



Research Article

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Availability of Healthy Food in Different Categories of Markets

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ABSTRACT

Objectives: The study is aimed at assessing and comparing the availability of healthy food among different types of markets; the price of healthy food between supermarkets, groceries and convenience stores; as well as the presence of the section that only contains healthy food. **Methods:** We divided markets into three categories (Supermarkets, Grocery stores, and Convenience stores) and divided Riyadh into 4 regions to ensure that the data represents the whole regions of Riyadh. The data was entered to Microsoft Excel 2010, and then transferred to Statistical Package for the Social Sciences (SPSS). Percentage was used to assess the level of the availability of healthy food and Chi-square was used to test for statistical differences. ANOVA and Post Hoc tests were used to assess the presence in difference of the price of healthy food. **Results:** Availability of healthy food items differs based on the size of the stores. Large stores contain more vegetables and fruit groups than small stores. Only drinks group showed no significant difference (p -value 0.465) with the highest percentage of availability among other groups; while, miscellaneous group showed the least percentage of availability between different markets. The difference in price between the three different commercial outlets is not significant except in meat group. Healthy food sections were found in two out of sixty markets. **Conclusion:** Availability of healthy food items increases with the increase of stores' size. There is no price difference between different markets except meat group. Healthy food sections were found in two out of sixty markets.

Key words: Healthy food, healthy food cost, less healthy food cost, nutrition.

INTRODUCTION

Sedentary lifestyle and unhealthy food consumption are major causes of obesity. Ministry of Health reports that obesity is a major contributor to many diseases including high blood pressure, diabetes, heart diseases and cancer. From 2010 to 2013, the prevalence of obesity increased in Saudi population from 11.8% to 24.1% in males and from 11.1% to 33.5% in females. [1] According to World Health Organization (WHO), 39% of adults aged 18 years and over were overweight and 13% were obese in 2014. Overweight is defined as a body mass index (BMI) greater than or equal to 25 and obesity is defined as a body mass index (BMI) greater than or equal to 30. [2] A systematic review of randomized controlled trials assessed the relation between physical activity and healthier diet and their effect on type 2 diabetes and found that combination of physical activity and healthier diet reduced the risk of type 2 diabetes. [3] In addition, the prevalence of high blood glucose in Saudi population is 10% for males and 7.8% for females. [4] The worldwide prevalence of diabetes was increased since 1980 to 2014 from 4.7% to 8.5% in adults over 18 years old. [5] A study conducted in U.S. in urban areas made a cross-city comparison of healthy food availability within small food stores which revealed a limited availability. [6] Another study conducted in a rural area showed that there is an overwhelming increase in the number of convenience stores

and less healthful food choices compared to other food store sizes. [7] Small grocery stores within neighborhoods had a limited access to whole grain products, and low-fat cheese. [8] A study which assessed the availability of healthy food items in groceries, convenience stores and restaurants revealed that healthier food options were more accessible in groceries when compared to convenience stores. The restaurants had limited number of healthy food items. [9] Various strategies were done to improve the consumer knowledge and affect their dietary behavior using shelf labels, posters and increasing the availability of healthy food. [10] Many studies showed the difference in availability of healthy food in different parts of the world but none were conducted in Saudi Arabia. Large sized stores are expected to have increased availability compared to small sized stores in Saudi Arabia with less price. In this study, our aim is to compare the availability and price of healthy food, and the presence of healthy food sections in different commercial outlets.

Easier access to healthy diet is needed to control non-communicable diseases that are caused by unhealthy food and increase the overall wellbeing of the community. The results of this study will help identify if there is a shortage of healthy food items and variation in price among different commercial outlets that might influence the access to healthy food items and help the government to increase healthy food and make it easily accessible. Without the availability of healthy food, a healthy diet is out of reach. Furthermore, improved sales of healthy food within groceries will give an incentive to companies to invest more in making healthy food available.

MATERIALS AND METHODS:

Subjects:

The study enrolled 60 markets, 40 convenience stores, 11 grocery stores, and 9 supermarkets. This is a quantitative, observational cross-sectional study. It has been conducted for the first time in Riyadh, Saudi Arabia from May to October 2017. We targeted three different commercial outlets (groceries, convenience stores and well-known supermarkets). We included the healthy food and excluded the less healthy food based on the amount of sugar, calories fibers, salt and fat. The food items were classified into 9 groups (Table1), fresh meat was included while processed meat was excluded; low fat dairy products were included and full fat dairy products were excluded; brown and bran grains were included and white bread and rice were excluded; fresh fruit with low sugar was included while fresh fruit with high sugar and canned fruits was excluded; fresh vegetables were included and canned vegetables were excluded; oats chocolate bars snack and wheat date mammal were included and chocolate-based products, cookies, nuts, and chips snacks were excluded; and drinks and sweeteners were included. The research protocol was approved by the Institutional Review Board, College of Medicine and KCUH. There were no human participants; therefore, no violation of human rights was expected. There was no conflict of interest and no funding source. Ethical approval to conduct the study was provided by the ethical committee of the College of Medicine at King Saud University, Riyadh, Saudi Arabia. Using Google map, we divided Riyadh into 4 regions, North West, North East, South West, and South East. Due to the lack of stores population data in Riyadh, the sample was selected using convenience sampling method.

