



Consumers' Bread Consumption Habits and Waste Status: Hatay/Turkey Example

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ABSTRACT

In this study, it was aimed to determine the reasons for the waste of bread among consumers in Hatay province and what should be taken for the elimination of these causes. The subjects of this study were the data obtained from 406 consumers selected from the city center. The data were obtained through face to face interviews during the period of May-2017. In the questionnaire, there were questions towards determining the bread consumption habits, consumption preferences and bread waste levels along with the socio-demographic characteristics of the consumers. Cross tabulation and chi-square analysis were used in the evaluation and comparison of the data. It was determined that the amount of bread consumed per person was 278 g/day and 7% of the total family consumption of bread was wasted without any consumption. While the most consumed types of bread are traditional white bread and flatbread, bakeries and groceries are the most common places to buy bread. Consumers usually buy bread twice a day and the main considerations in the consumers' preference for bread purchase are that the establishments comply with hygiene requirements and that quality materials are used in the bread making process. Staling and bad taste are among the significant issues in bread wastage. Taking future trends in the sector into consideration, producers should pay attention to product quality, production according to health conditions and longer shelf life on bread; depending on consumer awareness. The producers should diversify their production of bread and other bakery products.

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ÖZ

Bu çalışmada Hatay ilindeki tüketicilerin ekmek tüketim alışkanlıkları ve ekmek israfı incelenmiştir. Kent merkezinden seçilen 406 tüketiciden elde edilen veriler bu çalışmaya konu olmuştur. Veriler Mayıs-2017 döneminde yüz yüze görüşme ile elde edilmiştir. Ankette tüketicilerin sosyo-demografik özellikleri ile birlikte, ekmek tüketim alışkanlıkları, tüketim tercihleri ve ekmek israf düzeylerini belirlemeye yönelik sorular yer almıştır. Verilerin değerlendirilmesinde ve karşılaştırılmasında çapraz tablolama ve ki-kare analizi kullanılmıştır. Kişi başına tüketilen ekmek miktarının 278 g/gün ve toplam aile tüketimi içindeki ekmeğin %7'si hiç tüketilmeden israf edilmektedir. En fazla tüketilen ekmek çeşitleri beyaz somun ve pide olurken, fırın ve bakkallar ekmek satın almada ilk tercih edilen yerlerdir. Tüketiciler genellikle günde 2 kez ekmek satın almaktadır. Ekmek satın alırken işletmelerin temizlik ve hijyen koşullarına uyması yanında, kaliteli malzeme kullanılması dikkate alınan başlıca konulardır. Ekmek israfında bayatlama ve kötü tat başlıca nedenlerdir. Sektörde gelecekte görülebilecek yeni eğilimler dikkate alındığında, üreticiler tarafından, tüketici bilinçlenmesine bağlı olarak ürün kalitesine, sağlık koşullarına uygun üretim yapılmasına ve ekmekte daha uzun raf ömrüne dikkat edilmelidir. Üreticiler ekmekte ve diğer unlu mamullerin üretiminde çeşitlendirmeye gitmelidir.

Introduction

Cereals have been seen as a basic food product by humans since ancient times and are frequently consumed as a source of energy. The food safety problem in the world, together with population growth, increases the importance of cereal and bakery products in global markets (Gîndu et al., 2015). Humans have learned to make bread more than 4,000 years ago. Although not always at the same level, bread has been a popular basic food throughout the ages. Bread is a versatile and useful food product that can be incorporated into a healthy and balanced diet. Bread, consumed almost everywhere in the world, has global importance in nutrition (Barrett 1975, Souki et al., 2016). Issues, such as varieties in cereal products and production techniques, vary considerably throughout the world. The basic ingredients usually are flour, water, yeast, salt and water (Martin, 2004). The nutritional value of the bread can be increased by mixing other cereal flours other than wheat. Also, from the health perspective, different types of bread should be preferred in some situations because their content may vary widely, from whole grains to non-wholegrains or from whole-wheat traditional white bread to wholegrain rye bread (Worsley 2003; Sandvik et al., 2014). Consumers tend to prefer different types of bread apart from traditional white bread for some reasons such as being healthy, having a good taste, being more nutritious, being non-staling and being recommended (Aksoylu et al., 2014). Bread contains a wide variety of important nutrients that have a positive effect on human health. However, its consumption has begun to decline due to the negative perceptions consumers have regarding the effects of bread and other starchy foods on weight and other health problems. This is in part due to the increasing use of breakfast cereals and ready-to-eat foods as a result of the changing nature of eating habits in recent years (Gellynck et al., 2009, O'Connor, 2012). Still, the choice of food depends on the beliefs and attitudes of consumers. Based on multiple characteristics perceived from a product, consumers adopt an attitude towards food products. The determinants of perceived quality are related to food characteristics, socio-demographic factors, and environmental factors. Food characteristics include sensory and health characteristics. Socio-demographic variables include age, gender, family size and existence of a child in the family (Solomon et al., 2014). Consumption of bread and consumed varieties differ according to age, education, income, gender differences, dieting and health problems of consumers.

