**Eurasian Journal of Forest Science**

2023 11(1): 1-13

https://dergipark.org.tr/en/pub/ejejfs

# An assessment of consumer demand for medicinal plants: a case of Istanbul

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**Abstract**

Non-wood forest products (NWFPs) are collected or harvested for commercial and medical purposes from forests. These plants can be diversified into wild food plants, medicinal and aromatic plants, bulbous plants, mushrooms, dye plants and honey. The aim of this study is to assess the demand of consumers who buy medicinal plants in Istanbul and to reveal the relationships between the variables affecting the demand. For this purpose, face-to-face interviews were conducted with consumers (n=384) who purchased medicinal plants in 20 randomly selected districts of Istanbul. Descriptive analysis, correlation analysis and Chi-square independence test were used in data analysis. These analyses were carried out with the SPSS 22.0 statistical package program. According to the results, the most demanded medicinal plants are *linden, mint and ginger*, respectively. People buy medicinal plants mostly for the treatment of *respiratory system* and *digestive system diseases* and the demand is generally high in *winter* and *autumn*. The most important factor affecting the purchasing preferences of consumers is *freshness*. The consumers mostly buy the medicinal plants from *herbalists*. According to the Chi-square analysis findings, there is a significant relationship between the gender of consumers and the purpose of using medicinal plants. In addition, while there was no relationship between gender and price, brand, quality, there was a statistically significant relationship between expiration date and visuality.

**Keywords:** Non-wood forest products, medicinal plants, demand, consumer, Istanbul.

## Introduction

Recently, orientation of people towards nature increases the importance of NWFPs due to reasons such as irregular nutrition and additives in food increase the possibility of catching diseases. The term NWFPs is trees, shrubs, shrubs and all kinds of plants and their parts, which are a part of the forest ecosystem, collected or harvested for commercial and medical purposes, in forests and clearings. These products are also called "*secondary products*", "*special forest products*", "*non-traditional products*". NWFPs are important in terms of economic and cultural as well as ecological or biological aspects (Türker 2011). NWFPs are used directly or by processing. For example; sage, eucalyptus leaves, bay leaves, thyme, frankincense, linden. The content of NWFPs can be diversified into wild food plants, medicinal and aromatic plants, bulbous plants, mushrooms, dye plants and honey (Safak and Okan 2004).

NWFPs are used such as medicine, food, chemistry, pharmacy, cosmetics etc. in various industries. Therefore, NWFPs have become an interesting forest benefit due to their positive features such as providing a source of livelihood to the local people in the forest areas and its surroundings, and the

diversity of consumption and utilization areas (Yıldırım 2012, Dar et al. 2017). Since the Paleolithic age, the Anatolian people have constantly benefited from the plants around them for food, fuel, weapons or house construction. In time, medicine making was added to these uses. In Anatolia, plants were primarily used as food and spice, then used as a dyestuff in fabrics or weavings. Its use as a medicine dates back to the Hittite period. In this period, besides the use of wild plants as medicine, some important medicinal plants were specially grown to obtain medicine. The plants grown for medicine use were sold to foreign countries during the Hittites and Byzantines (Baytop 1984).

Medicinal plants are important as a raw material in both the pharmaceutical industry and traditional medicine. These plants have an important role in the protection of biological diversity and traditional knowledge, as well as being used for income and employment, especially in rural areas (Belt et al. 2003, Eraydın 2010). According to the researches of WHO, while the number of plants used for medicinal purposes is approximately 20,000. While 20% of these plants are used as herbal medicine, only 10% are traded (Kurt et al. 2016).

It is stated that approximately 500 species of 12,000 plant species produced in Turkey are used to treat diseases for medical purposes (Adıgüzel and Kızılaslan 2016). However, it is known that 112 of 346 medicinal plant species collected from forests are exported. 24 of them are endemic and only 7 of these endemic plants are exported. For instance, thyme, shalba, and sage are native and exported continuously. At the same time, 179 species collected from nature are traded through herbalists, markets, neighborhood markets and pharmacies (Kurt et al. 2016).

Medicinal plants such as linden, sage, mint, thyme, sage, chamomile, fennel, etc. are mostly consumed in the treatment of simple diseases. In Turkey, Covid-19 pandemic situations considerably changed people's normal lives and eating habits. Kadıoğlu and Kadıoğlu (2021) determined that the coronavirus pandemic increased the consumption of medicinal and aromatic plants by 76%. In addition, the plants with the highest consumption during the pandemic were recorded as rosehip, linden, mint, and ginger. Özkan and Deniz (2021) evaluated the demand for medicinal plants from the point of view of herbalists in Istanbul. According to the results of the study, the first three medicinal plants with the highest demand were linden, ginger and sage, respectively. The most plant sales occur in winter and the most important criterion for consumers when purchasing plants is price. Herbalists mostly sell the medicinal and aromatic plants which are good for respiratory diseases. Şimşek et al. (2022) determined that consumers bought medicinal plants such as thyme, ginger, garlic, mint, sumac and turmeric were the most purchased in Covid-19 pandemic process.

