

## AN ABSTRACT OF THE THESIS OF

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Title: Point of Sale Nutrition Information in One College Restaurant: Impact on Sales and Perception of Healthfulness.

Abstract Approved:

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An increased frequency of eating meals away from home, increasing portion sizes in foods and a lack of information about the nutrient content of restaurant foods may be important factors related to increases in obesity. Methods to improve the healthfulness of meals eaten away from home have been highly debated. Legislation has been proposed to require restaurants to offer nutritional information on the menu, assuming that restaurant patrons could make more informed decisions when dining in a restaurant setting. This research study examined the extent to which the application of nutrition information (total calories, and grams of macronutrients per serving) presented on the menu and at the point of sale influences selections of and rating of healthfulness of menu items in one college campus restaurant.

The study involved surveying patrons of an Oregon State University campus restaurant both before (pre treatment) and after (post treatment) the addition of nutrition information for six target and four non-target entrée items. A total of 286 surveys (n= 143 pre-treatment, n=143 post treatment) from randomly selected patrons

were completed and returned. Sales data was collected for the menu items for a 10 week period, with nutrition information on the menu only for the second five weeks. Data analysis included descriptive statistics, and associations between variables through the use of *t*-tests and regression correlations. Menu item sales were gathered from point of sale (POS) receipts and Micros software systems.

The total restaurant weekly mean total sales and transactions were not different for the duration of the study but did vary for the menu items. Comparisons of mean sales and purchase popularity among target and non target menu items for all weeks of both pre and post treatments were made, and some of the items with nutrition information did show a decrease in sales during the study period. The application of nutrition information resulted in a higher healthfulness rating for one menu item, but resulted in a lower perception of healthfulness rating for three others. Changes in purchase counts as well as purchase popularity were also seen for two target and one non-target entrée menu items. Significant increases were found for the purchase count and purchase popularity of one non-target entrée menu item.

Through the provision of nutrition information on this restaurant menu patrons may have been better able compare the healthfulness of menu items. Although some interesting results were found in this study in one restaurant, further research is necessary.

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Point of Sale Nutrition Information in One College Restaurant: Impact on Sales and  
Perception of Healthfulness

by  
Sherice A. Peacock

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Sherice A. Peacock, Author

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# **Point of Sale Nutrition Information in One College Restaurant: Impact on Sales and Perception of Healthfulness**

## **INTRODUCTION**

One of the largest changes in the eating habits of Americans has occurred over the last couple of decades. This change revolves around the increasing popularity of meals eaten away from home, or dining out. In 1970, the food-away-from-home sector captured about a quarter of total food spending for a household (1). However, food spending on meals away from home has now increased to at least 44% of the food budget for a household, or sometimes as high as 50.4% in some households (2). Many factors contribute to this increasing trend of eating away from home, including an increase in women in the workforce, higher disposable incomes, more convenient restaurants with affordable prices, and increased advertising and promotion by large foodservice organizations (3).

In 1990, the Nutrition Labeling and Education Act (NLEA), was passed by Congress, making nutrition labeling mandatory for most grocery and packaged foods (4). However, among the few foods exempted from this act were the majority of restaurant items. The law states that restaurants must be able to provide documentation when the menu item carries a specific claim. Nutrient claims can be made about a menu item's nutrient content, such as stating that the menu item is low fat, or high in fiber (5). Claims can also be made about the relationship between a nutrient or food and a disease or health condition (5). For example, a menu item that

is low in saturated fat and cholesterol may be able to carry the claim about how diets low in saturated fat and cholesterol may reduce the risk of heart disease. These health claims usually appear on the menu in simple terms, such as “heart healthy” (5).

However, both nutrient claims and health claims when present on the menu must have evidence to substantiate the claim available and provided if requested by a patron (1).

Studies have shown that understanding food labels can lead to healthier eating (6). However, most restaurant menus do not make nutrient or health claims.

Therefore, information regarding the nutritional content of food purchased and consumed in a restaurant setting is often not available; and consumers usually have little or no knowledge about the attributes of these foods. This leads to the inability for many individuals to completely and accurately evaluate their total diet (5).

A report by the National Restaurant Association states that more than half of consumers 35 and older and 2 out of 5 consumers aged 18-34 look for lower fat menu options when eating out (5). Concerns about relationships of eating out and obesity have resulted in proposed regulations requiring restaurant menus to offer nutritional information for all menu items. This is thought to result in improving healthful eating, and has also prompted the introduction of the Menu Education and Labeling Act (MEAL), which is yet being discussed by Congress (5).

Although it is believe that the MEAL act would promote healthy eating and consumer awareness, many are appalled by the concept of required nutritional information of restaurant menus. It has been argued that due to the many options available on menus and consumers desire to customize their order in restaurant, no feasible, one-size-fits-all application of menu labeling legislation can be determined

(7). Also, it is believed that required menu labeling would stifle the creativity and spontaneity of some chefs, endangering the profitability of restaurants (8). Without the flexibility of being able to prepare a dish at the spur of the moment, or adapt a dish when ingredients are not available, chefs would have to rely on products that are regularly available. It is believed by the restaurant industry that these restrictions would lead to utter boredom for both the chef and the restaurant patrons (8).

Another concern for the restaurant industry is the additional costs that would be incurred by the menu labeling requirements. To maintain creativity and spontaneity in dining, a nutritionist may have to be hired to analyze each new dish. This additional cost could absorb the small profit margin of many restaurants, forcing them out of business (8).

The restaurant industry is an industry of choice, which is driven by customer demand. Therefore, it is unknown if the requirement of nutritional information would truly improve the eating habits of Americans. A poll conducted by the National Restaurant Association found that 84% of adults would oppose a law or regulation limiting portion sizes and mandating nutritional information (9). It is also a concern that in addition to unhappy restaurant patrons, such action could result in confusion for Americans (9). Also, it has been shown that conflicting nutritional advice and health messages actually cause individuals to respond by eating less healthful diets (10). In order to determine the consequences of requiring nutritional information on restaurant menus, more research on the effect of nutritional information at the point-of-sale or on restaurant menus is required.

Overall, the extreme increase in obesity has become one of the nation's largest health crises (1, 11). In combination with the increases in frequency of meals eaten away from home, portion sizes in restaurants continue to increase substantially (11). However, this increase in portion size is only partially due to restaurant trends, and is driven mostly by customer demand and perception of value (12). This is evident through the largest increase in growth and spending at fast food establishments (12), which often actively promote the largest portion sizes with "value meals" offering price bundling making it less expensive than buying small items separately (13).

Research suggests that the trend toward larger marketplace servings has occurred parallel with the rising rates of obesity. This implication is further strengthened through research determining that increases in portion size does lead to a greater consumption of food in both men and women without effecting levels of satiety (14). Therefore, individuals are consuming more food in one sitting without being aware of the increase in intake, and not adapting the remainder of their daily intake to accommodate what has already been consumed.

Although obesity continues to increase, systematic reviews of nutrition education have found that many programs are effective at adapting individuals' behaviors. Nutrition education programs are found to be most successful if education messages are direct, interactive, and require little or no additional time or money than the less healthful behaviors (15). Nutrition education interventions at the point-of-choice, also known as point-of-sale, are becoming more prevalent in stores, vending machines, and work-site cafeterias (15). These involve labeling the food, shelf, or menu with nutritionally relevant information such as "low fat". However, a review of

these point-of-choice programs found that choices are adapted while the programs are present, but change generally does not persist once the labels are withdrawn (15).