Due to being cheap and rich in nutrients and being consumed with other foods, the bread is frequently preferred by the Turkish people and as a result, more than half of the daily calorie and protein needs of a person is supplied by bread (Gul et al., 2003; Erturk et al., 2012; Aksoylu et al., 2014, Gul et al., 2017). Bread consumption, which shows a traditional structure in Turkey, is about 400 g per person per day, and the bread production sector can be seen as an important employment and economic activity area (Demir and Kartal, 2012). While in the past years white wheat bread

has been at the forefront of Turkish people's bread consumption habits, nowadays, these consumption habits have begun to change towards different kinds of bread which are made up of a mixture of flour and bran of different grains, depending also on consumer consciousness. Changes in bread production technologies and regulations in food legislation were also influential in this change (Anonymous, 2013). Despite these developments, the consumption of other bread varieties has not become a habit in Turkey. Nowadays, traditional bakeries are replaced by much more modern establishments and bread products made of different varieties of flour have begun to take the places of classic bread and flatbreads. There are sourdough, mixed grain, whole wheat, brown, whole wheat floured, corn and oat bread among the bread types specified in Turkish Food Legislation. There are also many traditional bread varieties traditionally produced in different regions of Turkey.

Turkey, which is one of the most wheat producing countries in the world, is also the country that consumes the most bread. Although it is stated that wastage is at high levels with this consumption, it is not revealed at what stage and at what size this wastage is, since there is no comprehensive study on this issue. A nationwide collection of information on the consumption, storage, and waste of the bread, which is the main food source of the Turkish people, should be made (Anonymous, 2013). There is a widespread belief in the community that some of the bread bought to be consumed daily is often wasted because it has been deteriorated for various reasons.

In this study, bread consumption habits of consumers in Hatay's province center were examined and it was aimed to reveal bread consumption preferences and the levels of waste made during this consumption phase. In the study, socio-demographic characteristics of the participants, bread buying behaviors, quality perception and attitudes of consumers about bread, levels of bread waste and suggestions for reducing bread waste are put forward.

Materials and Methods

Hatay's province center located in Eastern Mediterranean Region (TR63), which is one of the sub-regions of the Mediterranean Region, was selected as the research area. In the region, no study has been done earlier about bread consumption and waste. The data of 406 participants determined by sampling among the consumers in the city center was the subject of this study. The data were obtained through face to face interviews during the period of May-2017. The total number of households in Hatay province center were 194.926 nuclear families in 2016. In the sample of total households, the following formula was used (Equation 1) (Weiers, 2010). The sample number was set at 383 with a confidence limit of 99% and an error rate of 10% on average. In case of missing and inaccurate data, some of the surveys to be conducted in the study, a backup

questionnaire was made up to 5% of the sample size and the last survey was 406. While the places to be surveyed were determined to take into consideration the neighborhoods in the province center, consumers were selected randomly and then questionnaire was applied.

$$n = \frac{qp\left(\frac{Z_{\alpha}}{d}\right)^2}{1 + \frac{1}{N}\left[qp\left(\frac{Z_{\alpha}}{d}\right)^2 - 1\right]} + p \quad (1)$$

In the formula; p is the ratio of X observed in the population, q is the value of (1-p), N is the population, n is the sampling volume, Z_{α} , $\alpha=0.05$ for 1.96 and d is the acceptable error rate (taken at 10%). In addition to the questions about determining the socio-demographic characteristics of consumers, there are questions about determining bread consumption habits and bread waste levels in the questionnaire. Cross-tabulation and chi-square analysis were used in the comparison of the data. Chi-squared analysis is based on whether the difference between the observed and expected frequencies is meaningful and is used in the analysis of qualitative data.

Results and Discussion

Participants' Demographic Characteristics

Among the consumers participating in the study, men are the majority (n=406, male %61). The ages of the consumers range from 16 to 69, with an average age of 34.4 (SD=11.83). The majority of the consumers are married (n=406, married 62%). The number of individuals in the participating families range from 1 to 12, and the average number of family members is 4.64 (SD=1.74). The average number of women and men in the participants' families are also very close (n=406, female=2.19 and male=2.40). In terms of income level, the majority of participants are close to the average income level (average monthly income 2429.24 ₺/month). The number of participants with social security is very high (n=406, 78% with social security). The highest level of educational attainment among the participants is in 'before high school' level (n=406, before high school level 32%). According to these results, the participants represent the province-wide population in terms of demographic and socio-economic characteristics (Table 1).