The demand for these products in domestic and foreign markets is increasing day by day. The aim of this study is to evaluate the demand of consumers who buy medicinal plants in Istanbul and to reveal the relationships between the variables affecting the demand. The reason why Istanbul was chosen as a research area is that Istanbul has a high population density and the sale of medicinal plants is high

**Materials and Methods**

Demand means the relationship between the price of a good or service and its quantity in economics. In this case, demand is a function of price. However, demand is affected not only by the price of the good or service, but also by many independent variables such as the income of the consumers, their preferences, their tastes, education level, occupation, gender, purchasing behaviors etc. In this study, the relationships among the independent variables affecting demand are examined. Therefore, a demand analysis between price and quantity was not done.

The main material of the study is the data obtained by face-to-face survey method with 384 participants representing consumers who buy medicinal plants from 20 districts of Istanbul (Table 1). The survey could not be conducted in all districts of Istanbul due to time constraints and cost. The districts were randomly selected among 39 districts of Istanbul. 20 districts were selected from the Anatolian and European sides.

Table 1. District populations of Istanbul and the numbers of participants

| District | Population | Number of participants |
|---|---|---|
| Ataşehir | 416,318 | 20 |
| Bağcılar | 734,369 | 30 |
| Bahçelievler | 594,053 | 30 |
| Bakırköy | 222,668 | 10 |
| Beşiktaş | 181,074 | 10 |
| Çekmeköy | 251,937 | 14 |
| Esenler | 444,561 | 20 |
| Fatih | 436,539 | 20 |
| Gaziosmanpaşa | 487,046 | 10 |
| Kadıköy | 458,638 | 20 |
| Kâğıthane | 437,026 | 20 |
| Kartal | 461,155 | 20 |
| Küçükçekmece | 770,317 | 20 |
| Maltepe | 497,034 | 25 |
| Pendik | 693,599 | 35 |
| Sancaktepe | 414,143 | 20 |
| Şişli | 274,289 | 5 |
| Sultanbeyli | 327,798 | 10 |
| Ümraniye | 690,193 | 30 |
| Üsküdar | 529,145 | 15 |
| Total | 9,221,902 | 384 |

In the study, institutional statistics, records and relevant domestic and foreign literature on medicinal NWFPs were used as material. Since the demand for medicinal plants was investigated, 30 questions were arranged to investigate the attitudes, tendencies, thoughts and behaviors of consumers towards the demand of medicinal plant. It has been organized for the purposes of defining the variables affecting demand and the relationships between these variables, making inferences and suggestions for the future. The questionnaires were conducted with randomly selected participants in May-December 2018 and January 2019.

In the evaluation of the data obtained from the consumer surveys, primarily descriptive analysis techniques such as frequency, percentage, average, graph and tabulation were used to indicate the demographic, socio-economic characteristics, behaviors of consumers purchasing medicinal plants. Then, parametric and non-parametric relationship analysis techniques were used to determine the variables related to the medicinal plants demand and to determine the relationships between these variables. Parametric correlation analysis was done with correlation; non-parametric correlation analysis was done with Chi-Square ($\chi 2$) independence tests. In correlation analyzes and Chi-Square independence tests, the research hypothesis was determined as *$H_1$: There is a statistically significant relationship between the variables*. Statistical analyzes were performed using the SPSS 22.0 package program with a confidence interval of 95%.

## 3. Results

It is seen that 57% of the participants are women. Marital status of 226 (58.9%) the participants is seen to be married. Considering the education level of the participants, the share of high school graduates is the highest. The middle school graduates take the second place after high school. When the household income of the participants was asked, the highest number of answers was in the range of 1500-3000 TL monthly household income, followed by the answers of 3000-5000, 5000 TL and above, 0-1500 TL, respectively (Table 2). The weighted average age of participants is in the 28-48 age group.

Table 2. Socioeconomic variables of the participants

| Socioeconomic | Number | % |
|---|---|---|
| Gender | | |
| Female | 219 | 57 |
| Male | 165 | 43 |
| Marital status | | |
| Married | 226 | 59 |
| Single | 158 | 41 |
| Education level | | |
| No education | 1 | 0.26 |
| Primary school | 50 | 13.02 |
| Middle school | 52 | 13.54 |
| High school | 103 | 26.82 |
| Vocational school | 47 | 12.23 |
| University | 114 | 29.78 |
| Master/ PhD. | 17 | 4.43 |
| Income (monthly)* | | |
| 0 – 1500 | 13 | 3.4 |
| 1501 – 3000 | 165 | 43.0 |
| 3001 – 5000 | 115 | 29.9 |
| >5001 | 91 | 23.7 |

** 2018 prices.*

Almost more than half of participants (65.6%) think that medicinal plants are healthier than medicines. In addition, 13.8% of the participants stated that they consume medicinal plants as they trust traditional medicine more (Table 3).

