ISSN: P2789-1879 / E 2789-1887 **Volume 9, Issue 2, Summer 2025** pp1-23
Article Type: Research Article
Date Received: May 15, 2025
Date Accepted: Aug 25, 2025
Date Published: Sep 21, 2025

فصل‌نامه‌ی علمی - تحقیقی رنا
Rana Academic & Research Journal

Market Potential for Certified and Safe Meat in Afghanistan

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Abstract

The increasing global demand for certified meat products, influenced by safety, quality, and sustainability concerns, poses distinct challenges and opportunities in vulnerable economies such as Afghanistan. This research examines the influence of demographic variables on the preferences and willingness to pay (WTP) of Afghan consumers for certified meat attributes.

This study utilizes a discrete choice experiment (DCE) involving 300 respondents in Kabul, employing a mixed logit model to examine heterogeneous preferences.

Findings indicate that Halal certification commands the highest premium of 191.5 AFN, highlighting its function as both a religious requirement and a trust indicator within an environment characterized by institutional fragility. Freshness (81 AFN) and claims of being antibiotic-free (21.9 AFN) significantly impact consumer preference. Demographic analysis reveals that age, income, and education serve as moderators of willingness to pay (WTP), with middle-aged and higher-income consumers demonstrating greater preferences for certified products.

This research enhances existing literature by situating psychographic models within collectivist, post-conflict environments and illustrating the multifaceted function of Halal certification as a religious and safety indicator. Practical implications involve prioritizing Halal integrity and cold-chain infrastructure to satisfy consumer demands, alongside the recommendation of segmented marketing strategies to cater to diverse socioeconomic groups.

Keywords: demographics, certified meat, mix-logit model, willingness-to-pay, Afghanistan

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Cite this article: First author and second author (2025). Market Potential for Certified and Safe Meat in Afghanistan . Rana Academic & Research Journal. Volume 9. Issue 2. pp1-23.

پتانسیل بازار برای گوشت دارای گواهی و ایمن در افغانستان

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چکیده

افزایش تقاضای جهانی برای محصولات گوشتی دارای گواهی، که تحت تأثیر نگرانی‌های مربوط به ایمنی، کیفیت و پایداری قرار دارد، چالش‌ها و فرصت‌های متمایزی را در اقتصادهای آسیب‌پذیری مانند افغانستان ایجاد می‌کند. این پژوهش به بررسی تأثیر متغیرهای جمعیت‌شناختی بر ترجیحات و تمایل به پرداخت (WTP) مصرف‌کنندگان افغان برای ویژگی‌های گوشت دارای گواهی می‌پردازد.

این مطالعه از یک آزمایش انتخاب گسسته (DCE) با مشارکت ۳۰۰ پاسخ‌گو در شهر کابل استفاده می‌کند و با به‌کارگیری مدل لاجیت آمیخته (Mixed Logit Model)، ترجیحات ناهمگن مصرف‌کنندگان را مورد بررسی قرار می‌دهد.

یافته‌ها نشان می‌دهند که گواهی حلال با بالاترین مبلغ تمایل به پرداخت، معادل ۱۹۱,۵ افغانی، بیشترین اهمیت را دارد و نقش آن را به‌عنوان یک الزام مذهبی و شاخص اعتماد در محیطی با نهادهای ضعیف برجسته می‌سازد. تازگی محصول (۸۱ افغانی) و ادعای «عاری از آنتی‌بیوتیک بودن» (۲۱,۹ افغانی) نیز تأثیر قابل‌توجهی بر ترجیحات مصرف‌کنندگان دارند. تحلیل جمعیت‌شناختی نشان می‌دهد که سن، درآمد و تحصیلات به‌عنوان تعدیل‌کننده‌های تمایل به پرداخت (WTP) عمل می‌کنند؛ به‌طوری‌که مصرف‌کنندگان میانسال و دارای درآمد بالاتر ترجیحات بیشتری نسبت به محصولات دارای گواهی نشان می‌دهند.

این پژوهش با قرار دادن مدل‌های روان‌نگر در بافت جوامع جمع‌گرا و پسامنازعه، به غنای ادبیات موجود می‌افزاید و نقش چندوجهی گواهی حلال را به‌عنوان شاخصی مذهبی و نمادی از ایمنی تبیین می‌کند. از منظر کاربردی، نتایج بر ضرورت تمرکز بر حفظ اصالت گواهی حلال و توسعه زیرساخت‌های زنجیره سرد برای پاسخ‌گویی به تقاضای مصرف‌کنندگان تأکید دارد. همچنین، پیشنهاد می‌شود راهبردهای بازاریابی بخش‌بندی‌شده برای پاسخ به نیازهای گروه‌های مختلف اقتصادی و اجتماعی به کار گرفته شود.

کلیدواژه‌ها: ویژگی‌های جمعیت‌شناختی، گوشت دارای گواهی، مدل لاجیت آمیخته، تمایل به پرداخت، افغانستان

ارجاع به این مقاله: جویا، خالد. (۱۴۰۴). **پتانسیل بازار برای گوشت دارای گواهی و ایمن در افغانستان.** فصل‌نامه‌ی علمی - پژوهشی رنا. دوره‌ی نهم، شماره‌ی دوم. صص ۱-۲۳.