Table 1 Demographic and socio-economic characteristics of the participants (n=406)

| Features | | n | % | Features | | n | % |
|--------------------------|-----------|---------|-------|-------------------------|-----------------------|------|-------|
| Gender | Female | 160 | 39.41 | Type of social security | SSK | 169 | 41.63 |
| | Male | 246 | 60.59 | | Retired fund | 76 | 18.72 |
| Age | 18-25 | 118 | 29.06 | | Bağ-kur | 72 | 17.73 |
| | 26-35 | 125 | 30.79 | | Private | 21 | 5.17 |
| | 36-45 | 89 | 21.92 | | Optional | 15 | 3.69 |
| | 46-55 | 49 | 12.07 | | Agriculture | 6 | 1.49 |
| | 56≤ | 25 | 6.16 | | Retired | 47 | 11.58 |
| | Average | 34.45 | | Education | Non-literate | 10 | 2.46 |
| Marital status | Married | 253 | 62.32 | | Less than High School | 129 | 31.77 |
| | Single | 153 | 37.68 | | High School | 114 | 28.08 |
| Number of family members | 1-2 | 38 | 9.36 | | Associate Degree | 47 | 11.58 |
| | 3-4 | 158 | 38.92 | | Undergraduate | 97 | 23.89 |
| | 5-6 | 160 | 39.41 | | Graduate | 9 | 2.22 |
| | 7≤ | 50 | 12.32 | Profession | Self employed | 107 | 26.35 |
| | Average | 4.64 | | | Student | 68 | 16.75 |
| Monthly income (₺) | ≤1500 | 136 | 33.50 | | Public employee | 67 | 16.50 |
| | 1501-2500 | 142 | 34.98 | | Private employee | 63 | 15.52 |
| | 2501-3500 | 67 | 16.50 | | Housewife | 49 | 12.07 |
| | 3501≤ | 61 | 15.02 | | Farmer | 33 | 8.13 |
| | Average | 2429.24 | | Unemployed | 19 | 4.68 | |

Consumers' Bread Buying Behavior

The desire to consume fresh bread of Turkish consumers and the amount of bread consumed also determine their purchasing preferences. Consumers in the research area prefer bakery and grocery stores (n=254, 63%), followed by supermarkets (n=94, 23%) (Figure 1). In a study conducted in Manisa province, 58% of the participants buy their bread from bakeries, and 30% of them buy from grocery stores (Aksoylu et al., 2014). The fact that the first preferred places for buying bread are grocery stores and bakeries, raises the topic of inspection and improvisation of these enterprises in terms of quality and hygiene conditions (Gul et al., 2003).

It was determined that the amount of bread bought by consumers in one day ranged from 1 to 20 and that the number of bread with the highest purchase frequency was

3-4 (40%) and the average purchase amount of bread was 4.08. The factor that directly affects the amount of bread bought is the number of individuals in the consumers' families. Considering that the average member numbers of the families surveyed in the study are 4.64, it is understood that the amount of bread bought per person per day is close to one loaf of bread (278 g). While 331 grams of bread consumed per person per year in 2008 in Turkey, this figure declined to 319 grams in 2012 (Anonymous, 2013). Within the scope of the research, the amount of bread consumed per person per day was determined as 278 grams. It can be said that the consumption of bread in Hatay province is decreasing, as it is in Turkey-wide, due to consumer awareness, socio-economic developments and changes in food preferences.

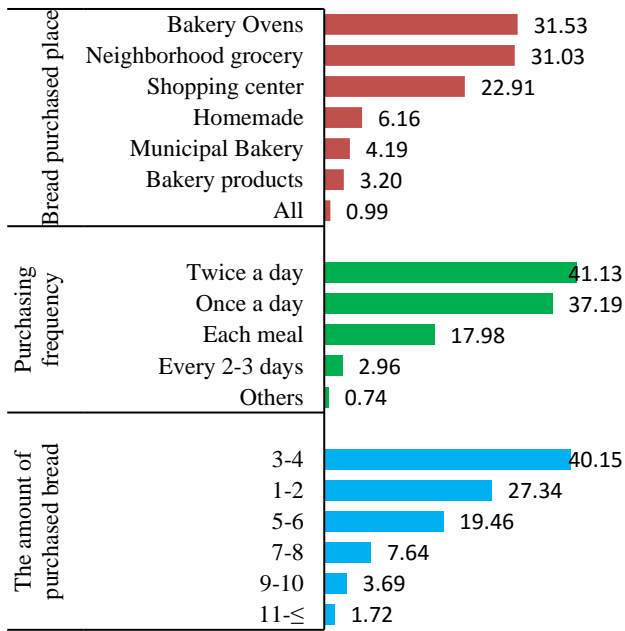


Figure 1 Consumers' bread buying behavior (%)