Therefore, when the information is absent and no reminders of healthy behaviors are present, consumers revert to old habits and consumption of less healthy items.

Due to the consideration of menu labeling requirements, and the limited study of the use of nutritional labeling, this research study attempts to provide some data in that void.

The purpose of this study is to examine if and to what extent nutritional information presented on the menu and at the point of sale influences selections of menu items of food consumed away from home. The influence and effect of provided nutritional information on a consumer's perception of their understanding of nutrition will also be analyzed. The research questions addressed by this thesis are as follows:

### **Research Questions**

#### ***Primary Research Questions:***

1. Will the addition of nutritional information to the menu for selected items at one college university restaurant affect the menu items that people choose, as evidenced by changes in sales or purchase popularity?

**Null Hypothesis H01:** The addition of nutritional information to selected items on the college university restaurant menu will not result in changes in the sales for that item.

2. Will nutrition information of one college university restaurant menu items have a stable effect on sales or purchase popularity, or will the effect of the treatment reduce over time?

**Null Hypothesis H02:** There will be no difference in item sales for individual item between weeks before treatment and weeks after treatment.

**Null Hypothesis H03:** There will be no difference in sales ratios, or the sale of menu items relative to total sales, between items with nutritional information and those without information, when examined during the before and after treatment sessions.

**Null Hypothesis H04:** There will be no difference in the mean sales per week for the items labeled with nutritional information.

***Secondary Research Questions:***

1. Will provision of nutritional information influence the perception of healthfulness rating of menu items?



**Null Hypothesis H05:** There will be no difference in scores of mean healthfulness rating between the pre-treatment and post-treatment periods.

**Null Hypothesis H06:** There will be no relationship between the calories, carbohydrates, fat, and protein content and healthfulness ratings on target menu items.

2. Will nutritional information on target (information provided) menu items impact healthful ratings of non-target menu items?

**Null Hypothesis H07:** There will be no difference between mean menu ratings of healthfulness between target and non-target menu items during the pre-treatment and post-treatment periods.

## **LITERATURE REVIEW**

The increase in obesity has been the focus of many research projects over the past few years (16, 17). Since activity levels have not drastically changed over the past decade (18), the basic cause of this increase could be attributed to an excess of energy intake over expenditure. Dietary intake surveys support this reasoning through reporting a 200-kcal/day increase from 1977 to 1994, as well as an ever-expanding food supply (19). Although these figures may not be precise since they are based on self-reported data, they do confirm that Americans as a whole currently have a higher energy intake than in the past.

### **Increases in Portion Size**

Studies have explored the reasons for the increase in energy intake, and much research suggests the foodservice trend of progressively increasing portion sizes. Among sources of food away from home; fast food outlets, take-out establishments, and family type restaurants currently rank highest in sales and also exhibit the highest growth rates (12). In one study, a variety of foods were sampled from multiple popular eating establishments categorized into the above-mentioned categories. The portion sizes were then compared to the standard portion sizes established by the FDA and USDA. With the only exception being white bread, all of the food portions measured greatly exceeded USDA and FDA standard portions. Cookies were found

to have the largest excess over USDA standards (700%), with cooked pasta, muffins, steaks, and bagels exceeding USDA standards by 480%, 333%, 224%, and 195%, respectively (19). French fries, hamburgers, and soda portions were found to be two to five times larger than the original portion sizes (19).

Research has also shown an increasing availability of larger portion sizes. They are often used as selling points for food, with one marketing focus being on the availability of the larger size (20). Larger portions are actively promoted throughout fast-food establishments, with “value meals” offering the largest sizes less expensively with bundling, than if purchased separately (21). Restaurants are also using larger plates, baking pans, and muffin tins to prepare larger portion sizes that many consumers have come to expect (19). Industries outside of foodservice are also adapting to the availability of larger portion sizes. This is evident through the increasing size of cup holders in automobiles and other methods of transportation.

Some food labels may also be misleading regarding portion size information, especially among baked goods, available in grocery stores, coffee shops, delis, and convenience stores. In a sample of single serving baked goods; including muffins, brownies, and cookies, the majority of samples were found to exceed label weights (14). The FDA’s rule allows that foods weighing less than twice the standard size may still be labeled as one serving size. This likely contributes to the current consumer confusion about appropriate portion sizes (22).

Overall, the research suggests that the trend toward larger marketplace servings has occurred parallel with the rising rates of obesity. This implication is strengthened with research determining that increases in portion size does lead to

greater consumption of food in both men and women. Subjects in a recent research study by Rolls, et al. consumed 30% more food when presented with the largest portion than when presented with the smallest portion (14). The increase in consumption was also found to be independent of body weight, weight status, or self versus pre-plated serving method. There was also found to be no difference in levels of hunger and satiety before and after consumption of varying portion sizes. The researchers suggest that perhaps there is an environmental effect of portion size regarding the development of hunger and satiety (14).

The increase in portion sizes of foods available away from home is affecting portion sizes consumed in the home as well. Since food spending on meals away from home has now increased to at least 44% of the food budget for a household, or sometimes as high as 50.4% in some households (2), restaurant portion sizes are becoming the norm, and appearing to be distorting consumer's view of appropriate portion sizes (22). This has led to a substantial caloric increase in a variety of foods. Compared to portion sizes from 1977, Americans are eating per portion on average: 93% more calories from salty snacks, 49% more calories from soft drinks, 97% more calories from Hamburgers, 68% more calories from French fries, and 133% more calories from Mexican food (23). Cookbooks may also contribute to an expansion of portion sizes being served at home. Identical recipes of old and new editions of classic cookbooks, such as The Joy of Cooking, specify fewer servings which means that portions are expected to be larger (21).

The availability of larger package sizes also has similar effects on consumption. Research has shown in both food and non-food items, such as bleach,

detergent, vegetable oil, and M&M's, that large packages of familiar products encourage greater use. Therefore, as the size of the package increases the usage volume of the product also increases (22). However, due to the Nutrition Labeling Act, consumers have instant access to nutritional information of foods they plan to purchase from grocery stores or supermarkets.

### **Nutritional Impact of Eating Foods Away from Home**

Information regarding the nutritional content of food purchased and consumed in a restaurant setting is often not available. Consumers usually have little or no awareness of the nutritional values of these foods. Therefore, many individuals are unable to completely and accurately determine their total caloric intake.

One study by Diluberti and Bordi has confirmed that the relationship of increased portion size and increased energy intake has expanded into restaurant meals (24). In this study, a cafeteria-style restaurant was used, and portion size of an entrée was manipulated from the standard portion to a much larger portion. The researchers covertly measured the energy intake by weighing each dish before and after the meal. The results from this study were consistent with other studies in that portion size again had a significant effect on the amount of the entrée consumed. However, this study is unique since it is the first to occur in a restaurant setting as opposed to a laboratory setting.

