Milk Consumption and its Determinants - An In-depth Study in the Context of Kunduz City

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ABSTRACT

This study has been launched to identify the factors influencing milk consumption in Kunduz City. Related data were collected from 335 samples by questionnaire using convenience sampling. Various statistical methods have been used to consider the goals, such as multiple linear regression, one-sample t-test, frequency, and percentage. The results of the analysis of factors affecting milk consumption showed that children under 10 years old, the number of family members with income, the number of family members, having sports activities, an educational level above a bachelor's degree, and age are important factors on the consumption of fresh milk in Kunduz city. Knowing the factors affecting milk consumption will help producers adjust their marketing activities according to their needs and desires by understanding and familiarizing themselves with consumers and customers. In addition, to produce proper and sustainable milk products, dairy companies need to solve the obstacles and infrastructure challenges in their way with the help of responsible institutions.

Keywords: Consumption, Consumer preference, Dairy products, Kunduz city, Milk consumption

INTRODUCTION

The demand for a product significantly influences both its production and economic growth in the short and long-term (Yoshikawa, 2003). Numerous factors impact milk consumption across different societies, as evidenced by various studies. Variables such as age, ethnicity, and behavioral factors markedly affect the increased consumption of dairy products (Boniface & Umberger, 2012). Conversely, price and family expenses can reduce the likelihood of choosing and consuming dairy products. Factors like age, education, and physical activities enhance dairy consumption. Additionally, the four marketing Ps—product, price, promotion, and place—also play a crucial role in the demand for dairy products (Kaliji *et al*., 2019). Beyond age, education, and advertising, price remains a significant factor limiting milk demand, with a 1% price increase resulting in a 10% decrease in demand. Family size, income, number of children, and education also contribute to higher milk demand *(Hatirli et al., 2004;* Mehmood *et al*., 2018). Examining the behavior of milk product consumers and understanding their consumption

reasons provide essential insights for business professionals in this sector.

The growing demand for dairy products, driven by improved nutritional knowledge, accessibility, and health benefits, creates favorable conditions for marketing and income generation based on this demand. However, manufacturers often introduce products without adequately considering customer preferences and demand factors, which can diminish their market share. Understanding customer needs is a critical marketing activity that promotes sustained demand for a company's products (John. & Supattra, 2002).

Afghanistan, with approximately 4 million cows and nearly 20 million goats and sheep, currently meets only 60% of its dairy product needs internally, with the remaining 40% sourced from neighboring countries such as Iran and Pakistan, and even from Holland (Shahamati, 2017). In countries with a substantial number of dairy cows and abundant food resources, the dairy industry holds significant economic importance. Bringing together dairy producers, suppliers, social decision-makers, and other stakeholders can foster a robust

and valuable industrial relationship. Although farm size correlates directly with yield and gross profit, dairy farms demonstrate the potential for increased yields, indicating further growth opportunities in this sector (Datta *et al*., 2019). For instance, dairy production is a vital component of India's agricultural economy, providing employment opportunities for the impoverished. The dairy industry is prioritized over other industries due to government and cooperative support. Education and information sources have profoundly influenced the adoption of livestock farming practices (Panchbhai *et al*., 2017). Agricultural cooperatives play a pivotal role in reducing costs and generating income for farmers. In Karnataka, India, cooperative members had lower production costs compared to non-members, despite similar numbers of dairy cows per household. Cooperative members had a net income of 7,700 Indian rupees per year, significantly higher than the 6,840 INR per year for non-members. Additionally, entrepreneurship rates in the cooperative sector were higher (Ravishankara & Kumar, 2019).

Recent years have seen growing investment in the production, processing, and sale of dairy products in Afghanistan. Alongside joint investments from the government, private sector, and international entities, private companies are striving to capture the annual market exceeding $100 million in dairy imports from foreign countries (Danish, 2018). The demand for a product is vital not just for production but also for its economic growth in the short and long term (Yoshikawa, 2003). The increasing demand for dairy products, driven by improved nutritional awareness, accessibility, and health benefits, provides a solid foundation for marketing and income generation based on this demand. However, manufacturers often overlook customer preferences and demand factors when launching products, which can reduce their market share. Understanding customer needs is a crucial marketing activity that ensures ongoing demand for a company's products (John. & Supattra, 2002).