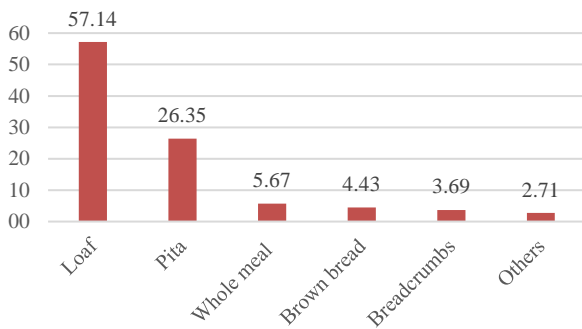


Figure 2 Distribution of bread preferences of consumers

Consumers' bread purchasing frequency is maximum twice daily (41%) and once daily (37%). That is, the majority of consumers (78%) buy bread once or twice a day (Figure 1). In a survey conducted throughout Turkey, the amount of bread bought daily was determined as 1-2 (41%), 3-4 (37%) and 5-6 (15%) and the frequency of buying bread was once a day (71%) (Anonymous, 2013). In another study, 31% of consumers bought 1 or more bread a day (Aksoylu et al., 2014). According to the results of the previous study, it was determined that the purchasing behaviors of the consumers in Hatay province are similar to those of Turkey.

More than half of the consumers interviewed within the scope of the research stated that the quality of the materials used in bread production and cleaning and hygiene of the places where they bought the bread was very important. On the other hand, the product diversity, the proximity of the production point and the fact that the products are packaged are considered less important. The preference differences of all variables, which consumers consider in buying bread, are found to be statistically significant (Table 2). In a survey conducted in Turkey-wide in 2012, the main topics that households paid attention to during baking are given as follows: being hot and fresh, being good cooked, production and sales in

hygienic conditions (Anonymous, 2013). In a study conducted in Isparta, it has been shown that consumers are paying attention to issues such as production and sales in hygienic conditions, being well cooked, being hot and fresh, appearance, nutrition, and satiety while buying bread (Erturk et al., 2015). In general, preference in bread type is influenced by consumers' dietary preferences, health-related behaviors, and demographic characteristics. In the case of bread quality perception, consumers may be divided into different segments according to their health, nutrition and sensory preferences (Gellynck et al., 2009; Worsley, 2003).

In Turkey, accustomed and commonly consumed and widely produced bread is the traditional white bread. However, in some regions, it can be seen that the regional bread types are consumed widely too. In the preference of the bread type of the consumers in the study area, the loaf of bread was predominantly leading (n=232, 57%), followed by the pita bread type (n=107, 26%). Of the other bread varieties, whole wheat and filo bread varieties are much less preferred (Figure 2). While the bread types in traditional bakeries are limited, the number of bread varieties has increased in recent years with the increase of modern enterprises known as bakery products industry (Gul et al., 2017). Consumers have begun to prefer tastier and nutritious products, especially with new bread varieties prepared with mixtures of different grains. According to various researches carried out in Turkey regarding this issue, among the bread types whose consumption is considered important apart from traditional white bread, whole wheat, rye, mixed grain, wholegrain and cornbread come first (Demir and Kartal, 2012; Bal et al., 2013, Aksoylu et al., 2014, Erturk et al., 2015, Gul et al., 2017). The bread type preferences of consumers in the study area were similar to those in other studies in Turkey. Especially "availability" is an important issue when consumers prefer different types of bread. Bread other than traditional white bread, which is preferred as being healthier and more nutritious, can be found more in supermarkets.

Consumers' Assessment of Quality in Bread

Quality assessment and consumption behavior of consumers in food products is mainly based on their past experiences. In this study, consumers' assessment of bread quality is also determined in two ways. These are quality assessments seen during the production phase and at home consumption phase. Consumers perceive some of the differences in bread quality as problematic and show purchasing behavior accordingly. The issues during bread production phase, caused by production techniques the enterprises have, such as not being well cooked, being overcooked, different taste of bread from the usual or altered shape have been expressed by consumers as issues affecting quality. In addition to these, the changes (staling, hardening, drying, mold, etc.) that occur as a result of the storage of bread for later meals which have been bought more than they need, are expressed among other issues affecting bread quality. While less than half of the consumers (n=184, 45%) were positive about the quality of purchased bread, the proportion of consumers with negative opinions was close to 1/3 (n=112, 28%). A significant number of consumers who evaluated quality in

bread also expressed an indecisive opinion (n=110, 27%). Accordingly, it can be said that the participants generally assessed the quality of the bread they bought as positive. More than half of the interviewed consumers (n=243, 60%) stated that they did not have a problem with bread quality, however; the remaining consumers (n=163, 40%) mentioned different quality problems. At the beginning of the problems arising from the production are not being cooked (n=39, 24%), being overcooked (n=27, 17%) and taste disorder (n=15, 9%). In addition, 7% of the participants showed that there were various foreign substances coming out of the bread as among the quality

problems. Among the quality problems seen during the consumption of bread at home, staling (n=48, 29%) and drying (n=13, 8%) are the first ones mentioned (Figure 3). In a bread consumption habits study conducted in Manisa by Aksoylu et al. (2014), 46% of the consumers reported that they had various quality problems with the bread they had bought. In Turkey, it is possible to speak of general quality problems in all food products, especially in the production phase. In addition to technological upgrading and modernization of bread production facilities, it will be possible to reduce these quality problems by applying much better control.