Table 3. The reasons of using medicinal plants by consumers

| Reason | Number | % |
|---|---|---|
| Natural and healthier than medicines | 252 | 65.6 |
| Traditional medicine is more reliable | 53 | 13.8 |
| The advice of herbalists | 25 | 6.5 |
| The advice of doctor/dietitian | 16 | 4.2 |
| Recommendation | 15 | 3.9 |
| Others | 12 | 3.1 |
| Medicines are useless | 11 | 2.9 |
| Total | 384 | 100 |

The majority of the participants (81.8%) said that they bought medicinal plants from herbalists, and secondly (8.6%) they obtained them from supermarkets. Some participants gave their answers as pharmacy (3.4%) and market (2.3%). Although online shopping increases every day, the number of

people who buy plants online is relatively low. Some participants answered that they cultivate medicinal plants or collect from nature by self (Table 4).

Table 4. The places of supply of medicinal plants.

| Place of supply | Number | % |
|---|---|---|
| Herbalist | 314 | 81.8 |
| Supermarket | 33 | 8.6 |
| Pharmacy | 13 | 3.4 |
| Market | 9 | 2.3 |
| Cultivating by self | 9 | 2.3 |
| Collecting by self | 4 | 1.0 |
| Internet | 2 | 0.5 |
| Total | 384 | 100 |

While the participants stated that they mostly bought medicinal plants in winter, some of them (7.8%) gave the answer in autumn (Table 5).

Table 5. Seasons in which medicinal plants are consumed the most.

| Season | Number | % |
|---|---|---|
| Winter | 312 | 81.3 |
| Autumn | 30 | 7.8 |
| All seasons | 20 | 5.2 |
| Spring | 12 | 3.1 |
| Summer | 8 | 2.1 |
| Spring + Winter | 2 | 0.5 |
| Total | 384 | 100 |

In summer, it has been seen that they usually buy medicinal plants to lose weight. The main reason for the decrease in the sale of medicinal plants in summer months is the low rate of illness in summer, depending on the seasonal conditions. The medicinal plants most purchased by the participants are *linden*, *mint*, *ginger*, *sage*, *thyme*, *rosehip*, *cinnamon*, *chamomile*, and *turmeric*, respectively (Figure 1).

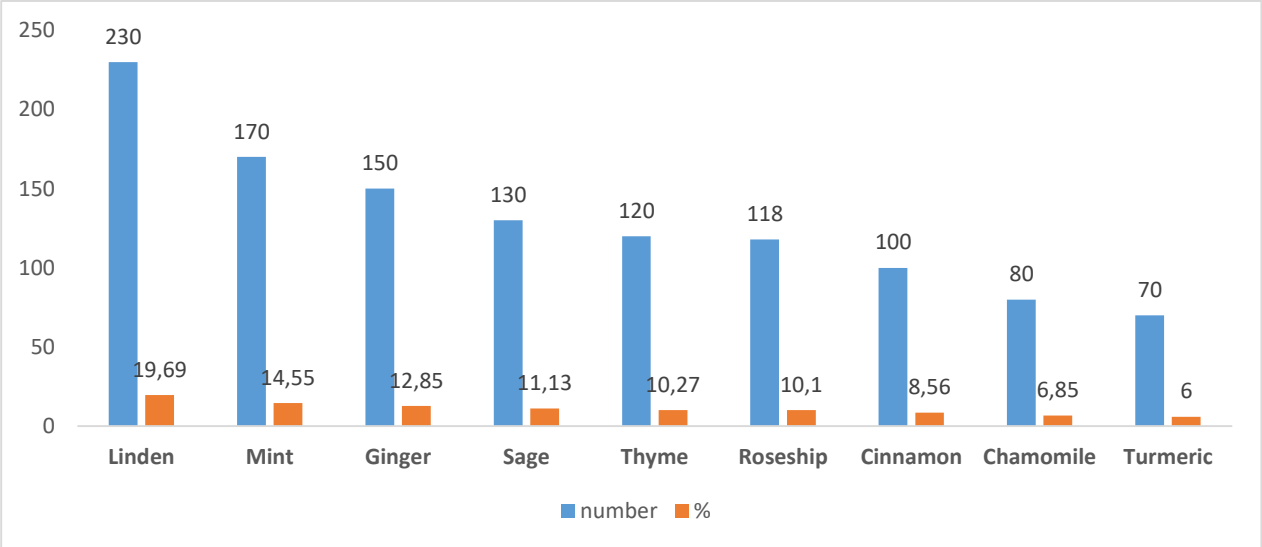


Figure 1. The ten most purchased medicinal plants.

