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Research Article
Assessment of the Bread Consumption Habits Among the People of Riyadh, Saudi Arabia

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Abstract

Background: Bread is an important component of the diet and is widely consumed among Saudi families. **Objective:** This study evaluates the frequency and patterns of bread consumption among people living in Riyadh. **Methodology:** A total of 525 residents and 105 bakeries were surveyed. **Results:** Within the demographic data that were collected regarding the participants, the attained levels of education were found to vary significantly ($p \leq 0.05$) among the parents, with fathers having higher educational levels than mothers. The results revealed that bread eating habits relate to the mothers because they are responsible for preparing meals. The frequency of consumption of bread was observed to be high, with more than 60% of the surveyed respondents reporting that they consumed 1-2 servings of bread daily. Almost half of the participants (49.42%) consumed bread as part of breakfast. Samouli was the most frequently consumed type of bread (34.90%), followed by mafrood (24.80%). Nearly 60% of the studied participants consumed white flour bread; subjects consuming whole wheat flour and bran bread represented only 11.82 and 2.52%, respectively. Approximately 80% of the bakeries used plastic bags as the packaging material for bread. Most health and safety rules and regulations were followed in the bakeries, with only a few exceptions. **Conclusion:** In conclusion, the results concerning the preparation, purchasing and consumption patterns of bread in Riyadh suggested that it plays a dominant role in the diets of people living in the city.

Key words: Bakeries, bread consumption patterns, mafrood, samouli, tamees

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Competing Interest: The author has declared that no competing interest exists.

Data Availability: All relevant data are within the paper and its supporting information files.

INTRODUCTION

Bread wheat (*Triticum aestivum* L.) is an important and widely cultivated crop worldwide that has played a vital role in fighting hunger and supporting global food security[1,2]. It is considered an essential crop in Saudi Arabia and the country has planned for self-sufficiency with respect to its production[3]. Wheat is an important component of the Saudi diet and is used in bread making, forms 64% of the country's total available cereals, further, its per capita consumption is estimated[4] to be 298 g day^{-1}. The bread making, selling and consumption in the country depend primarily on the wheat grains and the total wheat consumption in Saudi Arabia in 2014/15 was estimated to be approximately 3.35 million metric tons[4].

The nutritional value of bread depends on the quality and extraction percentage of wheat flour and whole wheat bread tends to be more nutritious than bread made with white flour[5]. However, most of the bread consumed in Saudi Arabia is made from white flour. In recent years, there has been an increasing demand for whole wheat flour owing to its apparent health benefits, principally by health-conscious consumers and those with a health condition such as diabetes or obesity[4]. The types of wheat bread (i.e., burr, tamees, tannouri, mafrood, samouli, white sliced loaf and brown sliced loaf) that are most commonly consumed in Saudi Arabia are broadly composed (per 100 g) of 26.4-37.7 g moisture content, 8.7-10.4 g protein, 0.4-2.4 g fat, 0.6-2.2 g ash, 1.8-4.8 g fiber and 235-288 kcal energy[5], which suggests that the range and levels of nutrients depend on the particular type of bread.

Despite the high nutritional composition of bread and its principal role in Saudi diets, studies concerning the national consumption trends are scarce[6]. An earlier study on the consumption pattern of bread in the wider Riyadh area affirmed that it is exceptionally important in the diet of Saudi families[6]. However, updated information on bread consumption trends in Riyadh was required due to the changing food habits and lifestyles, which might affect the bread consumption patterns in this dynamic city. Therefore, the primary aim of the present study was to estimate and analyze the bread consumption rates and habits among people living in the city of Riyadh.

MATERIALS AND METHODS

There are many types of bread consumed in the Kingdom of Saudi Arabia including samouli, toast, mafrood, Arabic bread, tamees and french bread. These types of bread were studied in terms of their aspects and physical characteristics. The size of bread was different between commercial bakeries.

Study area: This study was conducted in the city of Riyadh (latitude, 24.71° N, longitude, 46.68° E, altitude, 638 m), the capital of the Kingdom of Saudi Arabia from April 2011 through May 2011.

Design

Participants: To discover the bread-buying and consumption habits among people living in Riyadh, questionnaires were constructed and randomly distributed to 525 students from three different universities in the city. The data were collected through personal interviews with the heads of households using the structured questionnaire, which included information on education levels of the family, eating habits with respect to bread (number of servings per day and each week, consumption during meals, preferred types of bread and the flour used in bread making) and the places and times of buying and storing bread.