Table 2 Items to be considered when buying bread for consumers

| Reason for preference | VU | | U | | N | | I | | VI | | χ^2 | P |
|-----------------------|----|-------|----|-------|----|-------|-----|-------|-----|-------|----------|-------|
| | n | % | n | % | n | % | n | % | n | % | | |
| Cleaning and hygiene | 13 | 3.20 | 5 | 1.23 | 12 | 2.96 | 97 | 23.89 | 279 | 68.72 | 672.670 | 0.000 |
| Material quality | 4 | 0.99 | 7 | 1.72 | 23 | 5.67 | 159 | 39.16 | 213 | 52.46 | 471.389 | 0.000 |
| Good cooking | 1 | 0.25 | 7 | 1.72 | 12 | 2.96 | 185 | 45.57 | 201 | 49.51 | 515.429 | 0.000 |
| Warmth and freshness | 4 | 0.99 | 11 | 2.71 | 14 | 3.45 | 194 | 47.78 | 183 | 45.07 | 474.025 | 0.000 |
| Cheapness | 64 | 15.76 | 57 | 14.04 | 40 | 9.85 | 141 | 34.73 | 104 | 25.62 | 82.202 | 0.000 |
| Diversity | 54 | 13.30 | 78 | 19.21 | 62 | 15.27 | 118 | 29.06 | 94 | 23.15 | 32.473 | 0.000 |
| Closeness | 48 | 11.82 | 41 | 10.10 | 23 | 5.67 | 206 | 50.74 | 88 | 21.67 | 267.571 | 0.000 |
| Being packaged | 59 | 14.53 | 52 | 12.81 | 79 | 19.46 | 139 | 34.24 | 77 | 18.97 | 57.990 | 0.000 |

VU: Very unimportant, U: unimportant, N: Neutral, I: Important, VI: Very important

Table 3 Reasons for participants' not consuming and waste bread

| Reasons for not consuming | VU | | U | | N | | I | | VI | | χ^2 | P |
|---------------------------|-----|-------|----|-------|-----|-------|----|-------|----|-------|----------|-------|
| | n | % | n | % | n | % | n | % | n | % | | |
| Staling | 92 | 22.66 | 46 | 11.33 | 127 | 31.28 | 53 | 13.05 | 88 | 21.68 | 28.749 | 0.000 |
| Bad taste | 92 | 22.66 | 53 | 13.05 | 147 | 36.21 | 51 | 12.56 | 61 | 15.03 | 84.099 | 0.000 |
| Poor quality | 79 | 19.46 | 60 | 14.78 | 150 | 36.95 | 56 | 13.79 | 61 | 15.03 | 76.734 | 0.000 |
| Poor appearance | 133 | 32.76 | 44 | 10.84 | 148 | 36.45 | 27 | 6.65 | 54 | 13.30 | 150.330 | 0.000 |
| Moldy | 89 | 21.92 | 58 | 14.29 | 158 | 38.92 | 49 | 12.07 | 52 | 12.81 | 103.286 | 0.000 |
| Redundant | 106 | 26.11 | 62 | 15.27 | 150 | 36.95 | 51 | 12.56 | 37 | 9.11 | 105.700 | 0.000 |

VU: Very unimportant, U: unimportant, N: Neutral, I: Important, VI: Very important

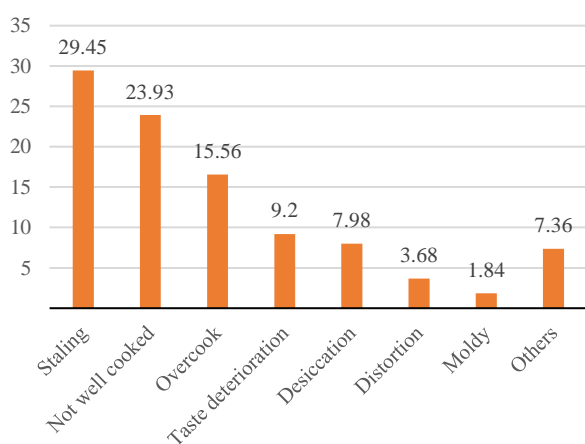


Figure 3 Consumers' quality problems in bread (%)

Bread Waste

Bread waste is defined as the use of the produced bread other than its purpose, that is to say, to be consumed not as a human food or to be discarded without being consumed. However, bread waste perception in the society may be different from the above definition (Anonymous, 2013). The bread that is given to animals as food should also be considered as wasted.