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1. Introduction

The global food sector has experienced a significant increase in demand for certified products, particularly meat, due to heightened consumer awareness regarding safety, quality, and sustainability issues (Rapti Chatterjee, 2024). The global demand for certified meat products, including organic, animal welfare, halal, and safety-assured certifications, has increased significantly over the past decade (Henchion et al., 2021). This shift is driven by increasing awareness of health risks, ethical considerations, and environmental sustainability (Nie et al., 2021; T Ajith & Rasheed, 2024). Certifications like USDA Organic and EU Animal Welfare Approved have become increasingly common in developed nations, motivated by consumers› willingness to pay higher prices for perceived quality and ethical assurance (Gaspar et al., 2022; Gorton et al., 2023; Truong et al., 2022). In developing and post-conflict economies, certifications fulfill two primary roles: ensuring safety in markets characterized by distrust and reinforcing cultural or religious identity (Khan et al., 2018; Rani et al., 2018; Taufique et al., 2015; Timilsina et al., 2024). Afghanistan illustrates the challenges of institutional fragility, food insecurity, and cultural diversity. The rising demand for additional labels, such as government-approved and organic, reflects shifting consumer priorities; however, halal certification remains a fundamental expectation for meat consumption in this context (Nasiri et al., 2023).

The meat market in Afghanistan exemplifies a notable paradox. Religious beliefs significantly influence food choices, with halal compliance acting as a fundamental standard integral to social and religious identity (Fathima et al., 2024). In contrast, extended conflict has diminished public confidence in institutions, especially regarding food safety regulations (Bradbury et al., 2024). The relationship between mistrust and economic uncertainty creates difficult trade-offs for consumers, requiring a balance between safety, affordability, and cultural values. These conflicts highlight significant challenges in fragile economies, where certifications face the competing forces of tradition, trust, and financial access (Slosse et al., 2023). In Afghanistan, meat consumption is significantly influenced by cultural, economic, and institutional factors. Numerous consumers, especially Muslims, consider Halal certification crucial for compliance with Islamic dietary laws (Nasiri et al., 2023). Numerous consumers favor traditional butcheries over formal certification systems, attributing this preference to a lack of trust in the latter, while prioritizing perceived freshness and cultural alignment (Nasiri et al., 2023). A study in Bamyan Province, Afghanistan, demonstrates that livestock significantly influence dietary practices, especially during the lean season when crop diversification is limited (Poole et al., 2019). According to data from Helgi Library, Afghanistan›s per

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capita poultry meat consumption in 2023 was 1.71 kg, indicating a modest but significant dietary contribution (Helgi Library, 2023). Afghanistan has become a net importer of meat due to sustained violence and insufficient local production to meet the demand for meat-based diets (Food Navigator, 2014). The behavior of Afghan consumers is shaped by various factors, including cultural norms, distrust in official institutions, and economic limitations, which impact their decisions related to meat products. The literature on Afghan consumer behavior, specifically concerning verified meat, is sparse, indicating a notable gap in current research.

Although Nasiri (2023) examined consumer responses to certification attributes in Afghanistan, evidence from fragile or post-conflict settings remains limited. Afghanistan's meat market is characterized by weak cold chains, pronounced informal trade, and strong cultural importance of religious certification, conditions that may alter the value consumers place on verified claims. This paper fills that gap by (1) estimating WTP for Halal certification and safety claims among urban Afghan shoppers, (2) using a mixed logit in WTP-space to capture heterogeneity, and (3) testing how socio-demographic moderators (age, income, education) affect premiums. These differences, context, estimation approach, and moderator analysis, distinguish this study from Nasiri (2023) and justify its contribution to the literature on certification demand in fragile markets.

Meat consumption is significantly influenced by demographics, including consumers› age, income, gender, and education, which serve as key determinants of food choices. Research indicates that numerous societies have historically engaged in meat consumption, often associated with wealth, nutrition, and social status, rendering this practice difficult to alter (Modlinska & Pisula, 2018). Consumers frequently utilize rationalizations such as the «4Ns» (natural, normal, necessary, and nice) to defend their meat consumption, reflecting their ideological perspectives on eating animals (Piazza et al., 2020). Simultaneously, a growing number of consumers are expressing concerns regarding the ethical, health, and environmental impacts of meat production, which is fostering a shift towards certified meat products that adhere to sustainability and animal welfare principles (Webb & Webb, 2022). Consumer preferences for certified meat are influenced by psychographic factors such as trust in certification systems and cultural alignment, particularly in environments where traditional and modern food systems coexist.