This research aims to address gaps in understanding the key factors influencing the demand for dairy products and to enhance marketing strategies for better customer insight. Livestock and dairy production are crucial economic activities in Afghanistan, and the rising demand has led to an increase in dairy production companies, associations, cooperatives, and individual farmers. Manufacturers must market their products to meet customer preferences effectively. This study identifies and examines the critical factors that influence consumer preferences for dairy products. Understanding these factors enables manufacturers to tailor their marketing efforts to consumer needs and preferences. While not entirely new in the country, this research is groundbreaking for Kunduz province and serves as a valuable reference for future studies.

MATERIALS AND METHODS
Study Area
The current study employs exploratory research to examine findings from qualitative and quantitative data using observation, face-to-face interviews, questionnaires, and field surveys. Secondary data are gathered from national and international journals, printed magazines, websites, and relevant departments. Kunduz Province (Figure 1), covering 7,668.7 km² and situated 405 meters above sea level, has a population of 1,184,024, with 599,985 men and 584,039 women. The province is predominantly agricultural, with 85% of its population engaged in livestock, agriculture, and horticulture. Kunduz shares borders with Tajikistan to the north, Baghlan and Samangan to the south, Takhar and Badakhshan to the east, and Balkh to the west. The region boasts significant natural resources, including forests and grasslands.
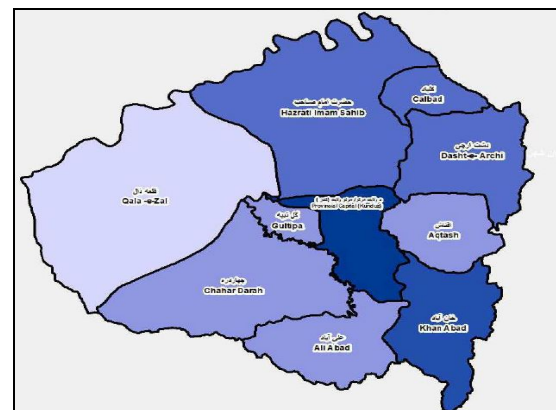

Figure 1. Map of Kunduz city with provinces
Source: National Statistic Information Authority

Kunduz is a major agricultural hub in northeastern Afghanistan, with 233,312 hectares of arable land, 48,820 hectares of agricultural land, 374,000 hectares of pasture, and 31,067 hectares of forests. Key products include wheat, rice, mung beans, chickpeas, beans, melons, watermelons, grapes, almonds, plums, apricots, apples, pears, turnips, onions, and potatoes. The province is

known for its substantial contribution to the production of wheat, rice, melons, watermelons, grapes, almonds, and other agricultural goods, which are exported to neighboring provinces and abroad (NSIA, 2021).

Samples Collection

Given that most dairy-related business occurs in the city, the research site was selected in Kunduz city, encompassing eight districts. This city has a significant dairy production and processing cooperative, along with numerous small milk-processing companies that purchase milk from farmers and cowherds and then sell it as milk, yogurt, Korot, and cheese. The study population includes all milk and dairy product consumers in Kunduz with independent income.

Due to low literacy rates and other challenges, convenience sampling was used. The sample size, based on Fisher, Mayland, and Burns' formula for populations over 10,000, totaled 335 samples, collected via pre-tested questionnaires and direct interviews from eight districts of Kunduz city. The research variables include milk consumption according to socio-economic factors.

Statistical Analysis

In the current research, several methods of statistical analysis were used, each of which is described in detail as follows:

Multiple Linear Regression

Multiple linear regression analysis is utilized to examine the determinants influencing the consumption of milk and dairy products. In this study, the quantity of milk consumed by households is designated as the dependent variable. The independent variables include the number of family members, the price of milk and dairy products (AFN/liter kilogram), family income (AFN), educational attainment of family members, the number of children under ten years old, nutritional knowledge regarding milk quality and nutrients, the number of income-earning family members, and engagement in sports activities. However, due to the uniformity in the price of fresh milk across all locations, this variable was excluded from the equation. The linear relationship between the dependent and independent variables is articulated in equation (1).

$$C = \beta_0 + \beta_1 X_1 + \beta_2 \beta_2 + \cdots \beta_i X_i + \varepsilon i \qquad \text{Eq. 1}$$

In the above formula:

C = milk consumption in liter/day by each household.

