing a psychometric assessment of the Knowledge and Attitude (KA) domains of meat handlers in J&K, serving as a baseline for designing targeted educational interventions.

### 2. Materials and Methods

#### 2.1 Study Design and Setting

This cross-sectional study was conducted from 2022 to 2024 across five districts of the Union Territory of Jammu and Kashmir: Jammu, Udhampur, Rajouri, Kathua, and Samba. These districts represent diverse.

## 2.2 Sampling Strategy

A total of 200 meat handlers were selected using a convenient sampling method from registered and unregistered retail outlets. The distribution was: Jammu (n = 65), Udhampur (n = 40), Rajouri (n = 40), Kathua (n = 35), and Samba (n = 20).

## 2.3 Data Collection Tool

A pre-tested, structured questionnaire was developed based on Codex Alimentarius principles and previous validated studies (Paudel *et al.*, 2013) [5]. The tool comprised three sections:

- 1. Sociodemographic Profile:** Age, education, experience, and media exposure.
- 2. Knowledge Assessment:** 15 dichotomous questions (True/False) testing technical understanding of spoilage, temperature control, and pathogen transmission.
- 3. Attitude Assessment:** 7 Likert-scale items (Agree/Disagree) measuring the value placed on hygiene protocols.

## 2.4 Statistical Analysis

Data were quantified and analyzed using SPSS. Pearson's

Chi-square ( $\chi^2$ ) test was employed to evaluate the statistical significance of differences in responses across districts and demographic groups, with a p-value of  $\leq 0.05$  considered statistically significant.

## 3. Results and Discussion

### 3.1 Sociodemographic Drivers of Competency

The workforce was predominantly male, with a maturity trend observed in the age distribution; the majority of respondents were aged 26-50 years. Educational attainment varied significantly across districts ( $\chi^2 = 33.01$ ,  $p = 0.001$ ), with Udhampur and Rajouri showing higher literacy rates among butchers compared to Jammu. This is a crucial determinant, as formal education showed a positive correlation with the ability to understand complex food safety concepts.

Interestingly, the "Source of Learning" (Table 1) indicated a heavy reliance on intergenerational knowledge transfer. Over 65% of butchers in Udhampur and 77.5% in Rajouri learned the trade from their fathers, compared to formal training. This "hereditary apprenticeship" model often perpetuates traditional, unscientific practices, shielding the workforce from modern food safety protocols.

**Table 1:** Sources of Information and Learning among Meat Handlers

Variable	Jammu (n = 65)	Udhampur (n = 40)	Rajouri (n = 40)	Kathua (n = 35)	Samba (n = 20)	P-Value
Sources of Media						0.001*
Newspaper	24.6%	47.5%	47.5%	28.6%	30.0%	
Television	38.5%	45.0%	52.5%	37.1%	35.0%	
Source of Skill Learning						0.001*
Father	36.9%	65.0%	77.5%	37.1%	55.0%	
Relatives/Friends	41.5%	35.0%	22.5%	54.3%	35.0%	
Formal Training	6.2%	0.0%	0.0%	8.6%	0.0%	

### 3.2 Knowledge Assessment: The "Invisible" Risk Gap

The overall knowledge score was **62.6%**, classified as "Fair." However, a granular analysis (Table 2) reveals a dangerous dichotomy. Handlers scored high on "visible" hygiene concepts—such as the need for chilling (87.5%) and handwashing (86.5%). Conversely, scores plummeted on "invisible" microbiological concepts. Only 12.5% understood that microbial contamination leads to serious illness, and only 16.0% recognized that a handler with diarrhea poses a severe risk.

This suggests that while butchers understand *preservation* (to prevent economic loss from spoilage), they fundamentally lack understanding of *pathogenesis* (public health risk). The significant difference ( $p < 0.05$ ) across districts for questions on cross-contamination highlights regional disparities in awareness campaigns.

**Table 2:** Critical Knowledge Gaps in Food Safety

Knowledge Statement	Awareness Level	Verdict	P-Value
Chilling prevents spoilage (<20 °C)	87.5%	Adequate	0.004*
Handwashing reduces risk	86.5%	Adequate	0.008*
Contamination via bare hands	37.0%	Poor	0.025*
Healthy carriers can transmit microbes	31.5%	Poor	0.131
Handler with diarrhea is a risk	16.0%	Poor	0.001*
Microbes cause serious hospitalization	12.5%	Poor	0.119

### 3.3 Attitude Profiling

Attitude scores averaged **59.21%**, slightly lower than knowledge scores, indicating a resistance to behavioral change. While 84.5% agreed that equipment cleanliness is important, attitudes toward *personal* restrictions were dismissive. Nearly half (49.5%) of the respondents saw no issue with wearing jewelry (rings/watches) during slaughter, and 62.5% did not prioritize personal hygiene as a critical safety factor (Table 3). This reflects a "business-first" mindset where operational cleanliness (equipment) is valued over personal biosecurity.

**Table 3:** Attitudinal Tendencies toward Hygiene

Statement	Agreement (%)	P-Value
Cleanliness of equipment is important	84.5%	0.001*
Selection of healthy animals is important	75.5%	0.002*
Jewelry is unnecessary during work	49.5%	0.001*
Personal hygiene is critical	37.5%	0.023*
Same towel should NOT be used everywhere	33.0%	0.101

## 4. Conclusion

The study identifies a specific "cognitive blindness" among meat handlers in J&K. While they possess functional knowledge of meat preservation, they lack critical awareness of microbial safety and personal hygiene risks. The strong reliance on informal, hereditary learning paths

perpetuates these gaps. Future certification programs must pivot from general "cleanliness" to specific microbiological education to effectively protect public health.

### 5. Disclaimer (Artificial Intelligence)

Author(s) hereby declare that no generative AI technologies such as Large Language Models in the manuscript.

### 6. Acknowledgement

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### 7. Competing Interests

Authors have declared that no competing interests exist.

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