Another study by Binkley and Jekanowski further strengthens the association between dietary changes and rising obesity in the United States (25). This study

focused on determining if the source from which food is obtained has contributed to the increased obesity of the nation's population, while controlling for demographic, lifestyle, and regional factors. Secondary data from the 1994-1996 Continuing Survey of Food Intake by Individuals consisting of twenty-four hour food recalls was analyzed to determine if the source from which food is obtained contributes to being overweight. It was found that for males, those who ate food away from home from any venue during the food recall were about 1 kg heavier, all other factors being equal (height, age, and lifestyle). Females were also found to be heavier if a fast food restaurant, but not any restaurant, had been frequented during the food recall period. The researchers concluded that the trends in both increased US obesity and in increased consumption of food away from home are unlikely to be coincidental. Therefore, it was determined that food away from home, particularly fast food consumption, are likely to be contributing factors to increased obesity.

### **Healthful Eating in Restaurants**

Today, more and more restaurants are attempting to incorporate more healthful offerings due to increasing customer demand (26). Modifications, such as low-carbohydrate, low-fat, and high protein items are becoming much more available providing more options for consumers who are watching their intake of certain nutrients (26). Still, many individuals may need a little more guidance due to lack of nutrition knowledge or understanding of dietary needs (27). However, in one survey, more than two out of three individuals reported they are tired of hearing about what is

good and what is bad for them when it comes to food items (26). Therefore, more creative methods may need to be addressed when attempting to motivate individuals to make healthier food choices when eating away from home.

One study by Colby, Elder, Peterson, et al examined promoting the selection of healthy food through the menu item description that was provided in a family style restaurant (28). This study used three different written messages included on the restaurant menu, varying in content and emphasis, to promote one food special during each day of intervention. The first message emphasized the healthfulness of the special, noting low levels of fat and sodium. The second message stressed flavor, and added that the menu choice was healthful. A third, non-specific message made no mention of taste or health factors. The results indicated that restaurant patrons were more apt to select the healthful specials when the message emphasized taste but also noted that the selection was healthful (28). Therefore, researchers concluded that patrons were more open to information about the palatability of the food than its healthfulness (28).

Researchers are also beginning to focus on how nutrition information on a menu will influence consumers' attitudes and purchase intentions. One study by Kozup, Creyer, and Burton focused types of information to determine influences (29). It was found that favorable nutrition information, or stating healthy nutritional information or making positive health claims, on a restaurant menu had a positive effect on the attitude of the product, and on purchase intention.

The nutritional frame, or the context that occurs when nutritional information is presented for some but not all menu items, has also been found to influence

consumer's attitudes and beliefs about the nutrient values of menu items. One study by Burton and Creyer used prepared sample menus to evaluate participant's perceptions of nutrient levels for menu items (30). This study provided information for target (nutrient information or health claims supplied) and non-target (no nutrient information or health claims supplied) menu offerings to determine how the nutritional context would affect perception and likelihood to purchase. The researchers found that the provision of nutrient information (such as an item being low fat) or a health claim (such as a heart-healthy claim) for the target item produced perception that the non-target items also contained these characteristics. Similar results were also found when negative nutritional information was supplied on the target item by also creating associations for the non-target item. Therefore, the nutritional frame manipulation created a context that influenced perceptions of the nutrient values of non-labeled items (non-target).

### **Research in Restaurants Involving Nutrition Labeling**

Many interventions have occurred over the past decade examining the effectiveness of nutrition labeling in restaurants. A study by Albright and Flora examined the impact of nutrition information on entrée sales and patron attitudes (31). In this study, the intervention consisted of placing a large red heart next to each entrée that qualified as being low in fat and cholesterol. A sign stating that those entrees designated with a "heart" were low in fat and cholesterol and "good for health". Restaurant patrons also completed a one-page survey to provide general



demographic information, awareness of the menu labels, and their knowledge of the purpose for the labels. Fifty percent of the restaurant patrons that were surveyed reported seeing both the heart labels. Over 60% of the patrons were able to correctly identify the meaning of the labels as identifying the entrees to be low in fat and cholesterol. Overall, two of the four restaurants participating in the intervention showed significant increases in the sales of targeted foods following labeling. In all four restaurants, women and older patrons were more aware of the program and more responsive to its recommendations.

A separate study published by Richard, Devost, Masson, and O'Loughlin also evaluated the effectiveness and feasibility of an intervention aimed at offering healthy menu options in a fast food restaurant and a family style restaurant in low-income neighborhoods (32). Specifically, the frequency with which customers ordered healthy menu options were monitored, and customer self-reports of the impact of the intervention were also gathered. Entrees with a lower fat and/or high fiber content than other entrees on the menu were labeled as "Express Fit" on the fast food menu, and "Great Shape" on the family service restaurant menu. The intervention was advertised in both restaurants on posters and placemats, as well as an insert in the menu. Happy-face labels were also assigned to the healthier items. Additionally, the intervention was publicized in the local newspaper, and in pamphlets delivered to all households in the research radius. It was found that the patrons of the family-style restaurant showed more interest in the targeted entrees compared with the fast food restaurant clientele. It was also found that males in the family-style restaurant and regular customers (at least one visit per week) in the fast-food restaurant were more

likely than others to order these options. The survey respondents also stated that taste is an important reason for ordering healthy entrees. Therefore, the authors suggested that promotional messages that convey that healthy options are “not only good for you but also taste great” might be more effective than those appealing to health motives only.

A study performed by Fitzgeralds, Eagle, Sheldon, and Kannan also posed the research question, “Does a promotional campaign impact the sales of heart-healthy menu items in community restaurants?” (33). Nine community restaurants participated in this intervention, which involved using promotional campaign materials (print advertisements, posters, and table tents) to increase awareness of heart healthy menu items on restaurant menus. A broad reach component was also utilized in this study, which involved advertisements in the local daily newspaper and a local entertainment publication that featured community events and resources. Four of the nine restaurants involved showed a small increase or no decrease in the percent of heart-healthy menu items sold after the 8-week campaign. Overall, the percentage of heart-healthy items sold after the campaign showed a trend toward a small increase in heart-healthy dining. However, the campaign did not have statistically significant effect on the sales of healthy menu choices.

Additionally, a separate research intervention published by Dubbert analyzed the effectiveness of menu labeling in a work place cafeteria (34). This intervention consisted of labeling the three lowest calories items within the categories of salad, vegetables, and main courses. The sales of low-calorie salads and vegetables

increased when labels targeted these items, but sales of labeled lower calorie main dishes did not increase.

Eldridge, Kotz, Faus, and Snyder also performed an intervention examining the development and evaluation of a labeling program for low-fat foods in a discount department store (35). It was determined that this intervention would be worthwhile after a preliminary investigation found that 69% of shoppers surveyed stated that they would likely buy lower fat foods in Target Food Avenue. Target launched a “Good for You” promotion in all of its stores, with seven stores participating in the evaluation of the program. A total of fourteen existing menu items met the criteria of less than 10.5 grams of fat for entrees, and less than 3 grams of fat for snacks. Quarterly trends indicated that most “Good for You” items were purchased with increasing frequency throughout the monitoring period. Sales results indicated the effectiveness of the “Good for You” promotion, with significant increases in sales for lower fat sandwiches, pizza, and snacks. The sales of the “Good for You” foods as a percentage of sales continued to increase, even 9 months after the initiation of the program. Due to the success of this program, Target has focused on expanding the “Good for You” menu to provide more options for customers.