Table 1: The summary of the healthy food items

Groups	Examples
Meat	Fresh meats (E.g., chicken, lamb, veal, camel, fish, shrimp)
Dairy Product	Low fat dairy products (for example, laban, milk, labnah, ayran)
Grains	Bran based grains (bread, and corn flicks)
Snacks	Oats chocolate bars
Grains	Bran based grains (bread, and corn flicks)
Fruit	Fresh fruits with low sugar contents (E.g., orange, apple, lemon, and so forth)
Vegetables	Fresh fruits with low sugar contents (E.g, orange, apple, lemon, and so forth)
Drink	Diet 7UP
Miscellaneous	Sweeteners

Data collection:

We designed a questionnaire to assess the availability, price of healthy food items and presence of healthy food sections. The questionnaire was carried out by 5 trained investigators by inspecting the availability, price of

healthy food items and presence of healthy food sections. We divided Riyadh into 4 regions: North West, North East, South West, and South East and each investigator was assigned to a specific region to ensure that the data represents the whole regions of Riyadh. The data was entered to Microsoft Excel 2010, and then transferred to Statistical Package for the Social Sciences (SPSS).

Statistical methods of analysis:

Percentage was used to assess the level of availability of healthy food in different outlets. Chi-square was used to test the statistical difference in availability within different categories of outlets. ANOVA test and Post HOC test were used to assess the presence in difference of prices of healthy foods within the three comparison groups.

RESULTS:

A total of 49 healthy food items were classified into 9 groups to assess the availability and price of healthy food items and presence of specific healthy food sections within three different commercial outlets, supermarket, groceries and convenience stores as shown in Table 1. Table 2 compares the availability of healthy food items and shows that healthy food is more available in large markets compared to small markets. There was a statistically significant difference between the availability of healthy food among the three different commercial outlets, indicating that there is a shortage of healthy food items among different commercial outlets especially regarding vegetables and fruits groups. The study showed that the presence of vegetables among supermarkets was 91.3%, groceries 49.4% and convenience stores 2.5%. Additionally, the presence of fruit within supermarkets was 92.5%, groceries 37.9% and convenience stores 2.5%. Only drinks group showed no significant difference (p-value 0.465) with the highest percentage of availability among other groups (100.00% supermarket, 90.9% groceries and 97.5% convenience stores). Miscellaneous group showed the least percentage of availability between different markets, 55.6% supermarket, 0.0% groceries and 2.5% convenience stores. Healthy food sections were available in two markets over all the 60 markets. Tables 3 compares the price of healthy food items. The difference in price between the three different commercial outlets is not significant except in meat group. There was a statistically significant difference at the < 0.05 . Post-hoc comparisons using the LSD test indicated that the mean score for supermarket group ($M = 33.5157$, $SD = 24.91421$) was significantly different from convenience store group ($M = 12.3690$, $SD = 2.85217$) and the mean score for groceries ($M = 24.6050$, $SD = 29.04590$) was significantly different from convenience store ($M = 12.3690$, $SD = 2.85217$). Grocery group ($M = 24.6050$, $SD = 29.04590$) did not differ significantly from Supermarket group ($M = 33.5157$, $SD = 24.91421$).

Table 2. The availability of health food items

			Availability		P-value
			yes	no	
Meats	Supermarket	N	47	16	0.000016
		%	74.6%	25.4%	
	Groceries	N	19	58	
		%	24.7%	75.3%	
	Convenience store	N	42	238	
		%	15.0%	85.0%	
Dairy Products	Supermarket	N	50	13	0.000178
		%	79.4%	20.6%	
	Groceries	N	49	28	
		%	63.6%	36.4%	
	Convenience store	N	145	135	
		%	51.8%	48.2%	
Grains	Supermarket	N	24	12	0.000029
		%	66.7%	33.3%	
	Groceries	N	17	26	
		%	39.5%	60.5%	
	Convenience store	N	43	117	
		%	26.9%	73.1%	
Snacks	Supermarket	N	12	15	0.000152
		%	44.4%	55.6%	
	Groceries	N	8	25	
		%			

	Convenience store	%	24.2%	75.8%	0.465
		N	13	107	
Drinks	Supermarket	%	10.8%	89.2%	
		N	9	0	
	Groceries	%	100.0%	0.0%	
		N	10	1	
	Convenience store	%	90.9%	9.1%	
		N	39	1	
Fruits	Supermarket	%	97.5%	2.5%	
		N	99	8	
	Groceries	%	92.5%	7.5%	
		N	50	82	
	Convenience store	%	37.9%	62.1%	
		N	12	468	
Vegetables	Supermarket	%	2.5%	97.5%	
		N	115	11	
	Groceries	%	91.3%	8.7%	
		N	76	78	
	Convenience store	%	49.4%	50.6%	
		N	14	546	
Miscellaneous	Supermarket	%	2.5%	97.5%	
		N	5	4	
	Groceries	%	55.6%	44.4%	
		N	0	11	
	Convenience store	%	0.0%	100.0%	
		N	1	39	
		%	2.5%	97.5%	