Evaluation of stale breads

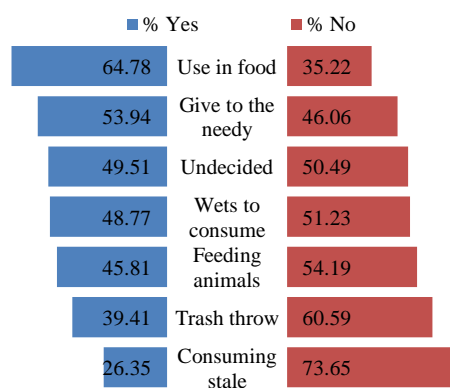


Figure 4 Participants' evaluation of stale breads

When the reasons for waste bread are examined, the most important issues are determined as staling (n=88, 22%), bad taste (n=61, 15%) and poor quality (n=61, 15%). Other reasons for waste include poor appearance, mold and excessive buying of bread. The difference between the importance levels of the subjects that were effective in wasting the bread was found to be statistically significant (Table 3). In a study conducted in Adana

province, it was determined that the most important factor that increased the amount of wasted bread was that consumers did not like stale bread (Gul et al., 2003).

In general, consumers do not consume all the bread they buy, more or less, they waste it. The rate of consumption of the whole of the purchased bread among the participants (n=253, 62%) is quite high (Table 4). However, it is known that the rest of the consumers do not consume all of the bread they bought, they store it at home, and even some of it is not consumed at all and thrown away. While participants who are interviewed within the scope of the study regarding their bread consumption consume 83% of their daily bread freshly throughout the day, 10% of the remaining bread is consumed as stale, and the amount of wasted bread is 7%. Nearly half of the consumers (n=162, 40%) stated that they did not consume ¼ of their daily bread, 21% of the consumers did not consume 1/3 of the bread, and 17% of

them did not consume half of the bread they bought. The proportion of participants who do not consume one or more of the bread they buy is 22%. According to these results, consumers in the research field generally do not consume a little less than 20% of the bread they buy, on the same day. Leftover bread left for later use can be put to good use in different forms in the home if there is no mold and deterioration. For this reason, it is wrong to consider the whole of the leftover bread that is not consumed during the day as wasted. Among the consumers in the city center of Isparta, on average 14% of the daily bread bought is not consumed, 5% becomes stale and a little more than 1% becomes moldy (Erturk et al., 2015). In a survey conducted across Turkey, it was determined that 3% of the daily bought bread were not consumed on the day and became leftover, 2% had gone stale, 0,4% had never been consumed and discarded due to mold (Anonymous, 2013).

Table 4 Distribution of participants' thoughts on bread waste

| Items | | n | % | Items | | n | % |
|------------------------------|-----------|-----|-------|--|---------------------|-----|-------|
| Consumption of all the bread | Yes | 253 | 62.32 | Causes of bread waste | Storage difficulty | 202 | 49.75 |
| | No | 153 | 37.68 | | Production excess | 83 | 20.44 |
| The amount of unused bread | 1/4 | 162 | 39.90 | | Needs to get more | 71 | 17.49 |
| | 1/3 | 84 | 20.69 | | Other reasons | 50 | 12.32 |
| | 1/2 | 69 | 17.00 | Determine the amount of bread consumed | Up to necessity | 351 | 86.45 |
| | 1≤ | 91 | 22.41 | | More than needed | 44 | 10.84 |
| Thoughts of waste | Yes | 85 | 20.94 | | Less than necessity | 11 | 2.71 |
| | No | 171 | 42.12 | Staling reasons | Not consumed daily | 128 | 31.53 |
| | Sometime | 150 | 36.95 | | Quality degradation | 107 | 26.35 |
| Evaluation of bread price | Expensive | 204 | 50.25 | | Not stored well | 99 | 24.38 |
| | Normal | 172 | 42.36 | | Need to get more | 72 | 17.73 |
| | Cheap | 30 | 7.39 | Bread storage methods | Room conditions | 161 | 39.66 |
| Effect of bread weight | Yes | 221 | 54.43 | | Bread box | 136 | 33.50 |
| | No | 185 | 45.57 | | Coolers | 109 | 26.85 |

Information about the bread price is generally good among consumers, but the price flexibility of the demand is very low since the bread is the main food for Turkish people and there is no substitution for it. For this reason, there is no decrease in consumption even when bread price increases. However, families whose daily consumption of bread is high tend to prefer bakery production facilities known as "halk ekmek" which are run by local governments due to price advantage. Among the consumers in the research area, the participants who find the bread price expensive are equal to those who find it cheap or normal. Consumers generally find food products expensive or inexpensive according to their level of income and the amount of money they spend on food. As a matter of fact, in a study conducted in Ankara, consumers with a high-income level found bread prices low and consumers with low income found bread prices high (Tasci et al., 2017).