Additionally, a study by Scheidt and Daniel focuses on the concern of the extent to which consumers actually gather and use nutritional information (36). The researchers believe that consumers may look at food labels to find the amount of only one or two components, such as calories or fat, but may be unaware of or ignore the overall levels of other nutrients. To combat this issue, the researchers propose the development of a ratio of recommended to restricted food components (RRR). The

RRR was conceived as a means to offer consumer a single number to evaluate food products. This tool can be used by the consumer to summarize the ratio of those food components that should be readily consumed (protein, dietary fiber, calcium, iron, vitamins A and C) compared with those that should be restricted to an upper limit (calories, sugars, cholesterol, saturated fat, and sodium). Specifically, the RRR may be used to help consumers compare foods within Food Guide Pyramid categories, such as white bread (RRR=.39) and whole wheat bread (RRR=.95) or whole milk (RRR=.58) and skim milk (RRR=1.33). However, research evaluating the effectiveness of this proposal and consumer understanding has yet to be completed.

Finally, a review by Holdsworth and Haslam involved reviewing point-of-choice nutrition labeling schemes in the workplace, public eating places, and universities (37). These schemes allow for the opportunity for behavior change by modifying the environment. Twenty different point-of-choice labeling schemes were reviewed for effectiveness. It was found that most of the schemes reviewed demonstrated some positive short-term benefits of point-of-choice nutrition labeling schemes. However, the researchers were unable to conclude that there are long-term behavior changes as a result of the schemes due to the lack of follow-up studies. It was also determined by the researchers that schemes in public eating establishments are less likely to reach lower socioeconomic groups, since these groups are less likely to eat out. In the workplace studies that were reviewed, all employees were equally targeted with no programs aimed at specific sections of the workforce. Given that the work force is heterogeneous, health promotion messages should be modified to target those most in need of dietary change. It was also determined that nutrition labeling

schemes at the point-of-choice are a modification of the environment, and that they may facilitate change slowly. Therefore, an immediate effect or change in eating habits may not be observed for some time as restaurant patrons “contemplate” changing their behavior. Overall, the researchers determined that nutrition labeling schemes may be most effective when they are adapted for the target audience and use simple messages, especially if the messages promote both healthiness and taste.

### **Other Research Involving Restaurants**

In a study by Dwivedi and Harvey, a Heart Smart nutrition campaign provided materials to restaurants to promote healthy nutrition choices (38). Promotional materials included decals, certificates, menu inserts, table tents, and a display poster. It was found that while 75% of restaurants recalled receiving these promotional materials, fewer than 33% used the table tents and menu inserts. However, 45% or more used the decal and the certificates provided. This study indicates restaurateurs’ preferences for labeling of healthy menu options, and could assist with future directions for programs similar to Heart Smart.

Another study by Root, Reiboldt, Frank, and Toma evaluated the accuracy of restaurant entrees identified as health choices on a menu at two fast food restaurant chains (39). It was determined that the entrees identified as healthy choices were in fact healthy, were accurately labeled, and were consistent among different locations of the same restaurant chain. This is promising considering potential legislation is

under discussion to require chains to provide nutritional information, which would likely be accurate for consumers.

A separate study by Cassady, Housemann, and Dagher focused on measuring cues for healthy choices on restaurant menus (40). The purpose of this study was to develop and test the Menu Checklist, which is an instrument to be used by community members to assess cues for healthy choices in restaurants. Fourteen menus were analyzed to show the availability of cues for healthy foods, such as menu labeling or low-fat choices. It was found that labeling on restaurant menus was rare, as were low-fat choices. Fruits and vegetables were readily available with 31% of all entrees including one serving and 39% of all appetizers were primarily fruits and vegetables. Therefore, the researchers determined that the Menu Checklist is a reliable, low-cost means for community members to collect data on influences on food choices in restaurants.

### **Research Relevance**

As the literature has stated, the increases in meals eaten away from home as well as increasing portion sizes in restaurants appears to be a great contributor to the ever escalating obesity issues (21). Although some studies have focused on attempting to motivate restaurant patrons to choose healthier options when eating away from home, effective methods for doing so are yet to be determined. It is also important to develop a greater understanding of consumer's nutrition-related evaluation of restaurant menu items to ensure that restaurant patrons are not being

manipulated, which may result in incorrect perceptions about the nutritional content of menu items.

## METHODOLOGY

The primary focus of this investigation was to determine if nutritional information presented on a restaurant menu and at the point of sale influences sales and purchase popularity of targeted menu entrée items. The perception of healthfulness of specific menu items was also investigated by asking customers to rate items on a scale of 0 (not healthy) to 7 (very healthy) for healthfulness. The research involved two phases. The first phase involved surveying restaurant patrons at two different periods, prior and post to the study treatment of adding nutritional information to menu items. The survey included information about the perception of the healthfulness of the selected menu items, dining habits, their influences on restaurant choice, and respondent demographics. Prior to adding macronutrient content to the menu, recipes and menu items were obtained and analyzed for nutrients in target menu items. Sales data was gathered from the restaurant, both before and while the treatment of adding nutritional information to the restaurant menu took place. The Oregon State University Institutional Review Board for the Protection of Human Subjects approved all research materials and procedures for this study.



### **Phase I: Survey of Restaurant Patrons**

In order to obtain information about the restaurant patrons' perception of healthfulness for menu items a survey was the most time and cost effective measure of gathering that desired information. To facilitate response rate among restaurant patrons, and to increase the randomness of the sample population, the survey was hand distributed by the researcher to customers after they placed their food orders. The survey was distributed during peak lunch hours (11:00 am to 1:00 pm) for four to five day periods during weeks 4-5, and weeks 10-11 of the winter academic term. The time frame was used to capture the majority of lunchtime sales' patrons. The data collection sequence for the research is summarized in Table 1.

Table 1: Data Collection Methods During the Research Period

Data Collection Method	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11
Sales	→	→	→	→	→	→	→	No Data	→	→	→
Customer Transactions	→	→	→	→	→	→	→		→	→	→
Treatment	None	None	None	Survey Distribution	Survey Distribution	Menu Nutritional Information	Menu Nutritional Information		Menu Nutritional Information	Menu Nutritional Information and Survey Distribution	Menu Nutritional Information and Survey Distribution

### *Survey Development*

The research questions and hypothesis along with suggestions from research committee members aided in the development of the survey instrument. The committee also reviewed the survey for face and content validity. The survey was revised to ensure a user friendly and well-formatted survey instrument that would be quick for the restaurant patrons to complete. Multiple individuals outside of the food and nutrition field examined the survey for possible biases, elimination of technical jargon, and to improve clarity.

The consent letter (Appendix A) was developed based on the requirements stated by the Oregon State University Institutional Review Board. Researchers ensured that the consent form stated the rights of participants through expressing their ability to answer as many or as few of the questions as was desired, and that they could refrain from completing the survey at any time. The consent letter concluded with the contact information of the researchers, if any of the participants had questions about the content or confidentiality of the study.

The researchers also determined that incentives would not necessarily increase the likelihood of survey completion, and would confound the survey distribution. Therefore, no incentives were offered for the completion of the survey.

### *Sample Population*

Restaurant patrons were randomly selected and invited to complete the research questionnaire during two weeks before nutrition information was added to the menu. The participant population was limited only in that the respondents had to be a patron of the restaurant during the research period. Therefore, the sample population included university students, faculty, staff, and others. The only exclusion criteria utilized was to avoid subjects' survey completion more than once during each phase of survey distribution.