The participants said that they usually consume medicinal plants when they are sick (60.7%), 20% say they consume it the day it was taken it, and 19.3% say they consume it every day for pleasure (Table 6).

Table 6. The consumption times of medicinal plants by consumers

| Consumption time | Number | % |
|---|---|---|
| The day it was received | 77 | 20.1 |
| When ill | 233 | 60.7 |
| Every day for pleasure | 34 | 19.3 |
| Total | 384 | 100 |

When asked whether there are diseases that can be cured by using medicinal plants, 69.8% of the participants answered YES, while 30.2% answered NO. The participants were asked about the purpose of using medicinal plants. 313 participants (48%) use for treatment purposes, while 119 of them (18%) use to give taste and smell to food. While 93 persons (14%) answered for food purposes, 89 persons (14%) answered for pleasure. 42 consumers (6%) use for cosmetic purposes (Figure 2).

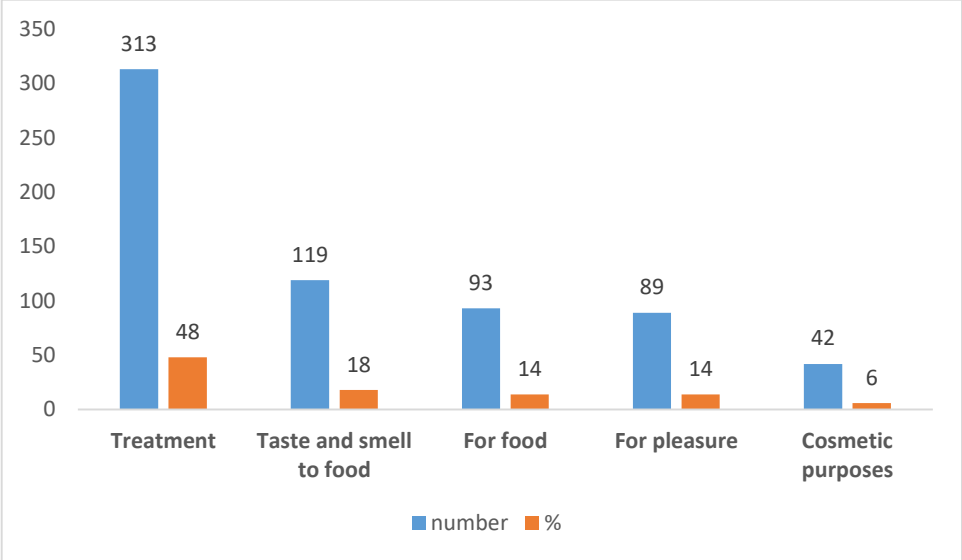


Figure 2. Purposes of using medicinal plants.

When asked what diseases they use medicinal plants for the treatment, most answers are digestive system diseases, respiratory system diseases, skin diseases, gynecological diseases, excretory system diseases, nervous system diseases, other diseases and cardiovascular diseases, respectively (Figure 3).