54% of consumers report a favorable opinion when it is asked if an increased weight of bread increases wastage or reduced weight of bread reduces wastage. Similarly, previous studies have shown that increased bread weight increases wastage and vice versa (Gul et al., 2003, Demir and Kartal, 2012; Erturk et al., 2014). Bread waste can be reduced with the bread production at different weights. The increase in a waste of bread is an increase in the need

for more production and more bread is taken to be considered other issues. Excess production of bread and buying excessive amounts of bread are other considerations that are considered important. Consumers' habit of buying more bread than they needed and the fact that the weight of bread is high can cause consumers to buy an excessive amount of bread and thus waste it.

Among the answers of the consumers interviewed within the scope of the research given to the question of what is the main cause of wasting bread, the difficulty of storing the bread (n=202, 50%) is the prominent one. This is followed by overproduction by 20%. The reasons and importance levels of bread waste will vary when the consumption places such as hotels, restaurants, and canteens together with houses are taken into consideration. For this reason, different waste prevention studies are needed for different consumption places. The issue that needs to be considered by producers in the research area in the prevention of waste is the maintenance quality, freshness, and appearance of the bread for a longer period of time. The main reason for wastage in bread is, rather than the increased weight or excess buying, the inability to keep the unconsumed portions of the bread in good condition. Among the participants, the amount of bread bought is usually determined according to daily necessity (n=351, 86%).

Only 11% of the participants said that they buy more bread than they needed. Therefore, it cannot be said that bread waste caused by buying extra bread is too much in the research area. According to a study conducted with consumers throughout Turkey, the reasons for waste of bread are as follows; buying more bread than needed (67%), people's unawareness to prevent waste of bread (32%), production more than necessary (17%), inability to put the stale bread in houses to good use (15%), bread's not being long-lasting (10%) and not keeping the bread in proper conditions (9%) (Anonymous, 2013). Due to the fact that the study area has a Mediterranean climate, it shortens storage times mostly in all food products. Food products are deteriorating much more rapidly in the research area than in other parts of Turkey.

The habit of consuming bread fresh in Turkey raises consumer waste in stale bread. For this reason, the opinions of the participants on the causes of produced bread's staying in the research area were examined. Among the causes of staling stated by the consumers, being unable to consume daily, poor quality and poor storage of bread constitute the majority (82%). In the field of research, bread are usually kept in plastic bags and in bread boxes or in bags with various coolers in room conditions. The bread kept in the room conditions or in the bread box for the daily consumption purpose should be kept in the refrigerator or freezer to store for longer periods. Bread that are not consumed fresh by the participants during the day are considered stale for reasons such as drying, hardening, crumbling in the following days. The stale bread, which have to be consumed in the following days, are also relatively reduced in quality. With regard to bread production techniques, the production of breads that have a long shelf life or non-staling and that can maintain quality and appearance for a long time seems to be an important issue.

The reasons such as the mold, the change in the taste, the easy crumbling due to the hardening and the deterioration of the appearance are considered as staling by Turkish consumers (Anonymous, 2013). Figure 4 shows how consumers act when bread becomes stale as a result of the difficulties in storage, which is pointed out by participants as the most important issue in wasting bread. While there is an above average tendency to give stale bread to the poor or utilize it in other foods among the participants, there is a balance between the opinions of consumers who are indecisive and who say 'I eat it after it is soaked' and who say 'I give it to animals'. Even though the opinions such as 'I throw stale bread away' or 'I eat bread even if it is stale' are below average, the highness of the tendency to throw away is remarkable (%39). According to these results, consumers are definitely throwing away some of the bread they buy. While the recycling rate of stale bread in various forms was 65% in the research area, it is 82% in Manisa, 68% in Tokat, 80% in Adana and 76% throughout Turkey (Gul et al., 2003, Anonymous, 2013, Bal et al., 2013, Aksoylu, 2014).

It is estimated that in Turkey, about 100 million pieces of bread are produced daily, of which 5 million (5%) are wasted. If the average bread price is thought to be 1 ₺, it can be said that the material cost of daily wastes is about 5 million ₺ and over 1.8 billion ₺ per year (Anonymous,

2013). When studies on bread consumption in Turkey are examined, it is seen that bread waste in mass production and mass consumption places is as important as it is in homes (Gul et al., 2003, Demir and Kartal, 2012, Erturk et al., 2012, Aksoylu et al., 2014, Gul et al., 2017). The excessive amount of wasted bread and high monetary waste require measures to be taken to reduce losses at both production and consumption points. Nowadays, with the efforts made to raise awareness of consumers in Turkey, bread waste has begun to be reduced. In general, it can be said that consumer awareness studies are still needed for all types of food.