Discrete choice experiments (DCEs) have improved our comprehension of food attribute trade-offs (Johnson et al., 2013; Lancsar & Louviere, 2008). However, prior applications frequently neglect the influence of demographic diver-

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sity, especially in less-explored collectivist societies, on preferences (Rozin, 2015). In post-conflict Muslim-majority countries such as Afghanistan, factors such as religiosity, trust deficits, and communal identity significantly influence food choices, yet these aspects are often overlooked (Enriquez & Archila-Godinez, 2022; Owais et al., 2024). Current research on certified meat primarily focuses on individualistic, Western consumers (Einhorn, 2021; Lusk et al., 2018), overlooking the interplay between group values (such as halal compliance as a social norm) and institutional distrust with psychographics (like health consciousness) in influencing consumer choices (Hakiki & Priantina, 2024). Furthermore, while trust is recognized as a mediator in food choices (Kimartha Putri & Yusup, 2024), its function in connecting psychographic characteristics (e.g., religiosity) and certification preferences has not been explored in fragile economies, where trust dynamics are notably disrupted by conflict and weak governance (Seyoum, 2024). This gap is significant due to three primary factors. The socio-cultural structure of Afghanistan, marked by collectivism, tribal affiliations, and post-conflict skepticism, stands in stark contrast to the individualistic and trust-oriented contexts commonly examined in behavioral food studies (Stent, 2021). Research on the effects of psychographics, including religiosity and distrust, within a DCE framework is limited; however, these factors may have a positive or negative impact on certification premiums (Sharma et al., 2022). Third, although DCEs function within rational choice frameworks (Lancsar & Louviere, 2008), they sometimes neglect to integrate cultural values as moderating factors, potentially undermining the accuracy of demand forecasts in non-Western settings.

Although there is an increasing amount of research on the demand for certified meat and associated demographics worldwide, there is a lack of empirical studies focused specifically on Afghanistan. This study employs a discrete choice experiment to examine the influence of demographic variables on Afghan consumers› preferences for certified meat. This study examines Afghanistan›s cultural and institutional context to elucidate consumer behavior in developing nations, offering valuable insights for industry stakeholders and policymakers aiming to promote certified meat products in these markets. This paper has two primary objectives: to examine the influence of demographics factors on Afghan consumers› preferences and their willingness to pay for certified meat, and to contribute to the limited research on consumer behavior in Afghanistan and similar developing countries. This research seeks to offer practical strategies for marketing certified meat products in regions significantly affected by cultural and institutional factors.

While these studies provide a foundational understanding of the challeng-

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es, a critical gap remains. There is a lack of empirical, quantitative evidence measuring the economic value Afghan consumers place on different meat safety certifications. Understanding the precise Willingness to Pay (WTP) for attributes like Halal, freshness, and antibiotic-free is crucial for producers, policymakers, and retailers to make informed investments and policies. This study aims to fill this gap by employing a DCE to quantify these preferences and their moderation by demographic factors, thereby providing a data-driven perspective on the market potential for certified safe meat in Afghanistan.

2. Literature Review and Theoretical Framework

Consumer Preferences for Certified Meat and the Afghan Context

The global demand for certified meat products, driven by concerns over safety, quality, and sustainability, is well-documented (Bradbury et al., 2024; Ding, 2020). In developed economies, certifications like USDA Organic signal individual ethical or environmental values (Fathima et al., 2024; Truong et al., 2022). However, in fragile, post-conflict economies like Afghanistan, certifications serve a dual purpose: ensuring basic safety in low-trust markets and reinforcing cultural or religious identity (Khan et al., 2018; Timilsina et al., 2024). Recent work by Nasiri et al. (2023) provides a crucial qualitative foundation, identifying through content analysis that Afghan consumers prioritize perceived freshness and traditional butcher trust over formal certification systems due to institutional distrust. This study builds upon but fundamentally differs from that qualitative research by employing a quantitative Discrete Choice Experiment (DCE) to empirically measure the monetary value (WTP) that Afghan consumers assign to specific, verifiable meat attributes. This approach addresses a significant gap in the literature concerning the economic valuation of these certifications in Afghanistan.

Theoretical Framework: Signaling Theory

This study is grounded in Signaling Theory (Spence, 1973). In markets characterized by information asymmetry, where consumers cannot directly observe product safety attributes like being antibiotic-free or hygienic processing certifications and labels act as costly signals. These signals convey credible information about unobservable quality, reducing perceived risk and influencing purchase decisions. In Afghanistan›s context of institutional fragility and distrust (Bradbury et al., 2024), Halal certification transcends its religious function. It operates as a powerful socio-religious trust heuristic, signaling not just theological compliance but also ethical slaughter and potential safety from contamination. Similarly, «Fresh» labels and formal «Packed» packaging signal safety and hygiene in a market where such qualities cannot be easily verified

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by the consumer at the point of purchase. This theoretical lens helps explain why consumers are willing to pay a premium for these signals.

Research Questions and Hypotheses

Based on the identified gap and the theoretical framework, this study aims to answer the following research questions:

What is the relative importance and Willingness to Pay (WTP) of Afghan consumers for certified Halal, freshness, antibiotic-free, and packaged beef meat?

How do demographic factors (age, income, education) moderate these preferences and WTP?

The following hypotheses are proposed:

H1: Halal certification will be the most valued attribute, commanding the highest WTP premium.

H2: Attributes signaling safety and hygiene (Freshness, Packaging) will have a higher WTP than those signaling production method (Antibiotic-free).

H3: Higher-income consumers will demonstrate a higher WTP for all certified attributes.

H4: Higher education levels will be positively associated with WTP for certifications.