Table 3. The price of meat items

ANOVA ^a					
Price					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	9937.061	2	4968.531	11.725	.000
Within Groups	44916.170	106	423.737		
Total	54853.232	108			

a. type = Meat

Table 4. Multiple Comparisons^a

Dependent Variable: Price						
LSD						
(I) factor1	(J) factor1	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Supermarket	Groceries	8.91074	5.49569	.108	-1.9850	19.8065
	Convenience store	21.14670*	4.37089	.000	12.4810	29.8124
Groceries	Supermarket	-8.91074	5.49569	.108	-19.8065	1.9850
	Convenience store	12.23595*	5.59248	.031	1.1483	23.3236
Convenience store	Supermarket	-21.14670*	4.37089	.000	-29.8124	-12.4810
	Groceries	-12.23595*	5.59248	.031	-23.3236	-1.1483

*. The mean difference is significant at the 0.05 level.

a. type = Meats

Table 5. The price of dairy products items

ANOVA ^a					
Price					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	4306119.876	2	2153059.938	1.946	.145
Within Groups	263257279.963	238	1106123.025		
Total	267563399.840	240			

a. type = Dairy Products

Table 6: The price of grains items

ANOVA ^a					
Price					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	20.624	2	10.312	.244	.784
Within Groups	3464.638	82	42.252		
Total	3485.262	84			

a. type = Grains

Table 7. The price of snacks items

ANOVA ^a					
Price					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	2.363	2	1.182	.194	.825
Within Groups	182.967	30	6.099		
Total	185.330	32			

a. type = Snacks

Table 8. The price of drinks items

ANOVA ^a					
Price					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.000	2	.000	.	.
Within Groups	.000	55	.000		
Total	.000	57			

a. type = Drinks

Table 9. The price of fruit items

ANOVA ^a					
Price					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	5.816	2	2.908	.148	.862
Within Groups	3135.665	160	19.598		
Total	3141.481	162			

a. type = Fruit

Table 10. The price of vegetables items

ANOVA ^a					
Price					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	52.206	2	26.103	.730	.483
Within Groups	7225.512	202	35.770		
Total	7277.718	204			
a. type = Vegetables					

Table 11. The price of miscellaneous items

ANOVA ^a					
Price					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	6.211	1	6.211	.116	.751
Within Groups	214.103	4	53.526		
Total	220.314	5			
a. type = Miscellaneous					

DISSCUSION AND RECOMMENDATION:

Consumption of unhealthy food plays a major role in body weight increase, and ministry of health reports that obesity is a major risk factor to many diseases including high blood pressure, diabetes, heart disease and cancers. [2] Obesity is increasing dramatically in Saudi Arabia population from 11.8% males to 24.1 and 11.1 to 33.5 in females. [1] This is the only study in Saudi Arabia that researched the availability of healthy food items to the best of our knowledge. Large markets have more available healthy food items while small markets have less or may not exist. This variation is likely to contribute to consumers' choice and might influence the access to healthy food items depending on different commercial outlets. Accordingly, we expect that people who live near to supermarkets may have better dietary intake which will improve their well-being. During our data collection, we faced difficulties finding healthy food. The presence of healthy food sections will save consumers' time and effort. The prices of Healthy food items were not different between large or small markets except for meat group. Supermarkets have higher prices compared to convenience stores. In addition, groceries have higher prices compared to convenience stores; while, supermarkets do not differ from grocery stores. This study will serve as an evidence to showcase the lack or presence of certain healthy food items and would encourage the government to support retailers in providing healthier choices in small markets especially fruit and vegetables. People use small markets on a daily basis, and it is the major reason that they cannot access healthy food easily. Many previous studies showed difference in availability of healthy food items based on stores' size. Three studies indicate an increase in availability of healthy food items with increasing stores size. [6, 7, 9] A US study showed healthy food items were substantially higher at small food stores with multiple aisles compared to a single aisle. [6] The presence of healthy food items were between 75% to 100% in supermarkets and groceries; while, it was 4% to 29% in convenience stores. The prices of healthy food items were higher in supermarkets and groceries than convenience stores. [7] The current study indicates that the availability of healthy food was more often in supermarkets, then grocery stores, and then convenience stores. Further investigation should include specialized markets that provide only healthy food items, and school canteen should be included as well. A survey should be conducted to assess the level of awareness about healthy food items. To the best of our knowledge, this study is the first of its kind conducted in Saudi Arabia. There are no records of the exact stores' population, which forced us to use convenience sampling as the sampling method.

CONCLUSION:

Healthy food items availability and price are the two main parameters that guide consumers' choice. Availability of healthy food items differs based on the size of the stores. Large stores contain healthy food items more than small stores. While the price of healthy food does not; except for meat group. Supermarkets and groceries have

higher price compared to convenience stores. Healthy food sections were found in two out of sixty markets. The finding of this study indicates the need to improve the availability of healthy food items in small markets to increase healthful eating. Since small markets are visited more by locals, health promoters primary focus should be on these small markets.

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