Bakeries: To evaluate the safety and trading of bread in Riyadh, a total of 105 bakeries were randomly selected, representing different areas and distributed according to the following geographical regions: 27 bakeries (25.71%) from Northern Riyadh, 32 (30.48%) from Eastern Riyadh, 14 (13.33%) from Western Riyadh, 16 (15.24%) from Southern Riyadh and 16 (15.24%) from the center of the city. A questionnaire was constructed to collect information about each bakery's size, type, product packaging materials used, bread making, bread handling, the safety of baking conditions and materials and the safety provided for and demonstrated by the bakery's staff. The data were collected using in-person interviews with each bakery's manager and employees and the questionnaires were completed, returned and analyzed.

Statistical analysis: The Statistical Package for Social Sciences (SPSS Inc., Chicago, IL, USA) version 17 was used for data analysis. The results were expressed as the means±standard deviations. All of the analyzed variables were non-parametric and were tested using chi-squared tests. All reported p values were determined using two-tailed tests. Differences were considered statistically significant at $p<0.05$.

RESULTS AND DISCUSSION

To aid in identifying the socioeconomic backgrounds of the participants, the education levels of their parents were evaluated. The results showed

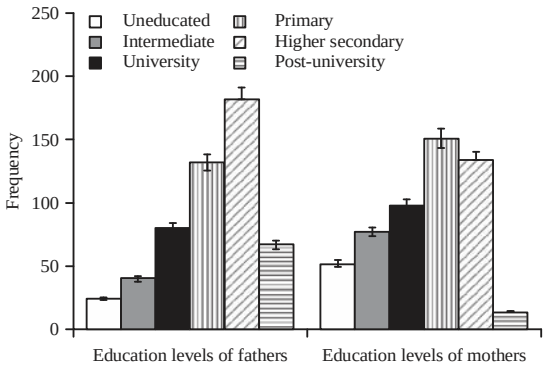

Fig. 1: Educational profile of fathers and mothers of surveyed participants in Riyadh City, Saudi Arabia

Table 1: Bread consumption habits of participants

Parameters	Total	%
Servings consumed per day		
Fewer than 1	164.00	31.27
1-2	339.00	64.48
3 or more	22.00	4.25
Frequency of consumption per week		
1-3 times	115.00	21.90
4-6 times	93.00	17.71
7 (daily)	317.00	60.39
Frequency of consumption during meals		
Breakfast	259.00	49.42
Lunch	74.00	14.09
Dinner	136.00	25.87
Between meals	56.00	10.62
Types of bread consumed		
Samouli	183.00	34.90
Mafrood	130.00	24.80
Toast	123.00	23.50
Arabic bread	78.00	14.80
Tamees	4.00	0.70
French bread	7.00	1.30
Type of flour used in bread consumed		
Whole wheat flour bread (Burr)	62.00	11.81
White flour bread	314.00	59.81
Whole and white flour bread	135.00	25.71
Bran bread	14.00	2.67
Participant disliked whole wheat flour / bran bread because of its		
Brown color	160.00	30.48
Dryness	251.00	47.15
Indigestibility	70.00	13.31
Taste	44.00	8.42

differences between the educational attainment levels of the participants fathers and mothers (Fig. 1). A significant percentage of fathers (34.58%) ($p \leq 0.05$) had attained university educational level and a significant percentage of mothers (28.76%) ($p \leq 0.05$) had attained a higher secondary school education. In addition, a significant ($p \leq 0.05$) number of fathers had attained a post-university-level of education compared to mothers. Similar observations concerning the higher education levels of fathers compared to mothers have been reported in a survey on the bread consumption habits among households in Adana Province, Turkey[7]. In the current study, it is noteworthy that the number of uneducated mothers was higher ($p \leq 0.05$) than the number of uneducated fathers, which could be germane to the bread-eating habits of the family because mothers are typically responsible for preparing meals.

Table 1 shows the bread consumption profiles of people living in Riyadh. The results concerning the number of servings of bread per day indicated that most of the respondents (64.48%) consumed one or two bread portions daily but a substantial number of them (31.27%) consumed fewer than one portion daily. Only a small number (4.25%) of respondents reported consuming three or more servings of bread daily. From these results, it can be inferred that the consumption of bread among people living in Riyadh is high because most of the studied participants consumed one or two servings of bread every day.