X1 to Xi = independent variables that include the number of family members, price of milk and dairy products (AFN/liter), family income (AFN), education level, number of children (under 10 years old), nutritional awareness, family size, family members with income and sporting activities.

β0 = the intercept of the regression line or constant

β 1 to β i = regression coefficient, and

Ui or εi = Error term

One-sample T-test

To compare the average milk consumption per capita between Kunduz and other countries, a one-sample t-test was employed. This statistical test is commonly used to compare the average of a sample with a global average, national level, or the averages of different countries. It is a well-established method among statisticians. By applying this method, the average per capita milk consumption in Kunduz is compared with the national average and the regional countries at a 5 percent level of confidence. The mathematical relationship for this comparison is expressed in equation (2).

$$t_{obt} = \frac{\bar{X} - \mu}{\frac{SD}{\sqrt[2]{n}}} \qquad \text{Eq.2}$$

In the above formula, (x̄) is the mean of the sample, (μ) is the mean of the population, (SD) is the standard deviation of the sample and (n) is the number of samples.

In the current research, Excel was employed to organize, clean the collected data and perform descriptive statistics. For the multiple linear regression, SPSS26 was utilized. Additionally, the research leveraged the agricultural facilities of Kunduz University and the resources of the researcher. Importantly, no harm—whether mental, physical, environmental, or otherwise—was inflicted on individuals, communities, or any other entities during this study.

RESULTS

Before delving into the results of the regression analysis, the study first examines various characteristics of respondents, such as milk consumption patterns, sources of purchase, and average milk consumption, which are visually presented through graphs and tables in the subsequent sections.

In Figure 1, the frequency of milk consumption by the respondents in the current

research is illustrated. The data reveals that the majority of respondents (55%) reported consuming milk daily. Following closely are individuals who consume milk three days a week, constituting 25% of the responses. The patterns of occasional and once-a-week consumption account for 12% and 8% of the responses, respectively.
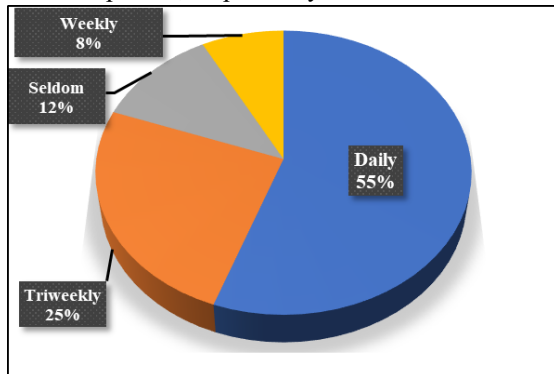

Figure 1. Frequency of milk consumption by the citizens of Kunduz city

Source: Author's calculation

Sources of buying fresh milk by consumers in Kunduz city

The sources of purchasing fresh milk by consumers in Kunduz city are visually represented in Figure 2. The data illustrates that a significant portion of consumers (35%) procure and consume milk from local farmers involved in dairy farming in proximity to their residences. Following this, dairy shops serve as the second most prominent source of milk for consumers (18%), with local distributors ranking third in providing milk for consumption (16%). Subsequently, the children of milk sellers, nearby shops, and vendors along the roads occupy the fourth, fifth, and sixth positions, contributing 14%, 9%, and 8% respectively to the sources of fresh milk acquisition by consumers in Kunduz city.
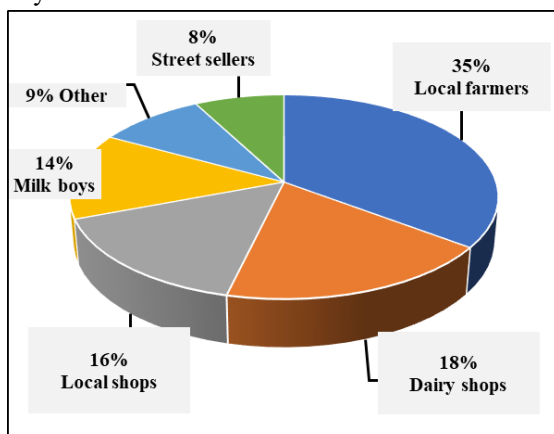

