

Factors Affecting Egyptian Consumer Preferences for Preserved Fresh Milk: A Case Study of the Damietta Governorate

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Abstract

This investigation aims to assess consumer preferences and the influence of sociodemographic characteristics on preserved fresh milk. To the best of our knowledge, this is the first study conducted on dairy consumers in Damietta Governorate, Egypt. A total of 385 participants were interviewed and divided into two groups: sterile milk consumers and pasteurized milk consumers. All sociodemographic factors except gender showed significant differences between the two groups of milk consumers. Four factors, including price, nutritional value, producing company, and package shape and size of preserved milk, were identified as key influencers of consumer preferences for two types of preserved milks. Price was the most important factor for consumers when selecting a type of milk. High-value products like ice cream, cheese, and yogurt should be the focus of the dairy industry's businesses to achieve high turnover and profitability. Stakeholders should consider the significant findings this study offers on consumer behavior before making any choices.

INTRODUCTION

Milk is an important part of human nutrition for all age groups. It contains bioactive components like calcium, immunoglobulins, conjugated linoleic acid, and lactoferrin, all of which have beneficial impacts on human health (Merlino *et al.*, 2022, and Gómez-Cortés *et al.*, 2018). According to FAO, in 2022, the yield of cow milk in Egypt reached 4347333.33 tons, while the milk production in Damietta Governorate reached 221.8 thousand tons. Individual consumption for the income-limited category averaged around four percent of their entire income, five percent for middle income, and nine percent for those with a large income (FAO, 2022).

Pasteurization and sterilization of fresh milk employ high heat to eradicate harmful pathogens and extend shelf life. It's ready to use in glass, plastic, and cardboard containers. Pasteurized milk (PM) consumers prioritize brand loyalty, choosing dairy products with high levels of safety. Consumers associate PM milk with delicious flavor, excellent nutritional value, availability, and heritage. Sterilized milk (SM) has been successful in the Egyptian

market due to its long shelf life and low cost per liter, despite having inferior nutritional content. Furthermore, socio-demographic factors, income, individual needs, and prices have a considerable impact on customer preferences and choices (Denver *et al.*, 2021 and Blanc *et al.*, 2020).

The dairy industry relies heavily on shareholder decisions about the types and quantities of products needed to meet demand, so it is important to understand consumer preferences and needs. As far as we know, this is the first study to analyze consumption preferences for preserved milk in Damietta, Egypt. The current research sought to answer the following questions in order to identify the sociodemographic factors influencing Egyptian consumers' decisions with regard to packaged fresh milk (PM and SM). Based on sociodemographic factors and milk type, (I) what factors influence customer preferences for PM and SM milk? (II) Are there any statistically significant variations in the perception of milk quality attributes?

MATERIALS AND METHODS

Data sources:

Data were collected using a questionnaire based on personal interviews. The information was collected between April 10, 2023, and May 15, 2023. Each respondent participated voluntarily and gave informed consent. Using an online calculator, a sample size of 385 was determined, considering the total number of 1,469,701 million Egyptian residents in Damietta (ECAPMS, 2017).

Questionnaire Development:

The questionnaire was developed and approved by the Food Science Department Committee of Damietta University. The questionnaire was divided into three main sections: the first section examined the socio-demographic characteristics of the participants; the second section examined participants' milk purchasing and consumption habits by alternating multiple questions, checking only all applicable answers; and thirteen closed-ended questions. The selected milk characteristics were based on articles published in the last decade assessing consumers' milk preferences. The aim of the final section was to elicit consumer preferences using the best-worst

scaling method experimental scheme by asking participants to select the best and worst items for each subset of milk attributes for their preferred milk (Tabacco *et al.*, 2021).

Research Hypothesis:

Hypothesis 1: Consumers' preferences for milk characteristics vary significantly based on their sociodemographic variables and choice of milk type.

Data Analysis:

Descriptive and quantitative analyses of the collected data were conducted using SPSS Statistics (version 25.0). The non-parametric Chi-square test was employed to identify significant differences in the main and sociodemographic variables between the two customer groups. In addition, a two-way ANOVA was utilized to evaluate the interaction effects of milk type alongside other sociodemographic factors (independent variables) on consumer preferences regarding selected milk attributes (dependent variables). Finally, the characteristics of the two consumer profiles identified in Section 2 of the questionnaire were qualitatively analyzed to understand PM and SM customers' purchasing and consumption behaviors.