### *Sample Size*

The determination of the sample size reflected the daily average customer count of the restaurant. Restaurant management determined an average daily customer count of approximately 300. However, many of these individuals are daily repeat customers, or regular customers. Therefore, approximately 150 completed surveys were gathered from restaurant patrons during each survey distribution period. This was an appropriate quantity of completed surveys to be gathered allowing for declined participation and yet large enough to minimize the variable sampling error. Therefore, the results could be generalized to this population of interest.

### ***Subject Selection***

Research participants were recruited to complete a survey, immediately after ordering their menu items. To ensure random selection of participants, and reduce bias of the researcher, every third individual was approached for participation. By requesting every third individual to participate, the established sampling frame would be achieved. If the individual refused, the researcher simply continued to the next third individual.

### **Survey Instrument**

The research questionnaire was designed to determine both pre and post perceptions of healthfulness of menu items and to gather information about the respondents dining habits. The survey tool provided no definition of healthfulness, allowing for highly subjective measurements of perceptions. The instrument consisted of three sections: questions about influences and frequency of eating food away from home, perceptions of healthfulness of menu items on the menu, and general demographic questions. The participants were asked to answer the questions by either placing a mark in the corresponding box, or circling the appropriate number on an ordinal scale.

### *Preliminary Questionnaire Content*

The questionnaire (Appendix B) began with very brief survey directions and encouraged participants to choose the answer that best represents their opinion. The first question focused on the influences of day-to-day restaurant choices, and includes location, selling price, ambiance, quantity of food served, variety, healthy options, and the speed of service. The second question asked the participant to summarize their knowledge of nutrition. The third question referred to the likelihood of an individual to purchase an “up-sized” (larger portion or bundled for reduced cost) meal, examine nutritional information, be influenced by nutritional information, select smaller portions, and not consume all food served when eating away from home. The questions are presented with an ordinal scale from 0 to 7 with appropriate anchor labels.

Question four of the survey focused on the frequency of meals purchased outside of the home on an average weekday and weekend day. This question was answered with choosing the frequency.

The back of the questionnaire contains the perception rating for healthfulness of target and non-target menu items. The menu items were listed by name, with the menu description listing the ingredients below the menu item. The participants were to rank how healthy they believed each menu item to be on an ordinal scale from 0 to 7. Eight menu items were listed in this section, matching the chosen target and non-target menu items.

The survey concluded with six demographic questions, including gender, race/ethnicity, age, university status, and a single open-ended question asking what the participant ordered from the menu that day. A question was also included in this section describing any food related lifestyle or medical considerations that might affect any diet choices, such as vegetarians, vegan, athletes, and religious or medical dietary restrictions.

### ***Post Treatment Questionnaire Content***

The post-treatment questionnaire (Appendix C) was identical to the first, with two exceptions. Nutrition information (calories and macronutrient gram counts per serving) was added in the section of menu items healthfulness perception rating. The target menu item nutritional information was provided matching what was presented on the restaurant menu. Also, a single question was also added to the end of the demographic section, which asked the participants if they examined the nutritional information that was presented on the restaurant menu.

### ***Questionnaire Structure***

With the exception of a single open-ended question, all questions were either closed ended or based on an ordinal scale. Numerical codes were assigned to each possible answer for the questions to aid in the computer processing of responses.

Completed questionnaires were also assigned an identification number for confidentiality.

### **Survey Administration**

The participants were approached immediately after placing their order, but before they had been seated, in an attempt to be as unobtrusive as possible. This also allowed the participants to ask the researcher any possible questions, and be informed where to place the survey upon completion. Both individuals eating in the restaurant, as well as those who placed to-go orders were invited to participate in the research study. The participants were requested to complete the survey before leaving the restaurant.

### **Phase II: Nutritional Analysis**

The research period took place at a university campus restaurant from January 3<sup>rd</sup> to March 18<sup>th</sup>, 2005. The research treatment was the application of nutrition information to the restaurant menu and began during the sixth week of the research period. This resulted in five weeks of baseline data and five weeks of data collection following treatment. The nutritional information for the menu consisted of a listing of the grams of carbohydrate, protein, and fat, as well as total calories per serving.



The target menu items included two menu items from each category of sandwich, wrap, hot entrées, and salads were analyzed. Within each entrée category the menu included one additional item with no information provided. For this study, entrees with nutritional information are referred to as target menu items. Entrees without information are considered non-target menu items. The items were monitored for the quantities sold. Menu items not listed as an entrée were not monitored in this study, and are referred to as non-entrée items.

The calculation of nutritional information occurred through the deconstruction of each ingredient in each target menu item. The macronutrients and calories were calculated for each weighed ingredient quantity using package labels, and with USDA (43) and other nutrient databases. Table 2 lists the calculated nutritional information for the target menu items.

Table 2: Nutrition Information for Selected Menu Items

Menu Item	Total Calories	Carbohydrate Grams	Protein Grams	Fat Grams
Thai Peanut Wrap	509	64	12	23
Classic Turkey Sand	420	52	18	16
Turkey Focaccia	666	69	48	22
Hot Gobbler	552	63	48	12
Greek Veggie Salad	382	17	9	30
Chicken Fajita Wrap	543	41	43	23
Chicken Caesar Salad	340	12	29	20
Chicken Caesar Wrap	462	35	31	22

The nutrition information was added to the menu with a listing of calories and macronutrients per serving just below the menu description of each specific item

(Appendix D). After the nutrition information was added to the restaurant menu, signage was also placed at four key points in the restaurant to draw attention to the addition of nutritional information and to encourage patrons to examine the provided information. The signage was essential since many of the patrons are returning customers of the restaurant and may not examine the menu due to its static nature during the research period. Also, due to limited menu space and the requests of the restaurant management, the nutrition information was rather small and could have been overlooked. The signage was placed on both sides of a menu board outside the restaurant entrance, on the special's board immediately inside the restaurant, and at the cash register.

### **Restaurant Sales and Purchase Data**

Purchase data revealing the selection of target and non-target menu items as a percentage of total transactions as well as total sales data by week was gathered using one of two possible point of sales collection systems. Data for the first four weeks of the research period was analyzed from the printed cash register reports from the Point of Sales (POS) system (Appendix E). The restaurant converted to a Micros cash register system during the fifth week of the research period. This system maintains a constant database of register transactions, which are available immediately after the completion of a sale. The sales records for the fifth through the eleventh week were obtained from sales reports available through the Micros database (Appendix F). Both systems provided identical information regarding sales of menu items. For one

week during the research sales data was excluded from the research study, due to a class project that utilized unique menu offerings from the standard menu that occurred in the restaurant.

### *Analysis of Sales Data*

The sales data collected consisted of the number of target and non-target menu items sold, and the total lunchtime sales. Data on transaction and total item count were gathered allowing for a calculation of purchase popularity, or menu item count divided by total transaction count for the meal. Data collection for the days was calculated into means for the week for each collection period. Variations in the day-to-day volume of sales and transactions were calculated into means and tested for random variation in sales volume over the whole collection period.

The sales data gathered was entered into a database by the researchers. This was then analyzed for frequencies and sales patterns.