Figure 2. Sources of purchase of fresh milk by consumers in Kunduz city

Examining average milk consumption with socioeconomic variables

This section pertains to the investigation of the correlation between the level of milk consumption and various demographic variables.

Milk consumption in Kunduz city

The milk consumption indices in Kunduz city (liter/day) along with per capita consumption (kg per year) are presented in (Table 1).

Based on the findings of the current study, residents of Kunduz consume an average of 0.155 liters of milk per day, with a standard deviation of 0.86 liters. The range of milk consumption varies from a minimum of 0.014 liters to a maximum of 0.400 liters per day. Furthermore, the per capita milk consumption is calculated to be 56.66 kg per year.

Table 1. Milk consumption index in Kunduz city		
Consumption indices	**Daily consumption (lit./day)**	**Per-capita consumption (kg/year)**
Average	0.155	56.66
Standard Dev.	± 0.086	0
Minimum consumption	0.014	31.34
Maximum consumption	0.400	146.00
Source: Author's calculation		

To assess the disparity between per capita milk consumption in Kunduz city compared to Afghanistan and other countries, a One-sample t-test was conducted utilizing the collected data and information sourced from Our World in Data (2017) which is 113 kg/capita. The results of this analysis are presented in Table 2.

The analysis reveals that the average per capita milk consumption in Kunduz city does not exhibit a significant variance from the national average of Afghanistan, Iran, and Tajikistan. Nonetheless, there is a notable distinction in the average per capita milk consumption of Kunduz city when compared to Pakistan, India, and the global average, indicating a considerably lower consumption rate in Kunduz city relative to those regions.

Table 2. Average per capita milk consumption in Kunduz city, Afghanistan and other region- a comparison

Region	Per capita consumption (kg/year)	One-sample t-test	P-value
Kunduz	56.66	Test	0
Afghanistan	54.19	1.65	000.1
Iran	53.76	1.86	00.06
Pakistan	184.57	-74.47	0.000**
Tajikistan	56.67	0.16	0.278
India	106.06	-28.75	0.000**
World	113	-32.79	0.000**

Source: Our World in Data, 2017 and author's calculation

Average milk consumption by gender

The average consumption of milk by gender presented in (Table 3), expresses that women's consumption is slightly higher (0.163 liters/day) compared to men's (0.153 liters/day).

Table 3. Average milk consumption by gender

Gender	Average milk consumption (lit./day)
Female	0.163
Male	0.153
Source: Author's calculation	

Average milk consumption by occupation

The average milk consumption based on occupation is detailed in Table 4. The data indicates that individuals working in the public health sector exhibit the highest milk consumption rate at 0.176 liters per day compared to other occupational groups. Following closely are individuals categorized under the "other" occupational group, which includes those employed in foreign institutions and organizations, with an average consumption of 0.168 liters per day. Furthermore, bankers and public service workers have an average consumption of 0.158 liters per day, followed by military personnel at 0.153 liters per day, academics at 0.150 liters per day, and businessmen at 0.149 liters per day, ranking third, fourth, fifth, and sixth, respectively, in terms of milk consumption based on occupation.

Table 4. Average milk consumption by occupation

Occupation	Average milk consumption (lit./day)
Academician	0.15
Businessman	0.149
Military	0.153
Public sector and Banks	0.158
Public health	0.176
Others	0.168

Source: Author's calculation

Average milk consumption by income level

The average milk consumption based on the income levels of the respondents is presented in Table 5.