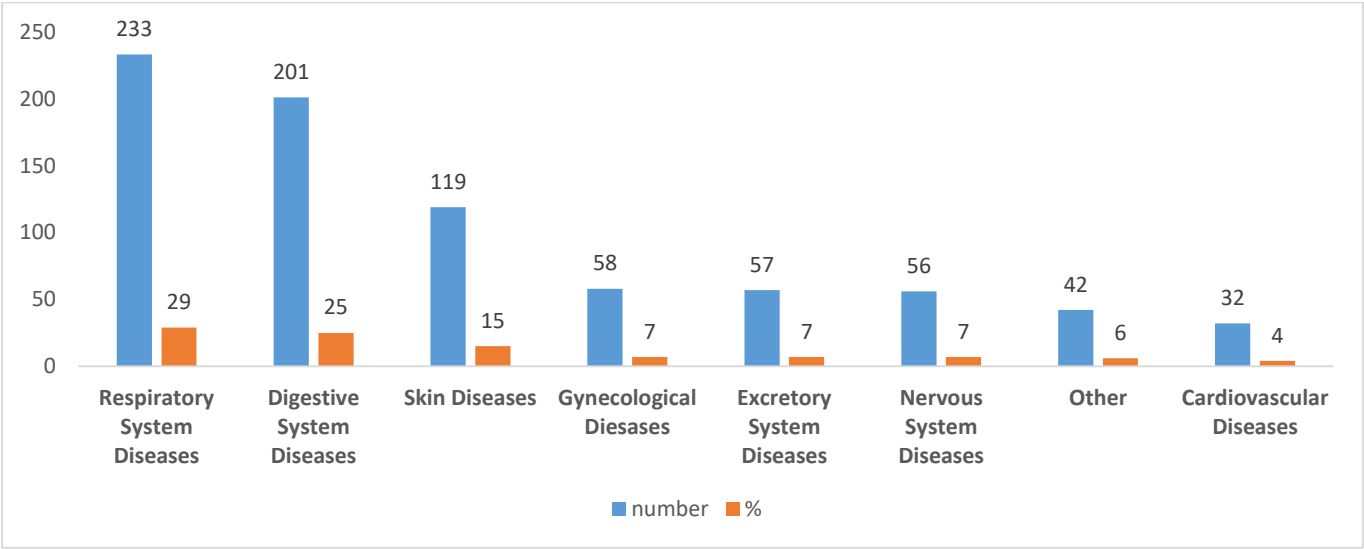


Figure 3. Medicinal plants are purchased for the treatment of which diseases

Considering the consumers' purchasing frequency of medicinal plants, it is seen that the number of consumers who prefer to buy medicinal plants when they are finished is higher (Table 7).

Table 7. The frequency of purchasing medicinal plants by consumers.

| Frequency | Number | % |
|---|---|---|
| When finished | 141 | 36.7 |
| Once a week | 40 | 10.4 |
| Once in a month | 51 | 13.3 |
| Quarterly | 84 | 21.9 |
| Once a year | 44 | 11.5 |
| Other | 24 | 6.3 |
| Total | 384 | 100 |

49.5% of the participants said that the most important feature when purchasing medicinal plants is *freshness*. Apart from this, the participants also attach importance to brand, image, and price while purchasing medicinal plants (Figure 4).

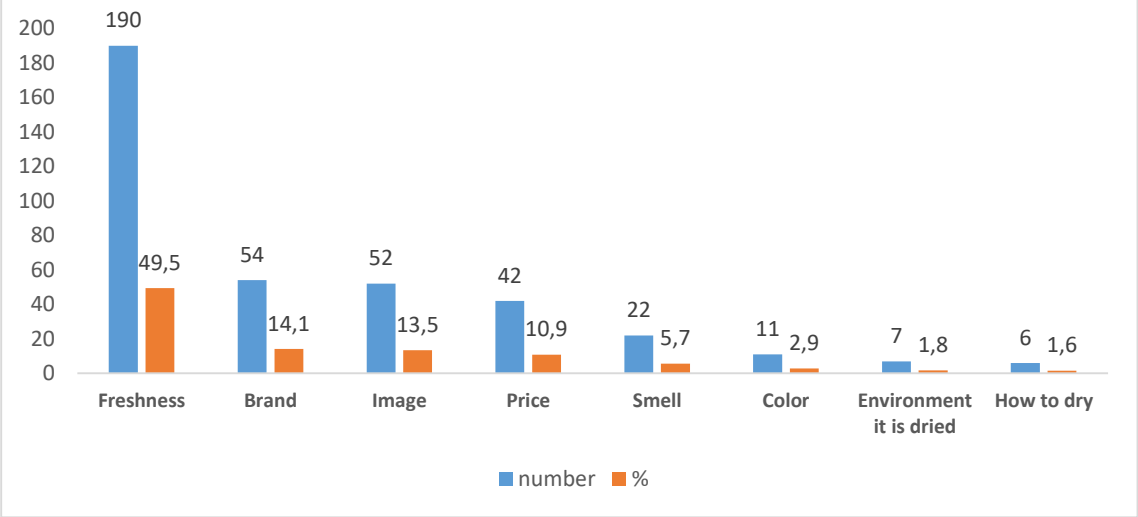


Figure 4. The consumers' quality criterion for medicinal plants.

Correlation analysis was made between the gender of the participants and the purposes for using medicinal plants. There is a statistically significant positive correlation of 0.01 between gender and those who buy medicinal plants as food. There is also a statistically significant positive correlation of 0.01 between gender and those who buy medicinal plants to give smell and taste to food or for cosmetic purposes.

There is a positive and significant correlation at 0.01 statistical level between consumers' use of medicinal plants and purchasing for treatment purposes. There is a negative significant relationship at the 0.05 statistical level between participants who buy medicinal plants with the aim of giving smell and taste to the food.