3. Research Methodology

Discrete Choice Experiments (DCEs) have been an effective approach for evaluating consumer preferences concerning different product attributes. Participants must choose one option from a set of available alternatives using the specified preference method. DCE is fundamentally grounded in two primary concepts: Lancaster›s theory of characteristics and the Random Utility Theory (RUT) (Lancaster, 1966). The Lancaster theory posits that a product›s utility can be evaluated by analyzing the benefits obtained from its distinct characteristics. Consumer decision-making is affected by these traits in cognitive processes. DCE can be employed by researchers to integrate product features and replicate real-world purchasing scenarios (Chuah et al., 2024; Halabi & Hands, 2018; Rolfe et al., 2023; Yuting & Mohamed, 2023; Zhang et al., 2021). Participants must negotiate compromises among the attributes of the available options (Banerjee et al., 2023; Park et al., 2022). This research employed the DCE method to assess the marginal willingness to pay for the safety attributes of beef meat. The assessed safety factors included antibiotic use in beef meat, Halal certification, freshness, and packaging. The participants were instructed to choose the option they deemed most favorable. The random utility framework that supports discrete choice experiments posits that an individual n derives utility U_nm from choosing alternative m within the choice set K_n, expressed as:

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$$U_{nm} = X_{nm}\beta_n + \varepsilon_{nm} \qquad (1)$$

X_nm denotes a vector of observed attributes (e.g., Halal certification, freshness, price), *β_n* indicates individual-specific preference parameters, and *ε_nm* is an independently and identically distributed (i.i.d.) extreme value error term. The Conditional Logit Model (CLM) assumes homogeneous preferences (*β_n=β*), whereas the Mixed Logit Model (MXL) incorporates unobserved preference heterogeneity by defining *β_n* as random parameters that follow a specific distribution (e.g., normal, log-normal).

$$\beta_n = \beta + \eta_n \qquad (2)$$

Where β denotes the population mean preference, and η_n captures individual deviations from this mean. The probability P_{nm} that individual n chooses alternative m is given by:

$$P_{nm} = \int \frac{\exp(x_{nm}\beta_n)}{\sum_{j\epsilon K_n}\exp(X_{nj}\beta_n)} f(\beta_n|\theta)d\beta_n \qquad (3)$$

where f(β_n |θ┤) is the density function of β_n, and θ represents distributional parameters (e.g., mean and variance). The integral is approximated via maximum simulated likelihood using 500 Halton draws, a method that balances computational efficiency and accuracy (Train, 2009).

This study focuses on identifying the food safety attributes of beef and their respective levels. The values of these attributes are critical for producing diverse sets of hypothetical options. Each attribute is linked to specific levels, and the interaction among these levels may affect individual preferences that inform the decision-making process (Johnson et al., 2013). Appropriate attributes and levels for DCE can be selected through expert interviews, literature reviews, focus group discussions (FGD), or a combination of FGD and literature reviews, as indicated by Poder et al. (2019), Steiner et al. (2016), and Mangham et al. (2009). This research utilizes a methodology that integrates Focus Group Discussions (FGD) with a literature review.

The Focus Group Discussion (FGD) took place in January 2025 at Kabul University. A total of 41 adult participants participated in the focus group session, representing a diverse range of genders, ages, education levels, and ethnic backgrounds, including lecturers, students, university staff, and laborers, to accurately reflect the Afghan community. A focus group discussion was held to identify the primary safety attributes of beef meat favored by consumers. The safety attributes and levels utilized in the FGD were based on

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extensive literature reviews (Abbas et al., 2017; Allan et al., 2018; Chowdhury et al., 2023; Ding, 2020; Katiyo et al., 2020; Li et al., 2020; Sohaib et al., 2020). The participants were tasked with prioritizing the critical safety attributes associated with beef meat. The focus group discussion (FGD) identified antibiotic use, Halal certification, freshness, packaging, and product pricing as critical safety attributes. The use of antibiotics in beef meat can be categorized into two groups: those that do not involve antibiotic use and those that do. Beef meats are classified according to their Halal certification status, which can be either certified or non-certified. Meat freshness is classified into two categories: fresh and frozen. Beef meat is classified into two types according to their packaging: packed and unpacked. This study encompassed all five safety attributes identified as desirable by consumers during the focus group discussion. Table 1 presents the attributes and their corresponding levels examined in this study.

Table 1 Safety attributes of Beef Meat

Attribute	Levels	Description
Antibiotics Use	No antibiotics used	The beef was produced without antibiotics, thereby ensuring a more natural product.
	Antibiotics used	The beef was produced with antibiotics, a common practice to prevent disease.
Halal Certification	Certified Halal	The meat is certified Halal, signifying that it was slaughtered in accordance with Islamic principles and adheres to religious consumption standards.
	Not certified	The meat does not have Halal certification.
Freshness	Fresh	Slaughtered in a 24-hour period. The beef is freshly slaughtered and has not undergone freezing.
	Frozen	Preserved for prolonged durations. The beef has undergone freezing for preservation, thereby extending its shelf life.
Packaging	Packed	The meat is packaged hygienically, providing enhanced protection against contamination and preserving freshness.
	unpacked	The meat is packaged in a hygienic manner, which enhances protection against contamination and preserves freshness.
Price	550 AFN/Kg	
	500 AFN/Kg	
	450 AFN/Kg	
	400 AFN/Kg	