Table 5. Average milk consumption by income level

Income level (Thousand AFN/Month)	Average milk consumption (L/day)
Less than 10	0.15
10 to 25	0.164
25 to 40	0.142
40 to 65	0.162
Above 65	0.13

Source: Author's calculation

Notably, the income category of "10 to 25 thousand AFN" exhibits the highest level of consumption, followed by the income brackets of "40 to 65 thousand AFN" and "less than 10 thousand AFN," both recording an average consumption of 0.150 liters per day. In contrast, the income group "above 65 thousand AFN" displays the lowest milk consumption at 0.130 liters per day compared to the other income categories.

Average milk consumption by education level

The average milk consumption according to the education levels of individuals in Kunduz is detailed in Table 6. The data indicates that graduates exhibit the highest consumption level, with an average of 0.179 liters per day, followed by individuals in the Master and Doctoral educational

categories consuming 0.162 liters per day. In contrast, those categorized as "Illiterate" and "Bachelor" display the lowest milk consumption rates at 0.135 and 0.151 liters per day, respectively.

Table 6. Average milk consumption by education level

Education Level	Average milk consumption (L/day)
Illiterate	0.135
Primary school	0.163
High school	0.158
Associate's degree	0.179
Bachelor's degree	0.151
Master's and Doctor's	0.162
Source: Author's calculation	

Average milk consumption by family type

The amount of milk consumption by family type is considered in (Table 7). As it is known, the nuclear family or small families consume more milk (0.168 liters/day) than extended families (0.149 liters/day).

Table 7. Average milk consumption by family type

Family type	Average milk consumption (L/day)
Extended	0.149
Nuclear	0.168
Source: Author's calculation	

An in-depth examination of essential factors of milk consumption in Kunduz city:

Multiple linear regression analysis has been employed to examine the key factors impacting the consumption of milk in Kunduz city. The primary objective of multiple linear regression is to assess the linear correlation between independent variables and dependent variables. Prior to unveiling the outcomes of the multiple linear regression analysis, it is imperative to conduct diagnostic tests to validate the accuracy and reliability of the analysis results.

Normality test

The normality test is a crucial step in conducting linear regression analysis. This test can be carried out through various methods such as Q-Q plots, histograms, or statistical tests like the Kolmogorov-

Smirnov and Shapiro-Wilk tests. To ensure robustness, both approaches have been utilized in this study. The results of the Kolmogorov-Smirnov and Shapiro-Wilk tests are presented in Table 8. The findings indicate that both tests yield statistically significant results at a 5% confidence level, suggesting that the data under examination follow a normal distribution.

Table 8. Normality test of the dependent variable in multivariate linear regression

Dependent variable: milk consumption	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Test value	Df	Sig.	Test value	Df	Sig.
	0.26	334	0.056	0.867	334	0.067

Consequently, employing the Weighted Least Squares method may lead to more favorable outcomes compared to the Ordinary Least Squares method in this context.

In conjunction with the aforementioned table, the normality test conducted through a Q-Q plot is visually depicted in Figure 3, showcasing favorable results.
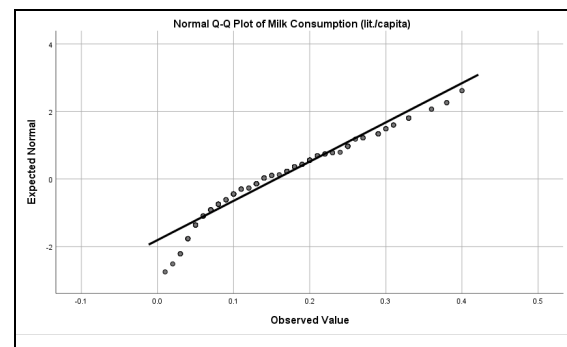

Figure 3. Normal Q-Q plot of milk consumption for the dependent variable

Multicollinearity test

The multicollinearity test assesses the consistency among independent variables in a regression analysis. Utilizing SPSS software facilitates the identification of variable alignment. In the current study, independent variables such as bachelor's education level, income below 10,000 Afghanis, and the academic job category were removed from the regression model due to multicollinearity. Table 9 not only presents the regression outcomes but also displays the results of the multicollinearity test using the Variance Inflation Factor (VIF) for each independent variable. With none of the variance inflation factors exceeding 10, it can be inferred that there is no multicollinearity present among the independent variables in the regression model.