RESULTS AND DISCUSSION

Results and Discussion

Socio-demographic profiles of preserved milk consumers:

The socio-demographic profiles of preserved milk consumers were detailed in Table (1) and Figure (1). A total of 385 participants were interviewed and divided into two groups: 329 consumers prefer (SM) and 56 consumers prefer (PM). Considering every socio-demographic factor, there were significant variations ($p \leq 0.05$) between the two groups.

Gender: Female responses (266) outnumbered male respondents (119), as seen in Figure 1. This suggested that the majority of consumers who actively purchase milk are women. As they assume responsibility for preserving the family members' health, women typically play a significant part in family decision-making.

Age: The majority of respondents (335) were young people (18–30 years old), followed by 45 in the intermediate age group (31–50 years old) and another 1.30% of customers (>50 years old). Compared to other age groups in the research region, the majority of consumers are in the youth age group, suggesting that these age groups desire to be involved in decision-making about the purchase of milk to a greater extent than middle and older age groups.

Education level: The dairy products market is more affected by the respondents' educational backgrounds; as the population becomes more educated, there will be a larger demand for more people who become aware of the health advantages of milk. Education is a vital component of growth since it helps people to comprehend their environment and surroundings in particular, as well as to get knowledge for advancement. Given that it includes knowledge of nutritional information and dietary fat consumption; education is regarded as a significant explanatory factor in milk buying. In the research region, a comparatively higher percentage of respondents had earned a bachelor's degree (165), followed by high school and pre-university education (151), and illiterate (3). Of the responders, 26 had a Ph.D. and 40 were Master's degree.

Occupation: Based on their employment pattern, the respondents in the research region were 56 housewives, 169 employees, 128 students, and 4 retirees Fig. 1. Consequently, the majority of respondents were female, as seen by the sample's overall plurality of female respondents. Only 15% of consumers were housewives and farmers due to the ban on women working outside the home, especially in the Damietta region (Table 1). The bulk of clients were employees, with the rest being customers, wage earners, students, and employees.

In terms of monthly income, 2 respondents had less than 1000 LE per month, while 331 had between 1000 and 6000 LE, 49 had 6000 to 9000 LE, and 3 had more than 9000 LE (Fig 1). In the current survey, over 85% of participants had an income ranging from 1000 to 6000 LE (Table 1), which might be attributed to the fact that the majority of them are housewives and students. Consequently, a rise in income will boost the family's spending power and encourage them to explore new market opportunities and purchase better and more nutritious food and dairy products.

living Place: According to the statistics shown in Table 1, 27.53% of the participants lived in Damietta city, 24.68% in New Damietta city, 10.91% in Ras El-bar city, 10.39 in Kafr Saad city, 9.87% in Faraskour city, 9.35% in ElZarqa city, and 7.27% in Kafr El-Battikh city.

On the basis of family size, the majority (98.18%) lived in nuclear families with less than six people, while just 1.82% lived in joint families with more than six members (Table 1). The prevalence of nuclear families with two or less than six individuals can be ascribed to improved knowledge of family planning and government initiatives to control population growth. The respondents' higher literacy levels also affected their preference for small families. Urbanization is causing family fragmentation in rural areas. The current tendency in society is to have smaller families to focus on providing better education, nutrition, and health for their children.

These findings concurred with those of Mahrous and Bahgaat (2019), who observed comparable outcomes.