### **Statistical Analysis**

Data analysis was completed using SPSS version 12.5. Descriptive statistics, such as frequency distributions, means, and standard deviations, were calculated for the rating scales of restaurant influences, knowledge of nutrition, and prevalence of specific choices when eating foods away from home. Correlation analysis was also used to evaluate the perception of healthfulness rating scores for target and non-target

menu items, and the calorie and macronutrient content. Mean sales and total transactions of menu items were also compared between pre and post treatment using independent t-tests. Correlation analysis was used to reveal relationships among survey items and respondent demographic variables.

## **RESULTS**

The purpose of this study was to determine if and to what extent nutritional information presented on the menu and at the point of sale influences selections menu items of food consumed away from home. Statistical analyses were performed on both responses from completed surveys, as well as sales data and purchase counts gathered. The purpose of the statistical analyses was to determine the effect of nutrition information presented on the menu and at the point of sale influencing selections of menu items at this restaurant. Information regarding the research participants was also obtained through analysis of the survey responses provided.

### **Survey Response Results**

The results from this study represent the responses of 286 patrons of the Pangea restaurant. One hundred and forty three respondents completed the survey in both the pre treatment period and post treatment period. The response rate for this survey distribution was quite high since almost all of the surveys returned were completed, although an exact calculation cannot be obtained given that the number of individuals who refused to take the survey was not recorded.

## *Demographics*

A summary of the respondents' demographic characteristics is presented in Table 3. The pre treatment survey respondents were primarily female (58.7%), with the largest group in the age range being 18-24 (57.3%), primarily Caucasian (82.5%), and at an undergraduate level at the University (60.8%). The post treatment survey respondents had very similar demographics and were also primarily female (59.4%), in the age range of 18-24 (60.1%), Caucasian (75.5%), and largely at an undergraduate level (63.6%). The two groups were not statistically different in any of the demographic categories.

In addition to demographic characteristics, eating behaviors of respondents were also gathered on the survey tool. Respondents were asked if they were vegetarian or vegan, participated in athletic competition, or had religious or cultural restrictions, and medical dietary restrictions. Of the pre treatment survey respondents, the majority (72.7%) of respondents reported no behaviors that might affect food consumption. A very low number of respondents reported vegetarianism as affecting their eating behavior (9.8%). This was very similar to the post treatment survey respondents, which also reported having few behaviors that would affect food consumption (76.9%), and a small cluster (9.1%) of vegetarians made up the post treatment survey respondents. The data summarizing the eating behaviors of all participants is presented in Table 4.

Table 3: Demographic Characteristics of Respondents for Pre and Post Treatment Periods in Percents

	Gender		Age					Race/Ethnicity					University Status					
	Male	Females	18-24	25-34	35-44	45-54	55+	African American	Hispanic	Asian/Pacific Islander	Caucasian	Multicultural	Undergraduate	Graduate	Faculty	Staff	Alumni	Other
Pre Treatment n = 143	41.0	58.7	57.3	16.8	9.8	11.9	4.2	0.7	1.4	9.1	82.5	6.3	60.8	11.9	16.8	4.9	0.7	4.9
Post Treatment n = 143	40.6	59.4	60.1	14.7	11.9	9.1	4.2	0.7	4.9	11.9	75.5	7.0	63.6	9.1	15.4	5.6	0.0	6.3

Table 4: Eating Behaviors of Respondents for Pre and Post Treatment

Behaviors	Pre Treatment n=143		Post Treatment n=143	
	n=	%	n=	%
Vegetarian	14	9.8	13	9.1
Vegan	2	1.4	0	0
Endurance Athlete/Competitor	9	6.3	12	8.4
Religious/Cultural Restrictions	4	2.8	1	0.7
Medical Restrictions	6	4.2	4	2.8
None	104	72.7	110	76.9
Other	4	2.8	3	2.1

### *Influences of Restaurant Choice*

Survey respondents were very similar in identifying influences of restaurant choices. A summary of responses for influences of restaurant choices for all research participants is listed in Table 5. Both pre treatment and post treatment respondents acknowledged convenience of location of a restaurant having the greatest and ambiance having the least amount of influence on their day-to-day restaurant choices. However, a significant difference was shown between the influence of menu item selling price, with the post treatment survey respondents rating item price to be more of an influence on restaurant choice than the pre treatment respondents ( $p=.02$ ).



Table 5: Mean Responses for Influences of Restaurant Choice

Influences	Pre Treatment n=143		Post Treatment n=143	
	Mean <sup>^</sup>	Std. Deviation	Mean <sup>^</sup>	Std. Deviation
Convenience of Location <sup>f</sup>	5.6	1.46	5.7	1.20
Menu Item Selling Price <sup>b,f</sup>	4.8*	1.68	5.2*	1.64
Ambiance of Restaurant <sup>c</sup>	4.0	1.76	4.1	1.77
Amount of Food for Price <sup>b</sup>	4.7	1.60	4.9	1.60
Amount of Menu Variety <sup>c,e</sup>	4.8	1.57	4.9	1.47
Availability of Healthful Choices <sup>a,d,e</sup>	5.4	1.44	5.5	1.59
Quick Service <sup>a,d</sup>	5.0	1.45	5.0	1.54

<sup>^</sup>mean score derived from 0=low – 7=high

\**t*-test reveals significant difference in mean values ( $p=.02$ ).

*a*: Variables correlate Pearsons Correlation  $r=.40$ ;  $p<.05$

*b*: Variables correlate Pearsons Correlation  $r=.57$ ;  $p<.05$

*c*: Variables correlate Pearsons Correlation  $r=.36$ ;  $p<.05$

*d*: Variables correlate Pearsons Correlation  $r=.40$ ;  $p<.05$

*e*: Variables correlate Pearsons Correlation  $r=.48$ ;  $p<.05$

*f*: Variables correlate Pearsons Correlation  $r=.67$ ;  $p<.05$

Correlations between restaurant influences were also quite prominent. The influence of quick service highly correlates with all influences of restaurant choice ( $r=.40$ ), but was found to have the strongest correlation with the availability of healthful choices ( $p=.001$ ). Also, the amount of food for price and menu item selling price also highly correlated ( $r=.57$ ;  $p=.001$ ). Interestingly, the amount of menu variety influence highly correlated with the ambiance of the restaurant ( $r=.36$ ;  $p=.001$ ). The availability of healthful choices was also found to correlate with amount of menu variety ( $r=.48$ ;  $p=.001$ ). A correlation between convenience of restaurant location and menu item selling price ( $r=.34$ ;  $p=.001$ ) was also found.

### *Nutrition Knowledge*

The mean scores for the self-rating of nutrition knowledge (0=low nutrition knowledge; 7= high nutrition knowledge) are presented in Table 6. Both pre treatment and post treatment survey respondents summarized their knowledge of nutrition as being fairly high. No differences in mean scores of self-rated nutrition knowledge were found between respondent groups.

Although differences in the rating of nutrition knowledge were not found for age, ethnicity, or gender; a significant difference was found with regards to university status. Overall, when all respondents were combined, individuals classified as graduate students rated their nutrition knowledge to be higher than undergraduate students ( $p=.007$ ). The mean scores for summarized nutrition knowledge for undergraduate and graduates are also shown in Table 6.