There is a statistically significant negative correlation of 0.01 between those who use it for treatment purposes and those who buy it to give taste and smell to food. There is a positive and significant relationship at 0.01 statistical level between those who use it as food and those who buy it to give smell and taste to the food or for cosmetic purposes. There is a statistically significant positive correlation of 0.01 between participants who buy food for flavor and smell and those who buy medicinal plants for cosmetic purposes. There is a positive correlation of 0.05 statistically between those who use it to give taste and smell to the food and those who buy medicinal plants for pleasure (Table 8).

Table 8. Pearson's correlation coefficients and significance levels between gender and purposes of using medicinal plants of the consumers.

| | Gender | Purpose | Treatment | Food | Taste and | Cosmetics | Pleasure |
|---|---|---|---|---|---|---|---|
| Gender | 1 | | | | | | |
| Purpose of | 0.064 $^{NS}$ | 1 | | | | | |
| Treatment | -0.064 $^{NS}$ | 0.195** | 1 | | | | |
| Food | 0.135** | -0.003 $^{NS}$ | -0.308** | 1 | | | |
| Taste and | 0.195** | -0.107* | -0.260** | 0.344** | 1 | | |
| Cosmetics | 0.237** | 0.016 $^{NS}$ | -0.074 $^{NS}$ | 0.191** | 0.198** | 1 | |
| Pleasure | -0.009 $^{NS}$ | -0.097 $^{NS}$ | -0.128* | 0.078 $^{NS}$ | 0.112* | 0.025 $^{NS}$ | 1 |

*NS: non-significant; *Correlation is significant at the 0.05 level; **Correlation is significant at the 0.01 level.*

Chi-Square ($\chi 2$) test was applied in order to investigate the relationship between the occupations of participants and the types of diseases in which they use medicinal plants for treatment purposes (Table 9).

Table 9. Analysis of the relationship between the diseases for which medicinal plants are used and the occupation

| Occupations | | Digestive System | Nervous System | Cardio-vascular | Respiratory System | Excretory System | Gynecological | Other | Total | $\chi^2$ | p |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Officer | n | 31 | 10 | 6 | 34 | 13 | 6 | 29 | 129 | | |
| | % | 24 | 8 | 5 | 26 | 10 | 5 | 22 | 100 | | |
| Employee | n | 24 | 6 | 5 | 28 | 7 | 3 | 9 | 82 | | |
| | % | 29 | 7 | 6 | 34 | 9 | 4 | 11 | 100 | | |
| Student | n | 23 | 9 | 3 | 18 | 6 | 6 | 12 | 77 | 169 | 0.00 |
| | % | 30 | 12 | 4 | 23 | 8 | 8 | 15 | 100 | | |
| Retired | n | 9 | 1 | 2 | 11 | 3 | 0 | 1 | 27 | | |
| | % | 33 | 4 | 7 | 41 | 11 | 0 | 4 | 100 | | |
| Housewife | n | 35 | 6 | 1 | 11 | 7 | 25 | 54 | 139 | | |
| | % | 25 | 4 | 1 | 8 | 5 | 18 | 39 | 100 | | |
| Self-employment | n | 27 | 9 | 6 | 46 | 10 | 5 | 17 | 120 | | |
| | % | 23 | 8 | 5 | 38 | 8 | 4 | 14 | 100 | | |
| Tradesman | n | 9 | 2 | 4 | 40 | 3 | 2 | 5 | 65 | | |
| | % | 13 | 3 | 6 | 62 | 5 | 3 | 8 | 100 | | |
| Other | n | 43 | 13 | 5 | 12 | 8 | 11 | 34 | 126 | | |
| | % | 34 | 10 | 4 | 10 | 6 | 9 | 27 | 100 | | |

The $\chi 2$ independence test hypotheses are follows:

*$H_0$: There is no relationship between the occupations of consumers and the types of diseases they use medicinal plants.*

*$H_1$: There is a relationship between the professions of consumers and the types of diseases they use medicinal plants.*

According to the results of the $\chi 2$ independence test conducted regarding the consumers' occupations and the types of diseases, the $H_0$ hypothesis was rejected. It was revealed that there was a significant relationship between the occupations of consumers and the diseases. Brand, price, quality, expiration date and packaging (visuality) were analyzed as the features that affect the demand. According to the $\chi 2$ independence test between gender and brand, there was no relationship between gender and brand. In the same way, there was no relationship between gender and price. Considering gender and quality, the $H_0$ assumption was accepted. In contrast, there was a significant relationship between gender and expiration date. As there was a significant relationship between gender and visuality, the $H_0$ assumption was rejected (Table 10).