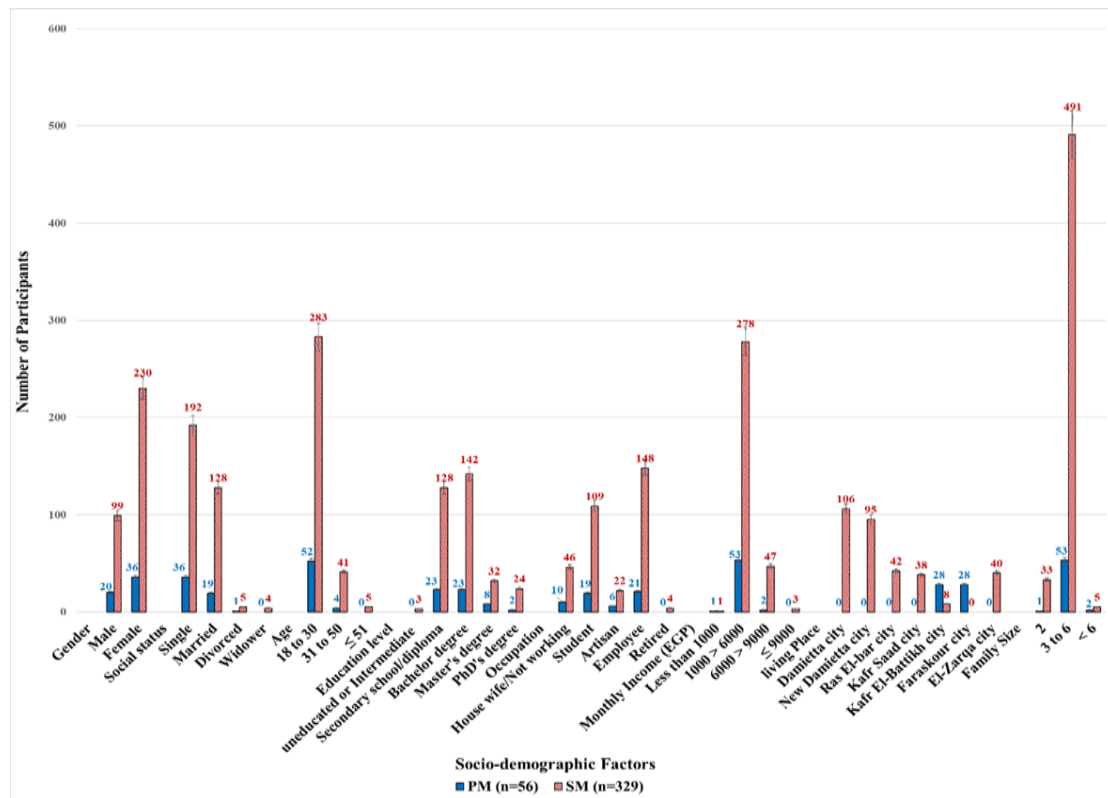


Figure 1. Socio-demographic profiles of preserved milk consumers.
The statistical significance level $p \leq 0.05$; PM= pasteurized milk; SM= sterile milk.

Table (1). Socio-demographic profiles of preserved milk consumers Damietta consumers' preferences for preserved fresh milk.

Factor	Total (n=385)	
	N	%
Gender		
Male	119	30.91 ^b
Female	266	69.09 ^a
Social Status		
Single	228	59.22 ^a
Married	147	38.18 ^b
Divorced	6	1.56 ^c
Widower	4	1.04 ^c
Age		
18 to 30	335	87.01 ^a
31 to 50	45	11.69 ^b
≤ 51	5	1.30 ^b
Education Level		
uneducated or Intermediate	3	0.78 ^b
Secondary school/diploma	151	39.22 ^a
Bachelor degree	165	42.86 ^a
Master's degree	40	10.39 ^b
PhD's degree	26	6.75 ^b
Occupation		
House wife/Not working	56	14.55 ^b
Student	128	33.25 ^a
Artisan	28	7.27 ^b
Employee	169	43.90 ^a
Retired	4	1.02 ^b
Monthly Income (EGP)		
Less than 1000	2	0.52 ^b
1000 > 6000	331	85.97 ^a
6000 > 9000	49	12.73 ^b
≤ 9000	3	0.78 ^b
Living Place		
Damietta city	106	27.53 ^a
New Damietta city	95	24.68 ^a
Ras El-bar city	42	10.91 ^b
Kafr Saad city	40	10.39 ^b
Kafr El-Battikh city	28	7.27 ^b
Faraskour city	38	9.87 ^b
El-Zarqa city	36	9.35 ^b
Family Size		
2	34	8.83 ^b
3-6	344	89.35 ^a
< 6	7	1.82 ^b

Means in the column that are not followed by the same letter are significantly different ($p \leq 0.05$).

Table 2 highlights the sociodemographic factors that determine the preferences of customers for preserved fresh milk.

Gender: Number of females who preferred (PM) is (36), while (230) preferred (SM). On the other hand, about (20) of males preferred

(PM) and (99) preferred (SM). This indicates that females and males in general tend to consume (SM) compared to (PM).

Social status: singles (192) were the most consuming (SM) followed by the married people (128).

Age: Table (2) shows that the age group (18-30) years is the most likely to consume preserved milks compared to the other age groups, as it was found that (52) of them preferred (PM) while about (283) others from the same age group prefer (SM).

Education level: Secondary school/diploma and

Bachelor degree were the highest consumers of (SM) = (128) and (142), respectively.

Occupation: generally, all groups tend to prefer (SM). Students (109) and employee (148) were the most groups consuming (SM).