Table 6: Mean Responses for Summarizing Nutrition Knowledge for Pre Treatment and Post Treatment, as well as Overall Undergraduates and Graduates

Group	Mean <sup>^</sup>	Std. Deviation
Pre Treatment n = 143	5.3	1.05
Post Treatment n = 143	5.3	1.30
Undergraduate n= 178	5.1*	1.19
Graduate n = 30	5.7*	1.08

<sup>^</sup>mean score derived from 0=none – 7=high

\*t-test reveals significant difference in mean values ( $p=.007$ )

### *Menu Choice Practices of Survey Respondents*

The menu choice practices of participants of pre and post treatment periods were also recorded and compared. These practices included purchasing up-sized meals, examining nutritional information, changing food choice after seeing nutritional information, selecting smaller serving sizes, and not consuming all food served (0 = not likely, 7 = highly likely). In the pre treatment survey respondents, the most common menu choice practice was to change their mind about a food choice after seeing nutritional information with the second most common being examining nutritional information when provided, although both practices were not scored very highly by any respondents.

The post treatment survey respondents listed the most common practice as examining nutritional information when provided, with the second most common being to change their mind about food choices after seeing nutritional information. However, these scores were again in the mid-range of the scale, as opposed to having a strong agreement to practices.

The results of the menu choice practices reported are summarized in Table 7. There was no difference between groups.

Table 7: Menu Choice Practice of Pre and Post Treatment Respondents

Menu Choice Practices	Pre Treatment n=143		Post Treatment n=143	
	Mean <sup>^</sup>	Std. Deviation	Mean <sup>^</sup>	Std. Deviation
Purchase up sized meal	1.5	1.88	1.4	1.60
Examine nutrition information provided <sup>a;b</sup>	3.9	2.01	4.0	1.99
Change mind about food choice after seeing nutritional information <sup>a;c</sup>	3.9	2.10	4	2.05
Select smaller portions when available <sup>b;c;d</sup>	3.2	2.09	3.3	2.10
Not consume all food served <sup>d</sup>	3.4	2.24	3.2	2.07

<sup>^</sup>mean score derived from 0=not likely – 7=highly likely

*a*: Variables correlate Pearsons Correlation  $r=.67$ ;  $p<.05$

*b*: Variables correlate Pearsons Correlation  $r=.36$ ;  $p<.05$

*c*: Variables correlate Pearsons Correlation  $r=.40$ ;  $p<.05$

*d*: Variables correlate Pearsons Correlation  $r=.50$ ;  $p<.05$

Correlations were found between many of the menu choice practices. The practice of changing one's mind about food choice after examining nutrition information, and examining nutritional information when supplied were strongly correlated ( $r=.67$ ;  $p=.001$ ). Examining nutritional information when available was also found to correlate with self-rated nutrition knowledge ( $r=.38$ ;  $p=.001$ ). Selecting smaller portion sizes correlated with the practice of examining nutrition information ( $r=.36$ ;  $p=.001$ ), changing one's mind about food choice after seeing nutritional information ( $r=.40$ ;  $p=.001$ ), and not consuming all food served ( $r=.50$ ;  $p=.001$ ). Gender was also found to correlate with the selection of smaller portion sizes ( $r=.39$ ;  $p=.001$ ). Additionally, gender also correlated with purchasing an up sized meal ( $r=-.35$ ;  $p<.001$ ) and not consuming all food served ( $r=-.42$ ;  $p<.001$ ).

### *Frequency of Meals Consumed Away From Home*

The pre treatment survey respondents displayed a tendency to purchase one meal outside of the home (38.5%) on an average weekday. The mean number of meals eaten away from home on an average weekday for the pre treatment participants was found to be  $1.2 \pm 1.15$ . Although a third of the pre treatment participants were inclined to also purchase one meal outside of the home during weekends as well (31.5%), the majority of survey respondents in the pre treatment group most often purchased fewer than one meal out during an average weekend day (42.7%). The mean number of meals eaten away from home for the subjects in the pre treatment group on an average weekend was  $1.0 \pm 1.16$ .

These results were similar for the post treatment respondents, who were most likely to purchase one meal away from home during an average weekday (37.1%) with a large percentage indicating that they only eat one meal out during the average weekend (46.2%). The mean number of meals eaten away from home on an average weekday for the post-treatment participants was  $1.2 \pm 1.25$ . The mean number of meals eaten away from home for the survey respondents in the post treatment period on an average weekend was  $.8 \pm .98$ . Table 8 summarizes the frequency of the survey respondent's meal consumption outside of the home.

Table 8: Frequency Percent of Respondents Meals Eaten Outside Home

		n=	Weekday %	n=	Weekend %
Pre Treatment n = 143	Less than 1	46	32.2	61	42.7
	1 per day	55	38.5	45	31.5
	2 per day	25	17.5	21	14.7
	3 per day	6	4.2	7	4.9
	More than 3	11	7.7	9	6.3
Post Treatment n = 143	Less than 1	46	32.2	66	46.2
	1 per day	53	37.1	50	35.0
	2 per day	21	14.7	18	12.6
	3 per day	9	6.3	5	3.5
	More than 3	14	9.8	4	2.8

### *Healthfulness Ratings of Menu Items*

Survey respondents in both the pre treatment and post treatment research periods were requested to rate following menu items with their perception of healthfulness, or how healthy they believed the menu entrees to be (0= not healthy, 7= very healthy). The pre treatment respondents were not supplied with any nutritional information or operational definition for “healthy”, but did receive a listing of the menu entrees’ ingredients. The post treatment survey respondents received the nutrition information (calories, fat, carbohydrate, and protein) for some (target) menu entrees, as well as the ingredients for all menu items for which they were requested to rate for healthfulness. The perception of healthfulness ratings made by survey respondents in both of the pre and post treatment periods are listed in Table 9.

Table 9: Perceptions of Healthfulness Ratings of Menu Items

Menu Item	Pre Treatment n=143		Post Treatment n=143	
	Mean <sup>^</sup>	Std. Deviation	Mean	Std. Deviation
Turkey Focaccia	4.3*	1.06	3.7*	1.27
Territorial Club Wrap	3.5	1.38	3.3	1.31
Caesar Wrap	3.9*	1.17	4.4*	1.30
Hot Gobbler	3.8	1.27	3.7	1.19
Pangea's Tuna	4.6	1.21	4.6	1.28
Reuben Bagel	2.9	1.31	3.0	1.23
Greek Veggies Salad	5.5*	1.11	4.9*	1.41
Sunflower Garden Salad	6.0	1.04	5.4	1.36

<sup>^</sup>mean score derived from 0=low-7=high

\*t-test reveals significant difference in mean values ( $p < .05$ )

Significant differences were found for some of the healthfulness ratings of a few menu entrees. However, the differences only occurred for target menu entrees, or those entrees for which the survey respondents were supplied nutrition information. The Caesar Wrap entrée was rated with a lower perception of healthfulness by respondents in the pre treatment group ( $3.9 \pm 1.17$ ) than in the post treatment group ( $4.4 \pm 1.30$ ). This finding was also statistically significant ( $p = .008$ ).

The Greek Veggies Salad was given a higher rating for perception of healthfulness ( $5.5 \pm 1.11$ ) by the pre treatment survey respondents than by the post treatment survey respondents ( $4.9 \pm 1.41$ ). This difference was also found to be statistically significant ( $p = .001$ ).

