

Whole Foods: Do healthier foods cost less?

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Business Analysis with Structured Data - DAT-7470 - FMBAN1

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December 9, 2022

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In this paper, healthy food has been defined as a product that has any one of the special diets: organic, sugar-conscious, whole foods diet, low sodium, low fat, engine-2, which have been shortlisted from the pool of thirteen special diets mentioned in the fmban_sql_analysis database basis online research. Vegan, gluten-free, vegetarian, dairy-free and kosher have not been considered as healthy because either they are a practice followed due to someone's belief (vegan/vegetarian/kosher) or followed because one is suffering a disease or being intolerant to the substance like dairy and gluten and hence have nothing to do with 'healthy' which we are trying to analyze in this assignment.

Keto-friendly is also not being considered healthy as studies have shown that it can lead to numerous potential health risks like nutrient deficiency and liver problems (Harvard Health, 2020). Paleo friendly is also not being considered healthy as research has pointed to the potential health risk of the diet (The Nutrition Source, 2022).

For this assignment, organic (Time, 2017), sugar-conscious (American Heart Association, 2021), whole foods diet, low sodium (Komaroff, 2022), low fat, engine-2 (Muinos, 2021) have been considered as diets which are healthy and if a product/food complies by any of these, it will be considered as healthy food.

The cost comparison metrics that has been taken here is price per serving as this metric allows for a comparison to be made between different foods in the way the consumers will consume the food i.e., as per the serving size (Jonas & Monsivais, 2016).

The products were first grouped into healthy and unhealthy groups basis if any one of the special diets which are healthy (as defined above) are present or not and means were compared at an overall level for the groups and at a category level and then one-tailed t-test was performed to

determine whether there is a significant difference in mean price per serving of the groups and hence determine whether healthier foods cost more.

Simple mean comparison of healthy and unhealthy food groups, show that at an overall level healthy food group has a higher mean of price per serving than unhealthy food groups indicating that healthy food is costlier (See Appendix A). We will next perform the t-test to check whether this finding is statistically significant.

The t-test hypothesis testing result show that healthy foods are costlier, and the result was statistically significant. On average, healthier foods were \$2.05 more expensive per serving than less healthy choices (95% CI \$3.70to \$5.75). When the same analysis was performed at a category level for those categories which had a certain sample size for both healthy and unhealthy groups, we find that healthy beers, bread rolls & bakery products and desserts are costlier than unhealthy options. However, for frozen foods, prepared foods, supplements and wines, unhealthy options are costlier than healthy options. Beverages, dairy and eggs, meat, produce and snacks & chips did not have/had single samples in the unhealthy group to perform the analysis (See Appendix B).

Business Insights

Promote bulk buying. With rising costs of food and beverages, consumers have already started feeling the pinch of inflation, with Innova reporting that about 62% consumers have noticed the rising costs in the last 12 months (Foodingredientsfirst, 2022). To counter this, consumers are actively looking for 'affordable nutrition' with bulk buying, opting for private labels, cooking from scratch, reducing spending on luxury items, and purchasing fewer items as key consumer behaviors being demonstrated in this environment (Foodingredientsfirst, 2022).

Whole Foods database shows that most of the categories have a mean number of servings per product in the range of 1 to 8 (if we remove supplements and beverages since supplements are tablets

with a high quantity per product and a low serving size, it might not be the right category to look at), which translates into 1 to 3 days(maximum) of consumption per family considering the average US family size of 3.15 (See Appendix C). Similarly for beverages, the mean serving for the category is 16 which will lead to the consumption happening in 5 days assuming one consumption per family member per day, which again is low for a fast-churning category like beverages. This indicates that majority of Whole Foods assortments in the said categories do not have many options for bulk buying. Hence, Whole Foods can look at leveraging the growing need of 'affordable nutrition' by providing an assortment of products for bulk buying.

Providing an option for bulk buying can also help cement Whole Foods position as a brand that cares not only about consumers but also about the planet. Bulk packaging is known to be more recyclable, uses less material, resources, and energy to produce than smaller serve packaging (Trayak), thus can be a new story on how Whole Foods is putting efforts to be true to its values.

Sugar conscious assortment limited in the Desserts category. As per the database, there were zero products for sugar conscious diet in desserts (See Appendix D). Upon further checking on the Whole foods (Soma store) website, we found only 5 products in a product assortment of 583 dessert products (retrieved on 2022, Dec 9). This clearly points towards a gap in the dessert assortment. This becomes especially important when we look at the predicted trends for 2023 which shows that there is a shift expected towards naturally occurring sweeteners and pushback against sugar alternatives (Supermarket News, 2022), indicating that the consumer is monitoring their sugar intake and type of sugar going into their bodies. Hence, increasing the sugar conscious assortment, which is currently limited for an indulgent, sugar conscious category like desserts can help boost consumer purchase of the category.