Table 1 also shows that most of the surveyed participants (60.54%) consumed bread every day of the week, which confirmed a high consumption rate of bread among people living in Riyadh. Similarly, an earlier study reported that almost all households in the city consumed bread at least once a day and that more than 66% served it three times a day[6]. Pomeranz[8] also reported high annual bread consumption in many other countries, such as Libya, Bulgaria, Egypt, Algeria, Morocco and Greece, at rates of 200, 164, 162, 160, 153 and 128 kg $year^{-1}$ $capita^{-1}$, respectively. Furthermore, a food consumption survey in urban Lebanon showed that bread was the most highly consumed (146 g day^{-1}) cereal-based food, providing 35% of the daily energy intake[9].

Analysis of bread consumption during meals as detailed in Table 1, shows that approximately one half of the participants (49.42%) consumed bread as part of breakfast, followed by 25.87% doing so during dinner, 14.09% at lunch and 10.62% between meals. In contrast, Al-Mohizea *et al.*[6] reported that the consumption of bread in the Riyadh area was higher during dinner than at breakfast. This discrepancy between the current study and the prior work may indicate a developing awareness of people living in Riyadh about the effect of food consumption habits on their health. The present finding that bread is increasingly being consumed as part of breakfast is notable because bread can supply the body with the required amounts of energy needed during the day. Conversely, consuming bread at dinner time is not recommended because this is the last meal of the day and

thus, the amount of carbohydrates consumed should be the least of all the meals to ensure and maintain overall health.

Among the common bread types consumed in Riyadh during the study, samouli was consumed most frequently (34.90%), followed by mafrood (24.80%) and toast (23.50%) and tamees (0.70%) was the least consumed type of bread (Table 1). The greater quantities of samouli and mafrood were consumed in the city might be related to the fact that both of these types of bread are readily available in most supermarkets and grocery stores and are thus easy to obtain. In agreement with present findings, previous research also found that mafrood and samouli were the most frequently consumed bread types in the Riyadh area, mafrood consumed in three meals each day and samouli most commonly consumed at breakfast[6]. The authors of the earlier study attributed the popularity of consuming samouli for breakfast and other meals to the suitability of this bread type for making a sandwich[6].

The results presented in Table 1 also show that most of the participants in present study consumed bread made with white flour (59.88%) as opposed to healthier breads made with whole wheat flour (11.82%) or bran (2.52%). Most of the participants attributed their dislike of whole wheat flour and bran breads to their relative dryness (47.15%) and browner color (30.53%) compared to white flour bread, which is perceived to be softer and more appealing in color. Similarly, a recent study on the consumption of whole grains and their products in Saudi Arabia inferred that the daily consumption of whole grains and their products remains low nationally because the studied participants did not like the taste of whole grains and whole grain products[10]. The preference for white bread over whole bread might be related to the socioeconomic status of the people living in Riyadh as high-income people seemingly prefer white bread to the whole wheat flour alternative. Interestingly, in Finland, rye bread consumption was found to be consistently associated with low educational attainment levels and a rural place of residence and the consumption of white bread was associated with low educational attainment. In contrast to rye bread, the consumption of white bread was correlated with an urban place of residence[11]. Meanwhile, the results indicated that the appearance of a bread affects its appeal to consumers in Riyadh, therefore, more attention should be directed towards enhancing the look of healthier breads and increasing consumer awareness concerning the health benefits of whole wheat flour and bran breads.

Table 2 presents the results related to bread buying and storage by the surveyed respondents in Riyadh. Most of the participants (60.54%) bought bread daily and the rest of participants (39.46%) purchased bread between two and six times a week, which supports the earlier finding of a high overall consumption of bread by residents of Riyadh. Elsewhere, similarly high purchasing and consumption rates of bread have been reported for people living in Adana Province, Turkey[7]. In addition, Al-Mohizea *et al.*[6] indicated that the purchasing and consumption of bread in the Riyadh area was very high and correlated positively with the income of the family. However, it is commonly accepted that bread consumption decreases as income increases because consumers with a higher income will likely switch to more expensive foods rather than buying bread[6,7]. Most of the participants bought their bread from bakeries (35.91%), followed by different places (33.20%) and the fewest respondents (2.51%) bought bread from a complex . These results are similar to the purchasing and consumption of bread by individuals in Adana Province, Turkey, where most people buy their bread from bakeries and grocery stores[7].