Monthly Income (EGP): (53) of respondents who had monthly income ranged from (1000 > 6000) (EGP) prefer (PM), while (278) of other respondents from the same category prefer (PM). In addition, none of those who had monthly income (≤ 9000) (EGP) prefer (PM).

Living Place: the highest consumption of (SM) was by respondents living in Damietta city

(106), followed by those living in New Damietta city. On the other hand, the highest consumption of (PM) was by those living in El-Battikh city (28) and Faraskour city (28).

On the basis of family size: families of (3-6) people are most consuming and preferring preserved milk, especially (SM), as about (491) of them preferred (SM) and (53) preferred (PM).

In general, all sociodemographic factors except gender showed significant differences between the sterile milk group (SM) and the pasteurized milk group (PM). These results are consistent with those of Merlino *et al.* (2022).

Factors affecting consumers' preferences for preserved fresh milk

The study looked at four factors of Damietta consumers' preferences for preserved fresh milk: price, nutritional value and product quality, producing company, and package shape and size. Using the mean value scores for each criterion, the elements with the highest were considered the most important, as shown in Fig. 2. Price was the most important factor for both PFM and SM consumers when selecting a type of milk. Next in line were the product's nutritional value and product quality, producing company, and package shape and size, respectively. The findings concur with those of Santhosha *et al.* (2022) and Krishnadas *et al.* (2016).

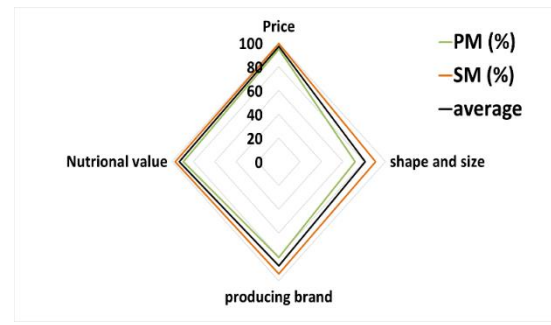


Figure 2. Factors affecting Damietta consumers' preferences for preserved fresh milk. The statistical significance level $p \leq 0.05$; PM= pasteurized milk; SM= sterile milk.

Purchase and consumption habits for preserved fresh milk

Figure (3. a-i) displays the purchase and consumption habits for SM and PFM milk. In (Fig. 3 a), the preferences of the two groups for cow's milk over buffalo milk did not differ significantly. Moreover, because milk is necessary for human health in order to develop strong bones and a healthy body, (fig. 3 e) shows that the consumers in both categories buy it less than three times a week and drink it every day as shown in (Fig. 3 g). Juhayna was the top local milk brand among Egypt's top four brands (Fig. 3 f). For convenience of handling, the preferred bottle sizes (Fig. 3 g) were 150 milliliters (64.7% SM and 58.9% PM), followed by one liter (34.4% SM and 35.7% PM) for bigger families. Regarding type of milk (Fig. 3 b), Damietta's customers preferred full-fat milk over semi-fat, fat-free and lactose-free milk types. While, (Fig. 3 c) shows that the PM group prefers to drink milk in the morning and evening, whereas the SM group prefers to consume milk in the morning. On the other side, the best milk flavor was chocolate, followed by vanilla and strawberry, respectively (Fig. 3 h). Regarding milk product preferences, Ice cream was the most popular dairy product, followed by yogurt and cheese (Fig. 3 i).. These findings were consistent with Merlino *et al.* (2022), Santhosha *et al.* (2022), and Li *et al.* (2022)

Table (2). Damietta consumers' preferences for preserved fresh milk.