Table 9. The results of multiple linear regression analysis (determining factors associated with milk consumption)

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics (VIF)
	β	Std. Error	β			
Constant	0.238	0.018		13.456	0	
Children aged below 10 years *	0.005	0.002	0.118	1.884	0.05	1.746
Age *	-0.001	0	-0.114	-1.993	0.047	1.455
Family members with income *	0.006	0.004	0.078	1.407	0.041	1.369
Family members **	-0.012	0.001	-0.569	-8.933	0.000	1.808
Sports activity (Lack of sports activity as ref.) *	0.018	0.009	0.095	1.89	0.06	1.113
Occupation (Business)	-0.005	0.01	-0.026	-0.464	0.643	1.45
Occupation (military)	-0.012	0.032	-0.019	-0.389	0.697	1.075
Occupation (Baking)	-0.015	0.018	-0.043	-0.840	0.401	1.165
Occupation (public health)	0.015	0.018	0.043	0.849	0.396	1.135
Occupation (others)	0.008	0.017	0.031	0.514	0.608	1.58
Monthly income (10-25 Thousand AFN)	0.01	0.009	0.058	1.04	0.299	1.383
Monthly income (25-40 Thousand AFN)	-0.003	0.016	-0.009	-0.163	0.871	1.321
Monthly income (40-65 Thousand AFN)	0.033	0.025	0.063	1.284	0.2	1.072
Monthly income (above 65 thousand AFN)	-0.008	0.019	-0.021	-0.403	0.678	1.166
Education (primary)	0.028	0.016	0.092	1.687	0.093	1.316
Education (High school)	0.014	0.01	0.076	1.373	0.171	1.375
Education (Associate degree)	-0.015	0.012	-0.068	-1.260	0.209	1.297
Education (Bachelor's degree and higher) *	0.036	0.025	-0.013	-0.259	0.053	1.074
Education (illiterate)	0.038	0.02	0.107	1.939	0.796	1.373
Family type (Nuclear as ref.)	0.012	0.01	0.068	1.215	0.225	1.409

Note: * significant at 5%, ** significant at 1%, R = 0.545, R2 = 0.297, Adjusted R2 = 0.252, Durbin-Watson = 1.794

Source: Regression output calculated by the author

Homoscedasticity test

The homoscedasticity test examines whether the error variance among all independent variable values is normally distributed, which can be visually assessed through a graph. Figure 4 illustrates the variance of the error across independent variables. The non-uniform distribution of observations around the line indicates a lack of homogeneity in variance among

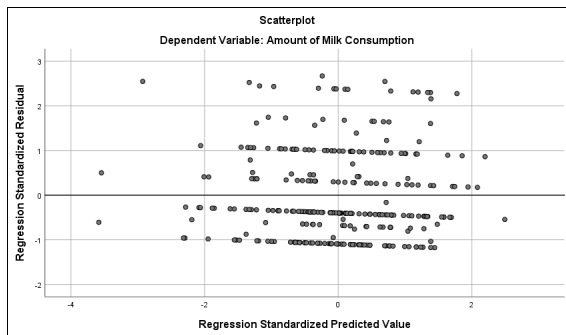the independent variables, leading to the utilization of the Weighted Least Squares model.

Figure 4. Scatterplot for test of Homoscedasticity

Result of regression analysis (Study of factors associated with milk consumption)

The outcomes of the multiple linear regression analysis, depicted in Table 9, unveil the significant factors influencing milk consumption. In this study, milk consumption (liters/day) served as the dependent variable, while independent variables encompassed age, monthly income, number of family members with income, total family members, number of children under 10 years old, physical activity, and education level higher than a bachelor's degree. The analysis indicated that variables such as "number of family members with income," "number of family members," "number of children under 10 years old," "age," "engagement in physical activities," and "education level higher than a bachelor's degree" exerted a noteworthy influence on milk consumption. Conversely, other variables with higher p-values demonstrated minimal to no impact on milk consumption.