Introduce low sodium products in prepared foods. According to U.S. Food and Drug Administration (FDA), high sodium intake can impact long term health resulting in problems like

hypertension, heart attacks and strokes as the population ages. About 70% of sodium consumed by Americans come from packaged, prepared and restaurants (Food & Beverage Insider, 2022). Keeping this in view, in 2021, FDA had released sodium reduction targets for processed, packaged and prepared foods to help reduce the amount of sodium in the U.S. food supply (Food & Beverage Insider, 2022). This points towards the growing awareness amongst consumers about their health and how sodium adversely affects them.

When we explore the Whole Foods database for prepared foods, one of the three groups in which contributes to 70% sodium intake in Americans, the number of products with low sodium is very low (only 7% of total number of prepared foods products (See Appendix D)). Upon further exploration on the Whole Foods website for prepared foods with low sodium, only 7 products from a pool of total 174 prepared food products pop up. This is especially interesting as prepared foods is focused category for FDA as it is part of the trio above that contributes to sodium consumption by Americans.

Hence, to show their commitment to public health and demonstrate that it cares about its consumers, Whole Foods can look at adding more low sodium products to its prepared food portfolio. This will also help Whole Foods leverage the growing public sentiment against sodium intake and help provide options for new upcoming low sodium diets like DASH diet which is seen as one of the healthy diet trends for weight loss in 2023 (Forbes, 2022).

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Appendix A

Mean comparison between healthy and unhealthy food groups at an overall and category level

Category	Healthy_Unhealthy	mean_price_per_serving
Overall	Healthy	5.75
Overall	Unhealthy	3.70
Beer	Healthy	2.00
Beer	Unhealthy	2.11
Beverages	Healthy	1.89
Beverages	Unhealthy	2.49
Bread Rolls & Bakery	Healthy	0.85
Bread Rolls & Bakery	Unhealthy	0.80
Dairy and Eggs	Healthy	16.98
Dairy and Eggs	Unhealthy	20.99
Desserts	Healthy	3.99
Desserts	Unhealthy	4.31
Frozen Foods	Healthy	1.81
Frozen Foods	Unhealthy	2.78
Meat	Healthy	1.86
Meat	Unhealthy	1.78
Prepared Foods	Healthy	4.98
Prepared Foods	Unhealthy	9.79
Produce	Healthy	3.15
Snacks & Chips	Healthy	1.34
Snacks & Chips	Unhealthy	0.74
supplements	Healthy	1.95
supplements	Unhealthy	0.61
Wine	Healthy	26.02
Wine	Unhealthy	11.49

Appendix B

Two Sample One Tailed t-Test

1. Performed on price per serving of healthy group and unhealthy group for the entire sample with 95% confidence interval

H₀: Healthy food costs more than or equal to unhealthy food

H₁: Healthy Food costs less than unhealthy food

t-Test: Two-Sample Assuming Unequal Variances		
	<i>Healthy</i>	<i>Unhealthy</i>
Mean	5.75	3.70
Variance	939.22	22.34
Observations	198.00	75.00
Hypothesized Mean Difference	0.00	
df	220.00	
t Stat	0.91	
P(T<=t) one-tail	0.18	
t Critical one-tail	1.65	
P(T<=t) two-tail	0.36	
t Critical two-tail	1.97	

P value (0.18) for one tail is greater than α (0.05). Therefore, null hypothesis is accepted.

This means that healthier foods cost more

2. Performed on price per serving of healthy group and unhealthy group for categories with certain sample size in both healthy and unhealthy groups, with 95% confidence interval

a. Beer

H₀: Healthy food costs more than or equal to unhealthy food

H₁: Healthy Food costs less than unhealthy food

t-Test: Two-Sample Assuming Unequal Variances		
	<i>Healthy</i>	<i>Unhealthy</i>
Mean	2.00	2.11
Variance	0.71	0.19
Observations	4.00	6.00
Hypothesized Mean Difference	0.00	
df	4.00	
t Stat	-0.25	
P(T<=t) one-tail	0.41	
t Critical one-tail	2.13	
P(T<=t) two-tail	0.82	
t Critical two-tail	2.78	

P value (0.41) for one tail is greater than α (0.05). Therefore, null hypothesis is accepted.

This means that healthier beers cost more

b. Bread Rolls & Bakery

H₀: Healthy food costs more than or equal to unhealthy food

H₁: Healthy Food costs less than unhealthy food

t-Test: Two-Sample Assuming Unequal Variances

	<i>Healthy</i>	<i>Unhealthy</i>
Mean	0.85	0.81
Variance	0.24	0.15
Observations	11.00	8.00
Hypothesized Mean Difference	0.00	
df	17.00	
t Stat	0.23	
P(T<=t) one-tail	0.41	
t Critical one-tail	1.74	
P(T<=t) two-tail	0.82	
t Critical two-tail	2.11	

P value (0.41) for one tail is greater than α (0.05). Therefore, null hypothesis is accepted.