Factor	PM (n=56)		SM (n=329)		Chi-Square	p-Value
	n	%	n	%		
Gender						
Male	20	35.71 ^b	99	30.09 ^b	0.709	0.400
Female	36	64.29 ^a	230	69.91 ^a		
Social status						
Single	36	64.29 ^a	192	58.39 ^a	3.297	0.021*
Married	19	33.93 ^b	128	38.91 ^b		
Divorced	1	1.79 ^c	5	1.52 ^c		
Widower	0	0.00 ^c	4	1.22 ^c		
Age						
18 to 30	52	92.86 ^a	283	86.02 ^a	6.267	0.004**
31 to 50	4	7.14 ^b	41	12.46 ^b		
≤ 51	0	0.00 ^c	5	1.52 ^b		
Education level						
uneducated or Intermediate	0	0.00 ^d	3	0.91 ^c	8.655	0.035*
Secondary school/diploma	23	41.07 ^a	128	38.91 ^b		
Bachelor degree	23	41.07 ^a	142	43.16 ^a		
Master's degree	8	14.29 ^b	32	9.73 ^c		
PhD's degree	2	3.57 ^c	24	7.30 ^c		
Occupation						
House wife/Not working	10	17.86 ^c	46	14.98 ^c	28.062	< 0.001***
Student	19	33.93 ^b	109	33.13 ^b		
Artisan	6	10.71 ^d	22	6.69 ^c		
Employee	21	37.50 ^a	148	44.99 ^a		
Retired	0	0.00 ^e	4	1.22 ^c		
Monthly Income (EGP)						
Less than 1000	1	1.79 ^c	1	0.30 ^b	7.422	0.030*
1000 > 6000	53	94.68 ^a	278	84.50 ^a		
6000 > 9000	2	3.57 ^b	47	14.29 ^b		
≤ 9000	0	0.00 ^c	3	0.91 ^b		
living Place						
Damietta city	0	0.00 ^b	106	32.22 ^a	34.941	< 0.001***
New Damietta city	0	0.00 ^b	95	28.88 ^b		
Ras El-bar city	0	0.00 ^b	42	12.77 ^c		
Kafr Saad city	0	0.00 ^b	38	11.55 ^c		
Kafr El-Battikh city	28	50.00 ^a	8	2.43 ^c		
Faraskour city	28	50.00 ^a	0	0.00 ^c		
El-Zarqa city	0	0.00 ^b	40	12.16 ^c		
Number of family member						
2	1.00	1.80 ^c	33	10.03 ^b	4.997	0.042*
3-6	53.00	94.70 ^a	491	89.46 ^a		
< 6	2.00	3.60 ^b	5	1.52 ^b		

Means in the column for each factor that are not followed by same letter are significantly different ($p < 0.05$) depending on the chi-values. While, the p -value refers to the statistical significance level of means in row: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$ and the absence of asterisks indicates the non-significance of the value. PM= pasteurized milk; SM= sterile milk.