The variable "number of family members with income" had a coefficient of 0.006 and a p-value of 0.041, indicating a positive effect on milk consumption in Kunduz city. This implies that with each additional income-earning family member, milk consumption increases by 0.006 liters/day, and conversely, decreases by the same amount if an income-earning member is removed. These results are statistically significant at a 5% confidence level.

Similarly, the variable "number of children under 10 years old" with a coefficient of 0.005 and a p-value of 0.050 also significantly impacted milk consumption. This means that adding a child under ten years old to a family increases milk consumption by 0.005 liters/day. This finding is statistically significant at a 5% confidence level.

Age also has a considerable impact on milk consumption in Kunduz city, with a negative coefficient of -0.001, indicating that as a person's age increases by one year, their milk consumption decreases by 0.001 liters/day. This result is statistically significant at a 5% confidence level. The variable "number of family members" also shows an inverse relationship with milk consumption. With a coefficient of -0.012, it indicates that an increase of one family member decreases milk consumption by 0.012 liters/day, a result statistically significant at a 99% confidence level. Engaging in sports activities is another influential factor, with a coefficient of 0.018. This suggests that individuals who participate in sports activities consume 0.018 liters/day more milk. If a confidence level of 0.06 is acceptable, this variable can be considered significant.

Moreover, having an education level higher than a bachelor's degree is also an important factor, with a coefficient of 0.036. This indicates that individuals with education levels higher than a bachelor's degree consume more milk by 0.036 liters/day. Variables such as income level of less than 10,000 AFN, academic occupation category, bachelor's degree education level, and family development type were excluded from the regression model due to multicollinearity.

The values of R, R², and Adjusted R², which serve as goodness-of-fit tests, indicate the predictive power of the regression model and are reported at the bottom of (Table 9). The study found that the model could explain 25% of the variation in milk consumption, while the remaining 75% is influenced by other factors not covered by the regression model, represented by (εi).

Thus, the mathematical relationship between milk consumption and its significant influencing factors can be expressed accordingly (Equation 1):

$$C = \beta_0 + 0.006_{Family\ Members\ with\ Income} + 0.005_{Children\ under \atop 10\ Years\ Old.} + (-0.001)_{Age}$$
$$+ (-0.012)_{\#\ of\ Family\ Members} + 0.018_{Sport\ Actiity} + 0.036_{Above\ Bachelor} + \varepsilon i$$

DISCUSSION

The discussion on socio-economic variables reveals a notable gender imbalance in the sample, with 83% being male, in contrast to the population distribution in Kunduz city. This discrepancy is likely influenced by traditional societal norms and the relatively lower engagement of women in

community activities, resulting in a higher representation of males in the study. In terms of age, the majority of respondents were under 35 years old, with 41% falling below 25 years and 26% in the 25-35 age group. These findings align with the young population profile in Kunduz, as indicated by the National Statistics and Information Authority (NSIA, 2021).

The study findings on milk consumption habits in Kunduz city highlight that a majority (55%) of the population consumes milk daily, playing a vital role in driving the sustained demand for milk and thereby supporting the local dairy industry. Additionally, the data shows that 35% of residents acquire their milk from nearby sources. These local milk sources are not only economically feasible and easily accessible but also possess high quality, a key factor influencing participants' preferences. Dairy shops emerge as the second most popular milk source, providing consistent availability and competitive pricing, albeit with slightly lower quality compared to local sources. These results are in line with the conclusions drawn by Bożena and Janusz (2020), emphasizing the significance of availability as a crucial factor in local dairy purchase decisions.

On average, the residents of Kunduz consume 0.155 liters of milk daily, amounting to an annual per capita consumption of 56.66 kg. While this consumption rate falls below that of Pakistan (184.57 kg/year) and India (106.06 kg/year) as per regional 2017 data, it closely resembles the national average of 54.19 kg/year and is comparable to Tajikistan's consumption (56.67 kg/year). It also slightly exceeds Iran's average consumption of 53.76 kg/year. Despite these figures, the National Health and Medical Research Council of Australia advocates for a daily intake of 250 ml (0.250 L) for adults (National Health and Medical Research Council, 2021), emphasizing the potential health benefits and food security enhancements associated with increased milk consumption (Dairy Products Industries Association, 2021), a stance supported by reports from the FAO (2016).