This means that healthier Bread Rolls & Bakery cost more

c. Desserts

H₀: Healthy food costs more than or equal to unhealthy food

H₁: Healthy Food costs less than unhealthy food

t-Test: Two-Sample Assuming Unequal Variances

	<i>Healthy</i>	<i>Unhealthy</i>
Mean	3.99	4.31
Variance	38.61	8.52
Observations	14.00	9.00
Hypothesized Mean Difference	0.00	
df	20.00	
t Stat	-0.17	
P(T<=t) one-tail	0.43	
t Critical one-tail	1.72	
P(T<=t) two-tail	0.87	
t Critical two-tail	2.09	

P value (0.43) for one tail is greater than α (0.05). Therefore, null hypothesis is accepted.

This means that healthier desserts cost more

d. Frozen foods

H₀: Healthy food costs more than or equal to unhealthy food

H₁: Healthy Food costs less than unhealthy food

t-Test: Two-Sample Assuming Unequal Variances		
	<i>Healthy</i>	<i>Unhealthy</i>
Mean	1.81	2.78
Variance	0.93	1.47
Observations	12.00	9.00
Hypothesized Mean Difference	0.00	
df	15.00	
t Stat	-1.98	
P(T<=t) one-tail	0.03	
t Critical one-tail	1.75	
P(T<=t) two-tail	0.07	
t Critical two-tail	2.13	

P value (0.03) for one tail is less than α (0.05). Therefore, null hypothesis is rejected. This

means that healthier frozen foods cost less

e. Prepared foods

H₀: Healthy food costs more than or equal to unhealthy food

H₁: Healthy Food costs less than unhealthy food

t-Test: Two-Sample Assuming Unequal Variances		
	<i>Healthy</i>	<i>Unhealthy</i>
Mean	4.98	9.79
Variance	4.67	14.75
Observations	5.00	8.00
Hypothesized Mean Difference	0.00	
df	11.00	
t Stat	-2.89	
P(T<=t) one-tail	0.01	
t Critical one-tail	1.80	
P(T<=t) two-tail	0.01	
t Critical two-tail	2.20	

P value (0.01) for one tail is less than α (0.05). Therefore, null hypothesis is rejected. This means that healthier prepared foods cost less

f. Supplements

H₀: Healthy food costs more than or equal to unhealthy food

H₁: Healthy Food costs less than unhealthy food

t-Test: Two-Sample Assuming Unequal Variances		
	<i>Healthy</i>	<i>Unhealthy</i>
Mean	1.95	0.61
Variance	1.25	0.29
Observations	9.00	18.00
Hypothesized Mean Difference	0.00	
df	10.00	
t Stat	3.42	
P(T<=t) one-tail	0.00	
t Critical one-tail	1.81	
P(T<=t) two-tail	0.01	
t Critical two-tail	2.23	

P value (0.00) for one tail is less than α (0.05). Therefore, null hypothesis is rejected. This means that healthier supplements cost less

g. Wines

H₀: Healthy food costs more than or equal to unhealthy food

H₁: Healthy Food costs less than unhealthy food

t-Test: Two-Sample Assuming Unequal Variances		
	<i>Healthy</i>	<i>Unhealthy</i>
Mean	26.02	11.49
Variance	486.57	37.10
Observations	11.00	6.00
Hypothesized Mean Difference	0.00	
df	13.00	
t Stat	2.05	
P(T<=t) one-tail	0.03	
t Critical one-tail	1.77	
P(T<=t) two-tail	0.06	
t Critical two-tail	2.16	

P value (0.03) for one tail is less than α (0.05). Therefore, null hypothesis is rejected. This means that healthier wines cost less

Appendix C

Calculation for understanding the mean number of days a product from the category gets consumed

corrected_category	mean_servings_per_category	no_of_days_consumption
Produce	4	1
Dairy and Eggs	8	3
Meat	5	2
Prepared Foods	2	1
Bread Rolls & Bakery	7	2
Desserts	4	1
supplements	55	17
Frozen Foods	4	1
Beverages	16	5
Snacks & Chips	7	2
Beer	1	0
Wine	1	0

Appendix D

Percentage of products with sugar conscious and low sodium diets for each category

corrected_category	no_of_products	percent_sugarconscious_products	percent_lowsodium_products
Produce	22	55	95
Dairy and Eggs	31	32	58
Meat	42	60	36
Prepared Foods	14	43	7
Bread Rolls & Bakery	21	43	14
Desserts	24	0	33
supplements	27	30	22
Frozen Foods	23	17	35
Beverages	22	14	59
Snacks & Chips	29	45	52
Beer	10	30	10
Wine	17	35	47