Business Analytics: Do Healthier Foods Cost Less?

Introduction

Most people have dietary habits that do not meet federal dietary recommendations. A common belief by these individuals is that healthier foods are more expensive than less healthy foods. The business question is, therefore, whether, contrary to popular belief, healthier foods cost less than less healthy foods. This study compares the pricing of healthier and less healthy foods using price metrics to answer the question.

"Healthy" in this context refers to an eating plan that emphasizes farm produce (vegetables, fruits, whole grains) and low-fat or fat-free milk and milk products (DGA, 2020). A healthy diet also includes protein foods like lean meat and poultry, seafood, legumes (peas and beans), eggs, nuts, soy products, and seeds (DGA, 2020). According to Herforth et al., (2020), "cost" refers to the amount required to purchase a basket of foods.

Analysis and Results

An Analysis of Variance (ANOVA) test is done to determine if there is a statistically significant difference in the average price of any of the food groups (Produce, Dairy and Eggs, Meat, Prepared Foods, Bread Rolls & Bakery, Desserts, Supplements, Frozen Foods).

SUMMARY

Groups	Count	Sum	Average	Variance
Produce	20	6781	339.05	29374.78684
Dairy and Eggs	24	15886	661.9166667	181265.0362
Meat	15	8657	577.1333333	93552.12381
Prepared Foods	17	16863	991.9411765	119034.5588
Bread Rolls & Bakery	23	12272	533.5652174	59596.62055
Desserts	21	15402	733.4285714	76115.55714
supplements	27	86073	3187.888889	4227964.103
Frozen Foods	21	72780	3465.714286	167278316.7
Meat1	26	23244	894	171874
Null	24	161.36	6.723333333	7.304057971

ANOVA

Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	294166862.9	9	32685206.99	1.958909388	0.045611	1.9251003
Within Groups	3470565355	208	16685410.36			
Total	3764732218	217				

The table above depicts there is a statistically significant difference in the price of two or more food groups, $F(9, 209) = 1.98$ $p < 0.05$.

However, a two-sample t-test comparison of healthy foods was conducted, in this case, Farm Produce ($M = 339.05$, $SD = 171.35$), and less healthy foods, such as Supplements ($M = 3187.89$, $SD = 2056.2$). Find the table below…

1	t-Test: Two-Sample Assuming Equal Variances		
2			
3		Produce	supplements
4	Mean	339.05	3187.888889
5	Variance	29374.78684	4227964.103
6	Observations	20	27
7	Pooled Variance	2455226.391	
8	Hypothesized Mean Difference	0	
9	df	45	
10	t Stat	-6.162686398	
11	P(T<=t) one-tail	0.00	
12	t Critical one-tail	1.679427393	
13	P(T<=t) two-tail	0.00	
14	t Critical two-tail	2.014103389	

Also, Desserts ($M = 733.42$, $SD = 275.89$), shows that the price of healthier foods is statistically significantly lower than the price of less healthy foods in the table below…

1	t-Test: Two-Sample Assuming Equal Variances				
2					
3		Produce	Desserts		
4	Mean	339.05	733.4285714		
5	Variance	29374.78684	76115.55714		275.8905
6	Observations	20	21		
7	Pooled Variance	53344.41264			
8	Hypothesized Mean	0			
9	df	39			
10	t Stat	-5.465143345			
11	P(T<=t) one-tail	1.43064E-06			
12	t Critical one-tail	1.684875122			
13	P(T<=t) two-tail	2.86128E-06			
14	t Critical two-tail	2.02269092			

A correlation testing was also conducted to ascertain the relationship between the dietary columns and the prices. This depicts all dietary food does not impact price. The result derived are as seen on the query table below…

category	subcategory	organic_Corr	lowsodium_Corr	vegan_Corr	lowfat_Corr	ketofriendly_Corr	kosher_Corr	paleofriendly_Corr	engine2_Corr	caloriesperserving_Corr	dairyfr...
Produce	Fresh Vegetables	0.38	-0.49	NULL	NULL	NULL	NULL	NULL	NULL	-0.49	NULL
Produce	Fresh Fruits	0.94	NULL	NULL	NULL	NULL	NULL	NULL	NULL	0.69	NULL
Dairy and Eggs	Butter & margarine	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL
Dairy and Eggs	Cheese	-0.3	-0.27	NULL	NULL	-0.31	NULL	NULL	NULL	-0.57	NULL
Dairy and Eggs	Eggs	1	NULL	NULL	NULL	0	-1	NULL	NULL	NULL	NULL
Dairy and Eggs	Yogurt	NULL	NULL	0.65	NULL	NULL	-0.21	NULL	NULL	0.8	0.21
Dairy and Eggs	Dairy alternatives	0.75	-0.83	0.2	NULL	0.15	0.75	-0.19	NULL	-0.3	NULL
Dairy and Eggs	Milk & cream	-0.3	0.04	NULL	0.3	-0.18	0.91	NULL	NULL	0.75	NULL
Meat	Turkey	0.59	0.46	NULL	-0.46	0.33	NULL	NULL	NULL	0	NULL
Meat	Chicken	-0.83	0.08	NULL	0.25	0.04	NULL	NULL	NULL	-0.28	NULL
Meat	Bacon	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL
Meat	Hotdogs & Sausage	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL
Meat	Meat alternatives	-0.57	-0.67	NULL	-0.01	-0.19	-0.25	-0.11	-0.66	0.7	NULL
Meat	Pork	NULL	-0.49	NULL	NULL	-0.11	NULL	0.19	NULL	0.22	NULL
Prepared Foods	Prepared meals	NULL	NULL	-0.59	-0.53	NULL	NULL	NULL	NULL	0.46	0.53
Prepared Foods	Prepared soups ...	NULL	NULL	-0.12	-0.12	-0.12	NULL	-0.12	NULL	0.17	0.32

Actionable Insights

Whole Food company should use a strategy recommended by Julia, (2017) to improve the sale of its healthy food products. That is, a complete strategy aimed at making the purchase of healthy foods "Convenient, Appealing, and Normal (CAN)" for customers.

The company should also sensitize its customers to the benefits of healthy foods and debunk the misinterpretation that healthy foods are expensive (Lusk, 2019). Lastly, the company should conduct more healthy food promotion and marketing (Elizabeth, 2020). This should be done after determining the most effective marketing strategy for improving healthy food purchases.

NOTE: Although, I do not think correlation is the best test to use, otherwise requests going beyond the numbers. the aspects such as a correlation in the data may mean that Whole Foods is already taking advantage of a trend. Therefore, may not be accurate to answer the research question if need to offer something new where feasible. Correlation would be useful if we wanted to check the relationship between healthy foods and cost, but here we are trying to find the differences in cost between healthy and less healthy foods. We can't also use correlation because to run a correlation test you need two continuous variables which isn't the case here. That is why I've used ANOVA (to determine if there is a statistically significant difference in the cost of different foods) and t-test.

References

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