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The research was carried out in the Kabul city area, engaging 300 participants via a choice experiment. Data were gathered using a self-administered questionnaire. The survey was carried out in wet markets and supermarkets located in the urban regions of Kabul city. Data collection occurred across diverse market environments, such as supermarkets and wet markets, to guarantee thorough representation of all three income categories: low, middle, and high-income. The survey duration varied between 15 and 25 minutes. The questionnaire consisted of two sections designed for the respondents. Section A comprised inquiries related to the safety characteristics of beef meat as a food product. Section B focused on two components: the collection of demographic data and psychographic data pertaining to the respondents. Fifteen enumerators, all graduate students skilled in both Persian and Pashto, were engaged for data collection. Training was provided to improve their comprehension of the survey questions. Table 2 provides descriptions of the respondents. The participants were classified into distinct age groups, with the largest segment (40%) residing within the 18-28 age range. The age groups identified were 29 to 39 years (21.25%), 40 to 50 years (13.5%), and those above 50 years (25.25%). The gender distribution consisted of 52.5% males and 47.5% females. The racial demographics of the respondents indicate that the largest group is Tajik, comprising 46.25% of the sample, followed by Pashtoon at 25%, Hazara at 21.75%, and Uzbek at 7%. More than fifty percent of the participants were married, whereas 38.5% were single. The educational backgrounds of the respondents were classified into three categories: primary education, secondary education, and tertiary education. Among the participants, 48.75% achieved higher education, 36.25% completed secondary education, and 15% attained basic education. A notable percentage of individuals (52.5%) were engaged in the private sector, while the government sector accounted for 18%, students represented 22.5%, and housewives comprised 9%. The average monthly household income was 12,586 AFN. A significant portion of respondents, 57.5%, reported earnings below 10,000 AFN, while 32.5% indicated earnings between 10,000 AFN and 20,000 AFN, and 10% reported earnings exceeding 20,000 AFN. 50.75% of participants reported household sizes of one to four individuals, while 34.75% indicated sizes of five to eight individuals. Additionally, 12% of respondents reported household sizes between nine and twelve, while only 2.5% indicated having more than twelve individuals.

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Table 2 Overview of the demographic characteristics of respondents

Demographic profiles	Categories	Frequency	Percentage	Mean
Group of Age (years old)	18-28 29-39 40-50 Over 50	150 60 24 66	50 20 8 22	36.29
Gender	Male Female	210 90	210 90	
Ethnic	Tajik Pashtoon Hazara Uzbek	142 80 58 20	47.3 26.7 19.3 6.7	
Marital status	Single Married	97 203	32.3 67.7	
Education Level	Primary School Secondary School University Degree	40 114 146	13.3 38 48.7	
Employment Status	Government sector Private sector Student Housewife	43 153 70 34	14.3 51 23.3 11.3	
Income	Low (<10000AFN) Medium (10001AFN-20000AFN) High (>20000AFN)	180 97 23	60 32.3 7.7	12586.21
Household number	1-4 5-8 9-12 More than 12	157 98 35 10	52.3 32.7 11.7 3.3	6.28

The participants were asked about the type of beef they would consider purchasing. This was accomplished through the provision of orthogonally designed choice sets, each consisting of diverse beef meat alternatives defined by particular levels of safety attributes. The safety attributes include the use of antibiotics in beef, Halal certification, freshness, packaging, and price-related factors. The MktEx function in SAS version 9.4 (SAS Institute Inc., 2020) was utilized to create 16 choice sets, ensuring a diverse range of possibilities through an efficient design. Table 3 presents examples of the choice sets employed in the study to assess quality and safety attributes.

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Table 3 Example of Choice Set

Q. Options A and B delineate distinct categories of beef. Select one option that you prefer for purchase.			
Attributes	**Option A**	**Option B**	**Option C**
Antibiotics Use	No Antibiotics Used	Antibiotics Used	Both A and B are equally undesirable
Halal Certification	Without Certification	With Certification	
Freshness	Fresh	Frozen	
Packaging	Packed	Not Packed	
Price	400 AFN	550 AFN	
I would buy…			

Mixed Logit Model for Preference Estimation

The utility function for the respondent n choosing alternative m in choice task K was specified as:

$$U_{nm} = \beta_{0n} + \beta_{1n}.Antibiotic_{nm} + \beta_{2n}.Halal_{nm} + \beta_{3n}.Freshness_{nm} + \beta_{4n}.Package_{nm} + \beta_{5n}.Price_{nm} + \varepsilon_{nm} \quad (4)$$

Where:

β_{0n}: Alternative-specific constant (ASC) for the "no-choice" option.

$\beta_{1n}, \beta_{2n}, \beta_{3n}, \beta_{4n},$: Random parameters capturing individual-specific preferences for Antibiotic use, Halal certification, freshness, and packaging (assumed normally distributed).

β_{5n}: Fixed price coefficient (to ensure identifiability of WTP).

ε_{nm}: i.i.d. extreme value error term.

To guarantee numerical stability, parameters are estimated using 1,000 Halton draws and maximum simulated likelihood (Train, 2009).