Table 10. Analysis of relationship between gender and the characteristics considered when purchasing medicinal plants.

| Gender | | Brand | Price | Quality | Expiration date | Packaging | Other | $\chi^2$ | p |
|---|---|---|---|---|---|---|---|---|---|
| Female | n | 85 | 127 | 145 | 113 | 70 | 21 | | |
| | % | 38.8 | 58 | 66.5 | 52.1 | 32.3 | 24.4 | | |
| Male | n | 48 | 104 | 100 | 67 | 73 | 22 | | |
| | % | 29.3 | 63 | 60.6 | 40.6 | 44.5 | 13.3 | | |
| **$\chi 2$** | | **3.769** | **0.997** | **1.422** | **4.947** | **5.982** | **1.218** | | |
| **p** | | **0.052** | **0.318** | **0.233** | **0.026** | **0.014** | **0.270** | | |

According to the result of the Chi-Square independence test between the education level and the brand, there was no relationship between the education level and the brand. As there was a significant relationship between education level and price, $H_0$ assumption was rejected. Since $\chi 2 = 21.172$ and $p= 0.002<0.05$ between education level and quality, the $H_0$ assumption was rejected (Table 11).

Table 11. Analysis of the relationship between education and the characteristics considered when purchasing medicinal plants.

| Education level | | Brand | Price | Quality | Expiration date | Packaging | Other | $\chi^2$ | p |
|---|---|---|---|---|---|---|---|---|---|
| No education | n | 0 | 1 | 1 | 1 | 0 | 0 | | |
| | % | 0 | 0.4 | 0.4 | 0.6 | 0 | 0 | | |
| Primary school | n | 18 | 40 | 24 | 22 | 30 | 6 | | |
| | % | 13.5 | 17.3 | 9.8 | 12.2 | 21 | 14 | | |
| Middle school | n | 17 | 41 | 26 | 29 | 23 | 5 | | |
| | % | 12.8 | 17.7 | 10.6 | 16.1 | 16.1 | 11.6 | | |
| High school | n | 31 | 67 | 65 | 57 | 39 | 11 | | |
| | % | 23.3 | 29 | 26.5 | 31.7 | 27,3 | 25.6 | | |
| Vocational sc. | n | 19 | 31 | 29 | 21 | 19 | 8 | | |
| | % | 14.3 | 13.4 | 11.8 | 11.7 | 13.3 | 18.6 | 189.559 | 0.000 |
| University | n | 45 | 46 | 90 | 46 | 25 | 11 | | |
| | % | 33.8 | 19.9 | 36.7 | 25.6 | 17.5 | 25.6 | | |
| Master/PhD. | n | 3 | 5 | 10 | 4 | 7 | 2 | | |
| | % | 2.3 | 2.2 | 4.1 | 2.2 | 4.9 | 4.7 | | |
| | **$\chi^2$** | **5.503** | **43.504** | **21.172** | **11.961** | **25.699** | **6** | | |
| | **p** | **0.481** | **0.000** | **0.002** | **0.063** | **0.000** | **0.906** | | |

Table 12. Analysis of the relationship between education level and the purpose of purchasing medicinal plants.

| Education level | Treatment | | Food | Taste and | Cosmet | Pleasure | Total | $X^2$ | p |
|---|---|---|---|---|---|---|---|---|---|
| No education | n | 31 | 10 | 6 | 34 | 13 | 129 | | |
| | % | 24 | 8 | 5 | 26 | 10 | 100 | | |
| Primary school | n | 24 | 6 | 5 | 28 | 7 | 82 | | |
| | % | 29 | 7 | 6 | 34 | 9 | 100 | | |
| Middle school | n | 0 | 0 | 0 | 0 | 0 | 0 | | |
| | % | 0 | 0 | 0 | 0 | 0 | 0 | | |
| High school | n | 23 | 9 | 3 | 18 | 6 | 77 | 169 | 0.000 |
| | % | 30 | 12 | 4 | 23 | 8 | 100 | | |
| Vocational school | n | 9 | 1 | 2 | 11 | 3 | 27 | | |
| | % | 33 | 4 | 7 | 41 | 11 | 100 | | |
| University | n | 35 | 6 | 1 | 11 | 7 | 139 | | |
| | % | 25 | 4 | 1 | 8 | 5 | 100 | | |
| Master/PhD. | n | 27 | 9 | 6 | 46 | 10 | 120 | | |
| | % | 23 | 8 | 5 | 38 | 8 | 100 | | |
| **$\chi^2$** | **10.518** | | **7.056** | **10.821** | **5.731** | **12.687** | | | |
| **p** | **0.104** | | **0.316** | **0.094** | **0.454** | **0.048** | | | |

As $\chi 2 = 169$ and $p= 0.00 <0.001$ according to the result of the Chi-Square independence test conducted between education level and the purpose of purchasing medicinal plants, the $H_0$ assumption was rejected. There was a relationship between education level and the purpose of purchasing medicinal plants (Table 12).