Analysis of average milk consumption by gender indicates no discernible difference between men and women, a finding consistent with prior research by Widodo et al. (2016). Similarly, job categories do not exhibit significant variations in average milk intake, contrary to the results reported by Widodo et al. (2016), which suggested higher milk consumption among individuals in permanent employment role. This study employs multiple linear regression analysis to examine factors influencing milk consumption, using daily milk quantity as the dependent variable. Independent variables include age, monthly income, number of family members with income, total number of family members, education level, engagement in sports, and family type.

The presence of family members with income positively impacts milk intake, with each additional member with income leading to a daily consumption increase of 0.006 liters. This is attributed to the rise in disposable income within the family, enabling increased milk purchases. While this aspect has not been extensively studied in relation to milk consumption, Rasoli et al. (2021) explored its effect on online purchase of food products, aligning with the findings of Ilie et al. (2021) regarding income as a determinant in milk purchasing decisions. However, the study contrasts with Semenova & Shumeiko (2019), who observed a negative correlation between disposable income and milk purchases in Russia, categorizing milk as an "anti-crisis" commodity. Given milk's affordability in Afghanistan and its popularity among low-income populations, higher incomes tend to drive increased consumption of this staple.

Moreover, the presence of children under 10 years old significantly influences milk consumption, with each additional child elevating daily intake by 0.005 liters. This correlation resonates with the findings of Hatirli et al. (2004) and Mehmood et al. (2018), emphasizing the link between larger family sizes and heightened milk consumption.

Conversely, age exhibits a negative association with milk intake, indicating a decrease of 0.001 liters per day as individuals age. This finding aligns with the research of Ates & Ceylan (2010) and differs from Mehmood et al. (2018), who observed an increase in milk consumption with age. Possible explanations for this discrepancy include reduced physical activity levels, lower income levels, individual preferences, and varying levels of nutritional awareness, as highlighted by (Cavadini et al., 2000) and (Roy, 2008).

Engagement in sports activities positively impacts milk consumption, with active individuals consuming more milk. This relationship is significant at a confidence level of 0.06 and is supported by the research of (Cavadini et al., 2000)

and (Roy, 2008), emphasizing the nutritional benefits of milk for those involved in physical pursuits.

Furthermore, higher education levels beyond a bachelor's degree are linked to increased milk consumption, with a coefficient of 0.036. This finding aligns with the research of (Mehmood *et al.*, 2018) and (Hatirli *et al.*, 2004), underscoring the association between advanced education and elevated milk intake.

Understanding these determinants of milk consumption enables producers to tailor their marketing strategies to better cater to consumer preferences. Educating the public on the nutritional advantages of milk can further enhance sales and contribute to improved public health outcomes.

CONCLUSION

The current research has identified several critical factors affecting milk consumption in Kunduz city. Age and the total number of family members were found to have an inverse relationship with milk consumption. Conversely, the number of family members with a monthly income, educational attainment above a bachelor's degree, and residing in a nuclear family structure positively influenced milk consumption. While variables such as job type and monthly income were included in the regression model, they did not exhibit a significant effect on milk consumption levels.

The average milk consumption among Kunduz citizens stands at 0.155 liters per day, which, although slightly higher than the average consumption in Iran, remains significantly lower than that in Pakistan, India, and the global average. The current consumption levels in Kunduz are also below the recommendations set forth by international health organizations.

These findings underscore the necessity for targeted interventions to boost milk consumption in Kunduz. Enhancing public awareness about the nutritional benefits of milk, improving accessibility and affordability, and encouraging higher educational attainment can play pivotal roles in increasing milk consumption. Such measures would not only align consumption with international standards but also contribute to better public health and economic stability in the region. Furthermore, it would support local dairy farms and increase the income of those playing in the supply chain.

AUTHORS CONTRIBUTIONS:
All authors have equally contributed.

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