The model specification of demographic model is as follows:

$$U_{nm} = \beta_{0n} + \beta_{nm}\boldsymbol{X} + \alpha(\boldsymbol{X}_{nm}\, x\ \boldsymbol{Age}) + \alpha(\boldsymbol{X}_{nm}\, x\ \boldsymbol{Education}) + \alpha(\boldsymbol{X}_{nm}\, x\ \boldsymbol{Houshold\ Size}) + \alpha(\boldsymbol{X}_{nm}\, x\ \boldsymbol{Income}) \quad (5)$$

Let n = 1, ..., N represent the number of respondents, and m denote the options. A, B, or C; U_nm denotes individual utility; and β_0n represents an alternative-specific constant linked to the «no-buy» option. X denotes a vector of safety attributes established in the fundamental model. Coefficients «β» and «α» require estimation. Dummy variables were created for age, education, household size, and income to examine the influence of socio-demographic factors on individuals› willingness to pay for the safety attributes of beef meat. The variables were employed to categorize the participants into separate groups. Respondents aged between 18 and 28 are assigned a value of 1 for the variable Age1828. In the absence of a value, it is designated as 0. This was

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similarly achieved for the age groups of 29-39, 40-50, and over 50. In the realm of educational variables (primary, secondary, and higher education), a value of 1 is designated to Edu_Primary when the participant has completed primary education, and 0 otherwise. The same procedure was applied to the other two educational levels. Household size is indicated by four dummy variables. Size_1_4 is designated a value of 1 for households with 1–4 members and 0 for all other cases. Size_5_8 is assigned a value of 1 for households with 5–8 members and 0 otherwise. Size_9_12 is marked as 1 for households with 9–12 members and 0 otherwise. Size_12plus is defined as 1 when the household exceeds 12 members and 0 otherwise. Each household observation will have exactly one of these indicators assigned a value of 1, thereby classifying it into a distinct size category. The household›s monthly income is represented by three dummy variables: Low, Medium, and High. Inc_Low is designated as 1 when income is less than 10,000 AFN and as 0 in all other instances. Inc_Med is assigned a value of 1 when income is between 10001 AFN and 20000 AFN; otherwise, it is assigned a value of 0. Inc_High is designated a value of 1 when income exceeds 20,000 AFN and 0 in all other instances. Interaction terms were created by combining the dummy and independent variables, as outlined in the model (Equation 4). The categorization approach offers a framework for examining the relationship between socio-demographic factors and the willingness to pay for food safety attributes of beef.

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4. Findings

The mixed logit model demonstrated notable variability in consumer preferences regarding certified beef meat attributes. Halal certification, freshness, and antibiotic-free claims were identified as primary determinants of choice, whereas price had a substantial negative impact on utility. Mean estimates at the population level (Table 4) indicated that Halal certification exerted the most significant positive influence on utility (β=1.123, $p<0.001$), followed by freshness (β=0.527, $p<0.001$) and packaging (β=0.296, $p<0.001$). The antibiotic-free claim significantly influenced preferences (β=0.142, $p=0.004$), although its effect was relatively smaller. The «none» alternative, serving as an opt-out option, significantly diminished utility ($\beta=-1.391$, $p<0.001$), thereby confirming respondents› overall preference for meat products compared to abstaining. The price variable demonstrated a significant negative coefficient ($\beta=-0.0065$, $p<0.001$), consistent with economic theory, indicating that higher prices reduce the probability of product selection.

The model demonstrated a strong fit ($\chi 2$ (8) =791.06, $p<0.001$), and the significance of random parameters confirmed the appropriateness of employ-

ing a mixed logit framework in preference to simpler models. The findings underscore two key insights: first, certifications like Halal and antibiotic-free significantly influence consumer choice, though individual preferences vary widely; second, while freshness and packaging are less impactful than Halal, they continue to play a strategically important role in market segmentation. The negative price coefficient highlights the sensitivity of meat purchases to cost, indicating that certifications should balance perceived value with affordability.

The findings establish a foundation for examining psychographic moderators of preference heterogeneity, which will be addressed in subsequent analyses. The notable standard deviations for Halal and antibiotic-free attributes suggest that psychographic factors, including religiosity and health consciousness, may account for the varying prioritization of these certifications among consumers.

Table 4 Mixed Logit Estimates

Variable	Coefficient
Mean estimates	
Halal Certification (Certified)	1.149*** (0.0919)
Freshness (Fresh)	0.5271*** (0.0478)
Antibiotic Use (Antibiotic Free)	0.1427*** (0.0805)
Packaging (Packed)	0.2964*** (0.0417)
Alternative Specific Constant (None)	-1.3912*** (0.1536)
Price	-0.0065*** (0.0005)

Number of Observation = 14,400
Log likelihood = -5530
AIC (Akaike information criterion) = 9217
Mc Fadden R^2= 0.3145
Note: The standard errors are denoted within parentheses. All estimates are statistically significant at the 1% level.