The waste of bread, which is produced as an essential nutrient in human nutrition, begins directly in the ovens which are the production places. The total wastage, with the bread produced in the bakeries that are not sold and bread returned from the retailer stores, is at the level of 3.4%. It can be said that about 2% of these bread are wasted because they are used as animal feed or thrown away (Anonymous, 2013). The presence of especially fresh bread consumption habits in the Turkish society is a negative issue in terms of healthy nutrition and bread waste (Erturk et al., 2012; Gul et al., 2017). Houses that have the biggest consumption rates of bread are also the biggest in the waste of bread. In addition to the houses, restaurants, workplace/student dining halls, hotels, buffets and other workplaces are other important places where bread is wasted. When the intensity of the bread waste is examined, the houses are listed as 41%, ovens as 38%, restaurants as 14% and workplaces/student dining halls as 7% (Anonymous, 2013).

Prevention of Bread Waste

Most important issues in bread waste are non-consumption of the bread bought for daily consumption, not being stored in good condition and buying more than needed. Accordingly, to prevent bread waste, bread bought for daily consumption should be consumed on a daily basis, it should be stored in suitable conditions and it should be bought no more than needed.

Another important issue in bread consumption is the quality of the bread. When the opinions of the consumers are analyzed, the proportion of consumers who consider the quality of the flour, which is the main raw material, as important and very important is 51%. Apart from flour, the quality of other materials (water, yeast, minerals, etc.) used in bread production is found important and very important by 46%. Another issue that determines the quality of the bread produced is that the enterprises are producing bread in hygienic environments. The proportion of participants who stated that the hygiene of producing enterprises is important and very important in bread quality is 53%. The proportion of the consumers who stated that the insufficiency of inspections in production facilities is important or very important in the quality decrease 60%. Bread makers' use of quality raw materials and adequate supervision of businesses will increase the quality of the products and reduce wastage.

Another issue that is effective in bread consumption is buying more bread than needed. Consumers buy more bread than their needs because families do not know exactly what their daily bread needs are, and this causes a waste of bread. In the research area, before the morning

and evening meals, where bread consumption is greatest, it can be said that the determination of the need for bread and the purchase of bread accordingly are effective in decreasing the waste of bread. In preventing waste, proper storage of bread and preservation of the quality is important. The way in which the bread are stored in the study area has shown similar results with studies carried out in other parts of Turkey. Among the households in Turkey, there is a habit of keeping bread in room conditions (Gul et al., 2003, Anonymous, 2013, Aksoylu et al., 2014). This situation causes the staling, the drying and the decrease of the quality if the bread is not consumed during the day, resulting in the waste of bread.

Conclusion

In this study, bread consumption habits and bread waste of the consumers in the research area were examined from various aspects and suggestions for producers, consumers and all it may concern are made. The most essential food for people in Turkey is bread, the most common food in flour and floured-based products, and this will continue in the same direction in the future. Consumers perceive bread as an essential and traditional food, and it is considered important for balanced nutrition due to its grain fibers, vitamin content and nutrient quality.

In this study, bread consumption habits and bread waste of the consumers in the research area were examined from various aspects and suggestions for producers, consumers and all it may concern are made. The most essential food for people in Turkey is bread, the most common food in flour and floured-based products, and this will continue in the same direction in the future. Consumers perceive bread as an essential and traditional food, and it is considered important for balanced nutrition due to its grain fibers, vitamin content and nutrient quality.

In order to increase the consumption of varieties other than white nut bread among consumers, it will be beneficial to have more bread varieties in the baker and grocery stores. In the field of research, consumers need surplus bread, causing stale. Due to the tendency of fresh bread consumption in Turkish society, bread intake according to every meal requirement will be beneficial in reducing waste. Storing the bread to be consumed in the next meal in good conditions and packaging will reduce the loss and quality losses. Information and awareness studies should be carried out for consumers in different ways to evaluate the bread that is not consumed fresh and stale. In the consumption of bread during the day, storing in packaging and in good conditions will reduce the deterioration and poor appearance of the bailing, and those reasons are less wasted.

In the field of research, the amount of waste in the bread is greater than in other regions of Turkey. In this region, it is important to develop the production technique in a way that reduces the waste of bread, produces smaller weight bread, and retains its freshness and quality for a long time. In the research area with a warmer climate, the shelf life seems to be a need for long, late-running, freshness, quality and the development of bread varieties that can preserve its appearance for a long time. In

preventing the waste of bread, producers should pay attention to the use of high-quality materials, comply with hygiene, and health conditions at the production site and perform adequate inspections at all stages of production to consume, improve production quality and it will reduce waste. It will be beneficial to encourage and inform consumers about the healthy and nutrient-rich bread varieties in terms of nutrition. In the region of Hatay, the quality criterion considered as the appropriate cooking, suitable taste and freshness for a long time to protect the subjects such as, should be taken into consideration by producers. Consumer associations, local governments, bread producers and retailers should make a joint study in the way that stale bread is not thrown away and evaluated in various ways.

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