Table 2: Purchasing and storage of bread by participants

Parameters	Total	%
Frequency of purchasing per week		
7 times (daily)	318.00	60.54
6 times	45.00	8.51
5 times	48.00	9.09
3 times	58.00	11.03
2 times	56.00	10.83
Places of purchasing		
Grocery	84.00	16.02
Supermarket	65.00	12.36
Complex	13.00	2.51
Bakery	189.00	35.91
Different places	174.00	33.20
Storage method		
At room temperature	201.00	38.30
In a refrigerator	139.00	26.50
In a freezer	95.00	18.10
In both a refrigerator and a freezer	90.00	17.10
No. of days bread was stored		
1	150.00	28.57
2	164.00	31.23
3	108.00	20.56
More than 3	103.00	19.61
No. of days bread was stored at room temperature		
1	333.00	63.43
2-3	157.00	29.91
More than 3	35.00	6.66

Gul *et al.*[7] reported that freshness is the most important factor affecting preference for the bread-purchasing location in Adana Province, Turkey, followed by the distance to the store or other retail outlet and the price of the bread. At the participant's homes, bread was stored under different conditions, with 'at room temperature' being the most common (38.30%), followed by 'in the refrigerator' and 'in the freezer' (Table 2). Under these conditions, approximately

60% of the participants preserved bread for one or two days, whereas the remainder (40%) preserved it for three days or more. During the summer in Riyadh, the temperature is greater than 45°C, therefore, the preservation of bread at room temperature should be avoided or at least kept to a minimum. More than 63% of the participants indicated that they would store bread at room temperature for only one day and approximately 30% said that they would store bread at room temperature for two or three days. However, storing bread for more than two days at room temperature resulted in its deterioration, with most of the participants observing changes in the color, taste and smell of the bread.

In order to understand the complete process of bread production and any allied safety issues concerning the industry in Riyadh, 105 bakeries in the city were surveyed. The results, listed in Table 3, show that approximately 67.62% of the bakeries in Riyadh city were automatic and 32.38% of them were manual. Most bakeries were medium to large in size (83.81%) and only a few small bakeries (16.19%) were documented. These results suggested that the bread-making industry in Riyadh is oriented to meet the high demands for bread by a large number of its residents. The automation of bread making in the Kingdom of Saudi Arabia has long been practiced for the production of various types of bread, including samouli and mafrood[12].

Table 3: Bakery characteristics

Parameters	Total	%
Bakery type		
Automatic	71.00	67.62
Manual	34.00	32.38
Bakery size		
Large	37.00	35.24
Medium	51.00	48.57
Small	17.00	16.19
Bread packaging materials		
No packaging	8.00	7.62
Paper	3.00	2.86
Newspaper	1.00	0.95
Plastic bag	84.00	80.00
Carton	9.00	8.57

As one of the major safety issues, the packaging materials used for bread at the bakeries were investigated in the present study and the results indicated that approximately 80% of the bakeries used plastic bags for this purpose (Table 3). However, some bakeries do not cover the bread at all, whereas others use cartons, paper, or newspapers.

Safety considerations for the preparation and handling of bread in the bakeries represent another critical issue, accordingly, we investigated the surveyed bakeries regarding safety issues. The results, detailed in Table 4, indicate that most of the critical safety rules and regulations were followed in the bakeries, with only a few exceptions. Overall, the bakeries were observed to be clean and well-ventilated, had no signs of humidity and contained several security and safety features. Additionally, the baking sheets were clean and made of appropriate high-quality materials and the bread was covered after baking. However, some shortcomings were found, such as the dough not being covered during fermentation and the bread being immediately packed after baking. Both conditions could lead to contamination of the

Table 4: Safety issues concerning the preparation and handling of bread inside bakeries

Issues	Yes	%*	No	%*
Safety of the bakeries and bread making and handling				
Is the bakery well ventilated?	82.00	78.10	18.00	24.90
Are there methods of insect and pest control?	72.00	68.57	28.00	31.43
Are the furnaces valid for operation?	64.00	60.95	36.00	39.05
Is the bakery clean inside?	95.00	90.48	5.00	9.52
Is there any source of moisture inside the bakery?	32.00	35.24	68.00	64.76
Is the dough covered during fermentation?	48.00	45.71	52.00	54.29
Is the bread packed immediately after baking?	74.00	70.48	26.00	29.52
Are the baking sheets clean?	59.00	56.19	41.00	43.81
Is the baking sheet material of good quality?	84.00	80.00	16.00	20.00
Are there bread displays in the bakery that lack covering?	29.00	27.62	71.00	72.38
Are there features of security and safety in place at the bakery?	67.00	63.81	33.00	36.19
Safety of the bakery workers				
Are there a suitable number of workers in the bakery?	97.00	92.38	3.00	7.62
Do the workers have health cards?	85.00	80.95	15.00	19.05
Are the workers wearing head scarves/coverings?	39.00	37.14	61.00	62.86
Are the workers wearing gloves?	49.00	46.67	51.00	53.33
Are the workers wearing specialist clothes?	85.00	80.95	15.00	19.05
Are the workers wearing clean clothes?	77.00	73.33	23.00	26.67
Are the workers smoking in the bakery?	14.00	18.10	86.00	81.90

*Total bakeries 105

bread, whether from dust or from the chemicals that might be released from the plastic materials used for packaging and thus, may ultimately affect the consumers' health.