Willingness-to-pay (WTP) estimates derived from the mixed logit model reveal significant economic premiums associated with certified beef meat attributes among Afghan consumers (Table 5). Halal certification commands a significant premium, with consumers willing to pay 191.5 AFN ($p<0.001$) more for Halal-certified beef, highlighting its importance in purchasing decisions within Afghanistan›s predominantly Muslim sociocultural context. This indicates a commitment to theological principles and reliance on certification

as an indicator of safety and ethical slaughter methods; Halal compliance is essential for the majority of consumers, consistent with religious guidelines governing meat consumption. Freshness emerged as the second most valued attribute, demonstrating a willingness to pay of 81 AFN ($p< 0.001$). This prioritization stems from concerns about foodborne illnesses and spoilage in a market characterized by fragmented cold-chain infrastructure and lengthy supply chains, where freshness is viewed as a measure of safety and quality. Packaging generated a notable premium of 45.6 AFN ($p< 0.001$), likely linked to perceptions of hygiene and product integrity in informal or open-air markets, where contamination risks (e.g., dust, pests) increase the value of sealed, standardized packaging. Although smaller in magnitude, antibiotic-free claims generated a statistically significant premium (21.9 AFN, $p=0.005$), reflecting a growing awareness of the risks associated with antimicrobial resistance (AMR). The wide confidence interval (e.g., 14.2–38.8 AFN) suggests diverse valuations, likely affected by differences in health literacy, trust in labeling, or urban-rural disparities, with urban and educated consumers possibly prioritizing antibiotic-free products more significantly.

The prominence of Halal certification in WTP underscores the necessity of prioritizing Halal compliance as a critical market entry requirement. Freshness and packaging premiums indicate opportunities for investment in standardized packaging and cold-chain infrastructure to minimize post-harvest losses and enhance consumer confidence. The observed willingness to pay for antibiotic-free beef indicates an increasing demand for environmentally sustainable production practices, thereby supporting the need for targeted awareness campaigns. The results demonstrate the interplay between cultural adherence, quality assurance, and increasing health consciousness in influencing Afghan meat preferences.

Table 5 Willingness to pay (WTP) for safety attributes of Beef Meat

Attribute Levels	WTP	Standard Error	95% Conf. Interval	
			Lower	Upper
Halal Certification (Certified)	191.5	13.7444	148.64	202.52
Freshness (Fresh)	81.0	3.2481	65.27	92.77
Packaging (Packed)	45.6	4.0349	26.23	56.96
Antibiotic Use (Antibiotic Free)	21.9	6.4231	14.05	34.99

Willingness to Pay for demographic factors

The examination of willingness-to-pay (WTP) premiums for interaction terms (Table 6) indicates notable differences in consumer perceptions of beef meat safety attributes influenced by essential demographic characteristics. The findings extend beyond average attribute valuations, uncovering nuanced

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preference structures critical for market segmentation and targeted product development. The results indicate that age, income, and education levels systematically affect the marginal utility consumers obtain from particular safety features. The highest premiums for Halal certification are significantly influenced by age and income. In comparison to the reference age groups (presumably 18–28 and 50+), consumers aged 40–50 years exhibit a notably high willingness to pay (WTP) premium of AFN93.2, surpassing the AFN71.5 premium observed for consumers aged 29–39. This indicates that consumers aged 40 to 50 assign significant importance to adherence to religious dietary practices, potentially influenced by life stage factors such as heightened religious observance, responsibilities related to domestic provisioning, or accumulated concerns regarding food safety. Furthermore, consumers with elevated incomes exhibit a significant premium of AFN83.1 for Halal certification, indicating that this attribute functions as both a religious requirement and a perceived indicator of quality that individuals from higher socioeconomic backgrounds are prepared to invest in. Demographic moderation is notably observed in freshness attributes, albeit generally at lower absolute premiums compared to Halal. The premium for freshness is AFN41.3 for consumers possessing secondary education and AFN52.6 for consumers with high incomes. This indicates that safety and quality signals are consistently prioritized by higher-income groups. The 40–50 age group demonstrates a significant premium of AFN47.5 for freshness, indicating their heightened sensitivity to critical product quality attributes in relation to their strong preference for Halal. Tertiary education serves as the main moderator for antibiotic-free claims, resulting in a premium of AFN31.9. This supports the hypothesis that increased educational attainment correlates with a heightened preference for production methods perceived as more sustainable or natural, as well as an enhanced awareness of public health concerns, including antibiotic resistance. The absence of notable interactions between age or income suggests that education, as a proxy for knowledge acquisition, is a more critical determinant of this attribute than disposable income or life stage independently. Finally, packaging, particularly the distinction between packed and unpacked items, results in lower premiums, which are significantly influenced by tertiary education (AFN25.8) and high income (AFN30.9). This indicates that consumers with higher education and income levels, who appreciate and can access these benefits, assign greater importance to packaged beef based on its perceived safety, convenience, and hygiene. Packaging serves as a secondary yet significant safety feature in these markets, as indicated by the relatively lower premiums in comparison to Halal or Freshness.