## Discussion and Conclusion

In this study, the socio-economic and demographic characteristics, purchasing behavior and consumers' demand characteristics purchasing medicinal plants in Istanbul were examined. When the participants were asked about the criteria that they paid the most attention to when purchasing medicinal plants, *freshness* took the first place. According to the results of this study, 65.6% of consumers think that medicinal plants are healthier than medicines.

While 48% of the consumers use medicinal plants for treatment purposes, 52% of them say that they consume plants other purposes (food, taste and smell to meals, cosmetic purposes or pleasure). The consumers most often refer to medicinal plants for the treatment of respiratory system diseases such as flu and cold. These are followed digestive system diseases, gynecological diseases, nervous system diseases, and cardiovascular diseases.

The consumers take medicinal plants for the treatment of respiratory system diseases (29%), for digestive system diseases (25%), and of 15% for skin diseases. In the study of Bayramoğlu (2007) for the region of Eastern Black Sea, 18% of consumers said that they use medicinal plants for digestive diseases, 17% for respiratory diseases, and 8% for nervous system diseases. Akbulut and Özkan (2016) also conducted a survey with 99 consumers in Kahramanmaraş province. The study revealed that the consumers mostly buy medicinal plants for digestive, respiratory, nervous system, cardiovascular and

skin-skin diseases, respectively. It is seen that the purposes of using of the consumers were similar with in Istanbul.

Korkmaz and Fakir (2009) determined the consumption preferences of the consumers concerning NWFPs in Isparta Province. The research results revealed that consumers use these plants for general health, treatment and enjoyment, respectively.

In this study for Istanbul, linden is the most demanded medicinal plant. Faydaoğlu (2013) also revealed that the consumers demand the most linden in Afyon and Isparta provinces. Bayramoğlu (2007) found that the most demanded medicinal plant is mint, while Kızıloğlu et al. (2017) determined that the most demanded medicinal plant in Kahramanmaraş is red pepper. In the study for İzmir, it was found that mint, linden and thyme by Arslan et al. (2016). Kadıoğlu and Kadıoğlu (2021) determined that the highest consumption were rosehip, linden, mint, and ginger for Erzurum province.

Korkmaz and Dündar (2019) determined the factors affecting the purchasing preferences of consumers for NWFP in Burdur province. This study revealed that the most important factors for consumers were natural and reliable, and health and nutritional values. In this study for Istanbul, the factor mostly affecting the purchasing preferences of consumers are *freshness*. Arslan et al. (2016) found as *price* for İzmir province. According to, domestic and international market research on medicinal plants should be increased. Therefore, consumers' purchasing and demand trends should be determined for each province.

The consumers mostly buy medicinal plants from herbalists in this study as in other studies (Korkmaz and Fakir 2009, Arslan et al. 2016, Korkmaz and Dündar 2019). Since herbalists are the places where consumers mostly buy medicinal plants, it should be legally determined who the herbalists can be and how this profession should be done.

As the importance of medicinal plants in human life increases, the demand for these plants is increasing day by day. In this sense, Turkey is both an exporting country and an importing country thanks to its climate and ecological characteristics. It is one of the leading medicinal plant producing countries in the world. However, an inventory of medicinal plants should be done throughout the country. The most suitable habitats of the species should be determined according to regions and provinces in accordance with the botanical characteristics of them. Medicinal plants, which are endangered but with high demand, should be cultivated and their uncontrolled collection should be prevented. On the one hand, while linden cultivation studies are carried out to expand the cultivation of linden, on the other hand, 950 thousand linden saplings were produced in forest nurseries in 2021 (GDF 2021).

In order to ensure the sustainability of these plants and to evaluate these products properly in the domestic and foreign markets, these products must be of the requested quantity, feature and quality. In addition, necessary measures should be taken to increase production and to meet the domestic and international demand. Thanks to this study, the use of medicinal plants by consumers in Istanbul and for what purpose they consume to these plants have been revealed. These studies should be increased throughout the country to enable accurate analysis of demand.

Medicinal plants should be included in forest management plans. Production should be increased in a planned manner for each species. Policies should be determined the real values of medicinal plants extracted from the forest to determine their real contribution to the economy of the country. For example, linden contributes approximately 5 million TL to forest villagers and 30 million TL to the national economy (GDF 2021). A standard should be determined by government intervention in the prices of these plants, which are imported or bought at low tariffs and sold at high prices.

**Acknowledgement:** This article is a summary of a part of Master of Science thesis titled "Tıbbi ve aromatik bitkilerin talebi üzerine araştırmalar: İstanbul örneği" prepared by Özkan (2019) under the supervision of Tuğba Deniz.

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Submitted: 27.01.2023 Accepted: 20.02.2023