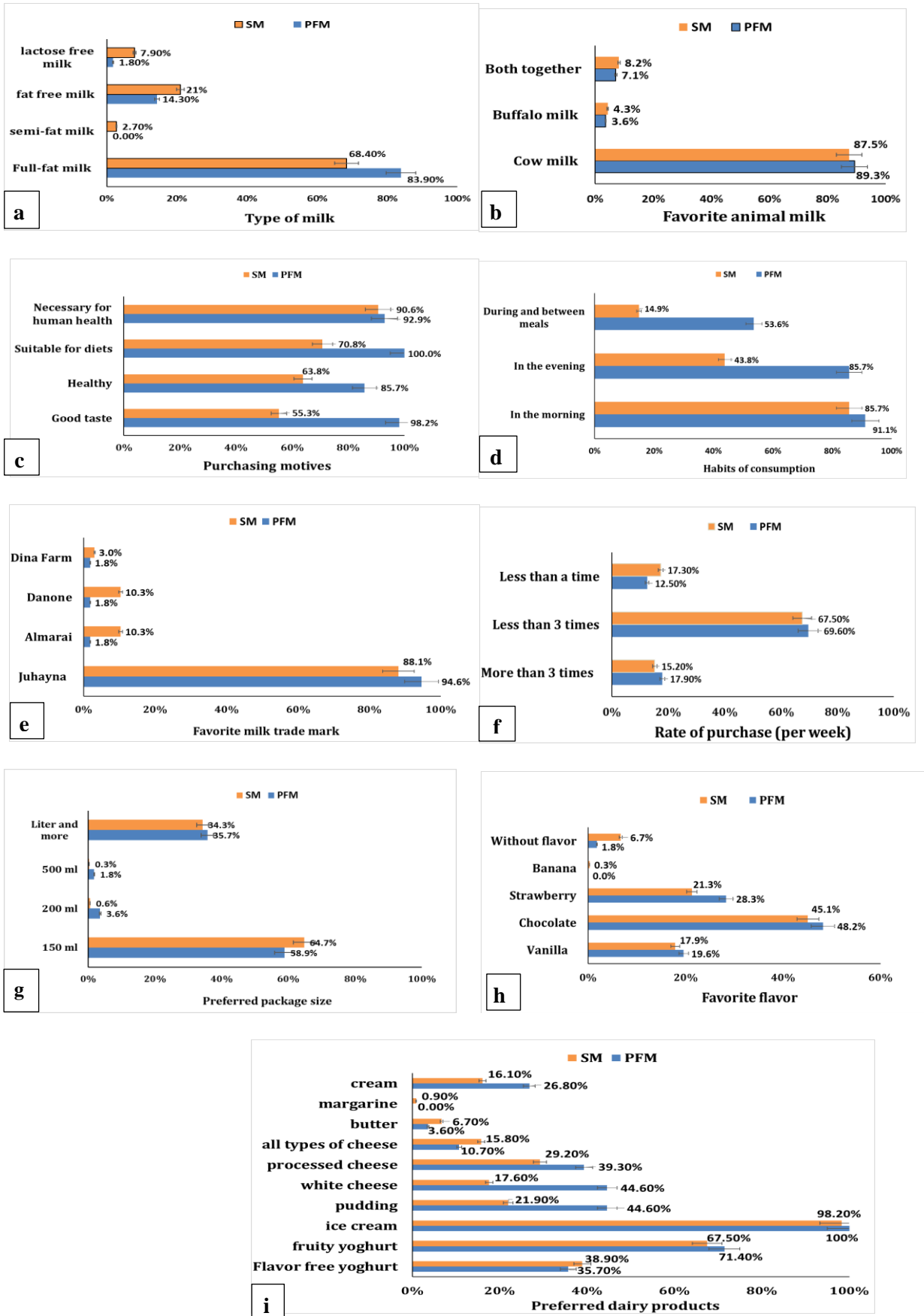


Figure (3 a-i). Purchase and consumption habits for preserved fresh milk
The statistical significance level $p \leq 0.05$; PM= pasteurized milk; SM= sterile milk.

CONCLUSION

Egypt's dairy consumption is growing quickly, which presents challenges to the stakeholders and environment. The current study fills in the gaps in the literature on the preferences of preserved milk consumers. The aim of this research was to investigate the attributes that influence consumer preferences for preserved fresh milk in the Damietta governorate. Based on this study of milk consumers, we identified that consumers' preferences for milk characteristics differ significantly depending on their sociodemographic factors and milk type. Overall, consumers prefer sterilized milk over pasteurized milk in terms of shelf life. The price, health benefits, and nutritional value of preserved milk were the most important factors influencing customer purchase behaviour; thus, the dairy industry must take these into account. Finally, the popularity of preserved fresh milk and dairy products such as ice cream, cheese, and yogurt are growing among rural customers. High-value products like ice cream, cheese, and yogurt should be the focus of the dairy industry's businesses and stakeholders in order to achieve high turnover and profitability. Stakeholders should consider the significant findings this study offers on consumer behaviour before making any choices.

Further research that includes an examination of aspects directly related to the categorization of people's habits may help to complete this study for profiling customers and defining buy intent behavior.

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CONFLICTS OF INTEREST: The authors declare no conflict of interest.

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الملخص العربي

العوامل المؤثرة على تفضيلات المستهلك المصري للحليب الطازج المحفوظ: دراسة حالة لمحافظة دمياط

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تهدف هذه الدراسة إلى تقييم تفضيلات المستهلك للحليب الطازج المحفوظ ومدى تأثيرها بخصائصهم الديموغرافية. حيث تعد دراسة الحالة الأولى التي أجريت على مستهلكي الألبان في محافظة دمياط، مصر. تم تجميع البيانات باستخدام استمارة الاستقصاء وإجراء مقابلات شخصية منفردة لـ 385 مستهلك مقسمين لمجموعتين من مستهلكي الألبان (مستهلكي الحليب المعقم ومستهلكي الحليب المبستر). وقد أظهرت جميع العوامل الديموغرافية فروق معنوية بين مجموعتي المستهلكين باستثناء النوع لم يظهر أي فروق معنوية. كما تم تحديد أربعة عوامل رئيسية مرتبطة بالمنتج مؤثرة في تفضيلات المستهلك للحليب وتتضمن السعر والقيمة التغذوية والشركة المنتجة وشكل وحجم العبوة. كان السعر هو العامل الأكثر أهمية بالنسبة للمستهلكين بمدينة دمياط عند اختيار نوع الحليب. ويعتبر الأيس كريم والجبن والزبادي منتجات رئيسية في مجال صناعة الألبان ذو معدل دوران وربحية مرتفعين والأكثر تفضيلاً لدى المستهلك الديمياتي لذا وجب على متخذي القرار الاطلاع على نتائج هذه الدراسة وأخذها بعين الاعتبار عند اتخاذ القرارات التصنيعية والتسويقية لمنتجات الألبان المختلفة.

الكلمات المفتاحية: تفضيلات المستهلك; الحليب الطازج; منتجات الألبان; الحليب المحفوظ.