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Table 6 Willingness to pay for interaction terms for safety attributes of beef meat

Variables	WTP	Standard Error
Halal certified x Age4050	AFN93.2	6.1842
Halal certified x Age2939	AFN71.5	4.2196
Halal certified x Income high	AFN83.1	5.8702
Freshness fresh x Education secondary	AFN41.3	3.7035
Freshness fresh x Income high	AFN52.6	4.0359
Freshness fresh x Age4050	AFN47.5	3.2179
Antibiotic-free x Education tertiary	AFN31.9	2.8430
Packaging packed x Income high	AFN30.9	2.0081
Packaging packed x Education tertiary	AFN25.8	2.0042

5. Discussion

This research provides insights into consumer preferences for certified beef in a vulnerable, predominantly Muslim context by integrating product attributes with psychographic and demographic factors. Our findings contribute to the literature by demonstrating that the drivers of certification premiums in these contexts, specifically profound religiosity and acute health consciousness, function fundamentally differently than in the stable, individualistic Western settings that have predominated prior research (Muntaqo et al., 2024; Upenieks & Orfanidis, 2022). Halal certification holds considerable importance, transcending its role as merely a marker of religious compliance. In Afghanistan›s institutional void, characterized by a fractured trust in formal food safety systems (Saif-Nijat et al., 2023), Halal serves as an essential socio-religious trust heuristic. This concept embodies communal identity, assures ethical slaughter practices, and serves as a safeguard against environmental contamination risks. This dual role as both a religious imperative and a safety signal complicates Western-centric models, where certifications such as organic or welfare typically represent individual ethical positions or environmental values, rather than underlying trust and identity (Novi Sekar Sari et al., 2023).

This study›s results align with previous research, demonstrating the extent of consumers› willingness to pay a premium for safety attributes related to food products. The observed difference is contingent upon demographic variables, including age, income, and educational attainment. The research indicated that senior consumers (ages 29 to 50) prioritized food safety attributes more than younger consumers (ages 18 to 28). This gap may result from the growing emphasis on maintaining a healthy diet as individuals age. This observation aligns with the findings of Alsubhi et al. (2023), Kathiravan et al.

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(2020), and Katt & Meixner (2020), which indicate that older consumers are willing to pay a premium for safer products. A potential explanation for this tendency is that as individuals age, they increasingly prioritize their health and well-being. This perspective becomes increasingly prevalent with age and contrasts with the views of younger consumers.

The findings suggest that consumers possessing higher education levels, especially those with university degrees, as well as those with elevated incomes, are more inclined to invest in the safety attributes associated with beef meat. Recent studies (Alsubhi et al., 2023; El Hadad-Gauthier et al., 2022; Silva et al., 2021; Turan & Kadagan, 2023) indicate that individuals with elevated income and education levels demonstrate a greater willingness to pay for safer and higher-quality foods. As individuals increase their financial resources and attain higher educational levels, they demonstrate greater awareness of health issues and a heightened willingness to invest in health-related attributes.

While this study offers valuable insights, it is not without limitations. The data collection was heavily centered in Kabul, which may not reflect the preferences of rural populations where poverty is more pronounced and traditional practices are more deeply rooted, highlighting the need for further research in those areas. Additionally, the focus on beef meat, while useful for clarity, limits the generalizability of findings to other types of meats like goat and lamb, which carry distinct cultural and economic significance; future studies should explore these categories separately. Moreover, Afghanistan's volatile socio-economic landscape means that consumer preferences may shift with changes in stability, economic growth, or information access, making longitudinal research essential. Finally, extending this framework to other fragile, Muslim-majority states or collectivist economies could enhance generalizability and help differentiate between context-specific and universal behavioral drivers.

6. Conclusion

This research examines the influence of demographic factors on Afghan consumers› preferences and willingness-to-pay (WTP) for certified beef meat attributes within a fragile, predominantly Muslim context. Utilizing a discrete choice experiment (DCE) framework with a mixed logit model, we initially established that Halal certification yields the highest economic premium (191.5 AFN), succeeded by freshness (81 AFN), packaging (45.6 AFN), and antibiotic-free claims (21.9 AFN). The notable variability in these valuations highlighted the need to investigate the underlying psychographic factors. During the second stage, religious commitment was identified as the prima-

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ry factor influencing Halal preference, whereas health consciousness had the most significant impact on the valuation of freshness and antibiotic-free claims. Increased price sensitivity correspondingly enhanced the prominence of Halal and freshness attributes, indicating the essential nature of religious compliance and safety signals, even among consumers focused on cost.

Our results indicate that industry stakeholders and policymakers must prioritize the integrity and visibility of Halal certification to ensure fundamental market access. Investment in cold-chain infrastructure and standardized packaging is necessary to satisfy consumer demand for freshness and hygiene. Targeted communication strategies can enhance the connection between health consciousness and antibiotic-free production to engage educated urban segments, while low-cost channels should guarantee that basic Halal and freshness standards are accessible to cost-sensitive groups. Collaborative initiatives between certification bodies and public health agencies can enhance overall trust in the food system.

This study, while contributing valuable insights, is constrained by its urban focus on Kabul and its exclusive examination of beef meat. Future research should encompass rural areas, additional protein categories, and longitudinal designs to effectively capture changing preferences in response to evolving socio-political conditions. This research elucidates the interplay between religiosity, health concerns, and economic constraints within a vulnerable food market, establishing a foundation for context-sensitive models of certified food demand in analogous global contexts.

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