Regarding the safety of bakery workers, the results demonstrated that most of the safety rules were followed, with some notable exceptions (Table 4). The number of employees in the bakeries were deemed to be sufficient (92.38%) and most of them had health certificates (80.95%), wore specialist (80.95%) and clean (73.33%) clothing and did not smoke in the bakery (81.90%). However, most did not wear gloves (53.33%) or headscarves/coverings (62.86%), which could lead to contamination of the bread with transmittable organisms and other contaminants. Accordingly, considerable attention should be directed toward these failings. Overall, the studied bakeries in Riyadh applied the majority of the measured safety rules during the making and handling of bread. The present findings suggest the need for strategies and coordinated efforts at all levels (family, university, community and government) to promote healthy eating habits and safety during the making and handling of bread. One limitation of this study, however, is that only information about bread safety was provided. Therefore, further research is suggested on supplementation for bread and the corresponding safety concerns.

CONCLUSION

This study assessed the bread consumption habits of people living in the city of Riyadh and provided definitive information on the importance of bread to those living in this area. Bread was found to be a main dietary component of the people surveyed, the majority of whom reported that they consumed it daily. The results indicated a preference for samouli, mafrood and toast, which confirmed the status of these types of bread in the diet of the residents of Riyadh city. Further studies should specifically address the technological, nutritional and marketing characteristics pertaining to the bread types identified as important in the present study.

SIGNIFICANCE STATEMENT

This study discovered that bread is a main component in the diet of Saudis and can be beneficial for making substantial progress in many areas of health. This study will help researchers to uncover the critical areas of contamination and supplementation for bread that many researchers were not able to explore. Thus, a new theory regarding this food item may be discovered.

REFERENCES

1. Bordes, J., G. Branlard, F.X. Oury, G. Charmet and F. Balfourier, 2008. Agronomic characteristics, grain quality and flour rheology of 372 bread wheats in a worldwide core collection. J. Cereal Sci., 48: 569-579.
2. Mutwali, N.I.A., A.I. Mustafa, Y.S.A. Gorafi and I.A.M. Ahmed, 2016. Effect of environment and genotypes on the physicochemical quality of the grains of newly developed wheat inbred lines. Food Sci. Nutr., 4: 508-520.
3. Al-Otayk, S.M., 2010. Performance of yield and stability of wheat genotypes under high stress environments of the Central Region of Saudi Arabia. JKAU: Meteorol. Enviorn. Arid Land Agric. Sci., 21: 81-92.
4. Ahmed, H.F. and H. Mousa, 2016. Saudi Arabia: Grain and feed annual 2016. GAIN Report No. SA1602. Global Agricultural Information Network. USDA Foreign Agricultural Service.
5. Al-Kanhal, M.A., I.S. Al-Mohizea, A.I. Al-Othaimeen and M.A. Khan, 1999. Nutritive value of various breads in Saudi Arabia. Int. J. Food Sci. Nutr., 50: 345-349.
6. Al-Mohizea, I.S., E.I. Mousa and M.A. Al-Kanhal, 1995. Bread consumption pattern in Riyadh area. Bull. Fac. Agric. Univ. Cairo, 46: 417-428.
7. Gul, A., H. Isik, T. Bal and S. Ozer, 2003. Bread consumption and waste of households in urban area of Adana province. Electron. J. Polish Agric. Univ., Vol. 6, No. 2.
8. Pomeranz, Y., 1988. Wheat Chemistry and Technology. 3rd Edn., American Association Cereal Chemists, USA.
9. Nasreddine, L., N. Hwalla, A. Sibai, M. Hamze and D. Parent-Massin, 2006. Food consumption patterns in an adult urban population in Beirut, Lebanon. Public Health Nutr., 9: 194-203.
10. Al Tamimi, J.Z., 2016. Consumption of whole grains by a sample of Saudi adults. Int. J. Nutr. Food Sci., 5: 117-123.
11. Prattala, R., V. Helasoja and H. Mykkanen, 2001. The consumption of rye bread and white bread as dimensions of health lifestyles in Finland. Public Health Nutr., 4: 813-819.
12. Mousa, E.I. and I.S. Al-Mohizea, 1987. Bread baking in Saudi Arabia. Cereal Foods World Res., 32: 614-619.