### ***Observing Nutritional Information***

For the post treatment survey only, one question was added to the demographic section asking if the individual noticed the nutritional information on the restaurant menu when purchasing their food choice at that time. The responses to the participants' observing the addition of nutritional information is summarized in Table 10. While all survey respondents in the post treatment period did reply to this question, only 37% reported noticing the nutritional information on the menu. Although those who did observe the nutritional information were compared to gender, age, university status, knowledge of nutrition, as well as likelihood to examine nutritional information when supplied, no significance was found.

Table 10: Post Treatment Responses to Observing Nutritional Information

		n=	%
Post Treatment n= 143	Yes	53	37.1
	No	90	62.9

### **Sales Data Results**

To ensure that the volume of sales in the college restaurant remained stable throughout the research period, overall sales and transactions were compared for the pre and post treatment period, as well as for weekly means. For some weeks, the POS system tapes were missing so sales data for one or two days were unavailable. Thus, means for the week were calculated. Daily fluctuation in sales was also



controlled by examining weekly means sales totals. The sales volume and transaction counts are summarized in Table 11. No difference was found between either sales or transactions for the two treatment periods, which affirms that there was no change in overall volume of sales or number of transactions during the research process. Table 12 also summarizes sales and transactions for the pre-treatment and post treatment periods, but also offers a detailed analysis of each week for the duration of the research timeframe.

Table 11: Pre-Treatment and Post-Treatment Means for Purchase Count and Sales

	Pre-Treatment Mean	Std. Deviation	Post-Treatment Mean	Std. Deviation
Purchase Count	324.5	29.71	309.3	58.04
Sales	\$1,585.09	\$126.06	\$1,519.00	\$272.61

Table 12: Total, Mean Sales, and Purchase Count by Week for the Research Period

	Week	Sales	Daily Mean Sales	Total Purchase Count	Daily Mean Purchase Count
Pre Treatment Weeks n=5	1 n=4	\$6,584.00	\$1,646.00	1323	330.8
	2 n=3	\$8,039.00	\$1,607.80	1642	328.4
	3 n=5	\$4,484.00	\$1,494.67	911	303.7
	4 n=5	\$6,300.00	\$1,260.00	1645	329.0
	5 n=5	\$7,771.00	\$1,554.20	1618	323.6
Post Treatment Weeks n=5	6 n=5	\$8,055.00	\$1,611.00	1688	337.6
	7 n=5	\$7,730.00	\$1,546.00	1582	316.4
	8 n=5	\$8,321.00	\$1,664.20	1697	339.4
	9 n=5	\$8,321.00	\$1,664.20	1671	334.2
	10 n=5	\$5,548.00	\$1,109.60***	1094	218.8*

\*ANOVA reveals significant difference in mean values ( $p < .05$ )

\*\*\*Tukey's sd significance ( $p < 0.01$ )

A one way ANOVA comparing each week in the research timeframe found that there was a significant difference of mean sales by week, and post hoc testing revealed that week 10 in the post treatment period ( $p = .001$ ) had significantly lower sales than all of the other weeks. However, this result was expected, since the last week of the academic term has a regular tendency to show a decline in sales and transactions. This decline in sales and transactions is due to the changing schedules of the student population, and the effect of preparation for final exams.

### Target and Non-Target Menu Item Counts

Both target and non-target menu entrée items transaction counts were recorded over both the pre treatment and post treatment period. The mean counts for

each target and non-target item are summarized in Table 13. Variations were found between the pre treatment period and post treatment period in regards to purchase count for multiple items.

Table 13: Pre-Treatment and Post-Treatment Daily Purchase Count Means for Target and Non Target Items

Menu Item	Entree	Daily Purchase Count Pre Treatment Mean	SD	Daily Purchase Count Post Treatment Mean	SD
Target	Turkey Focaccia*	10.1	3.49	7.5	3.93
	Classic Sandwich	7.6	4.04	7.0	3.30
	Caesar Wrap	19.6	5.20	18.2	6.12
	Thai Peanut Wrap*	11.0	3.83	8.6	2.92
	Chicken Fajita Wrap	15.0	3.00	14.8	6.65
	Hot Gobbler	6.9	2.33	8.2	2.73
	Greek Veggie Salad	5.6	2.56	6.6	3.03
	Caesar Salad	20.6	5.57	21.7	6.40
Non Target Menu Items	Pangea's Tuna*	7.0	2.51	9.6	3.15
	Tuscan Veggie*	5.5	1.82	4.0	2.16
	Territorial Club	17.4	5.65	17.6	5.24
	Chicken Wrap	6.9	2.95	7.3	2.62
	Reuben Bagel*	3.9	2.42	2.6	1.78
	Sunflower Salad	4.6	2.79	4.4	2.04
	Chicken Fajita Salad	11.1	3.91	9.6	2.81

\* *t*-test reveals significant difference in mean values ( $p < .05$ )

The pre treatment period mean daily count for Turkey Focaccia ( $10.1 \pm 3.49$ ) was found to be significantly different ( $p = .02$ ) than the post period count for this menu item ( $7.5 \pm 3.93$ ). The pre treatment period count for the Thai Peanut Wrap

(11.0±3.83) was also found to be significantly different ( $p=.02$ ) than the post period count for this menu item (8.6±2.92).

One non target menu entrée item, the Pangea Famous Tuna sandwich did significantly increase ( $p=.003$ ) in purchase count from the pre treatment (7.0±2.51) to the post treatment (9.6±3.15) periods. Additionally, two non-target menu entrée items also significantly decreased in purchase count sold from the pre treatment to the post treatment periods. The Tuscan Veggie sandwich had a significant decrease ( $p=.02$ ) between pre (5.5±1.82) and post treatment (4.0±2.16) periods. The Reuben Bagel was the second non target item to significantly decrease ( $p=.04$ ) in purchase count from the pre (3.9±2.42) to post treatment (2.6±1.78) period.

### **Purchase Popularity**

Purchase popularity was also calculated to determine differences in purchase count during the pre and post treatment weeks of the research period. Purchase popularity is derived by dividing the purchase count of each menu item by the overall transactions for the week. This can also be expressed as follows:

$$\text{Purchase Popularity} = \frac{\text{Purchase count transaction for menu item per week}}{\text{Weekly transactions}}$$

Comparing purchase popularity allowed for an alternative method to examine how weekly transactions may have changed over the research period and controls for

random day-to-day variability in sales. In addition to examining target and non-target menu entrée items, it also examines non-entrée menu items that were not studied in this research project and that also make up a portion of sales in this restaurant. The purchase popularity for target, non-target, and non-entrée items are summarized in Table 14.

Significant differences were found for two menu entrée items regarding purchase popularity. The Turkey Focaccia sandwich decreased in popularity ( $p=.04$ ) between pre ( $3.1\pm.51$ ) and post treatment ( $2.4\pm.38$ ) periods. However, the Pangea's Tuna sandwich significantly increased ( $p=.02$ ) between the pre treatment ( $2.3\pm.30$ ) and post treatment ( $3.2\pm.58$ ) periods of the research timeframe. These changes in purchase popularity match the changes observed in overall purchase count.

Table 14. Purchase Popularity for Target and Non Target Menu Entrée Items

Weeks	Total Transactions	Target Entrée Items								Total Target %	Non Target Entrée Items							Total Non Target %	All Other Items
		Focaccia	Classic	Caesar Wrap	Thai Wrap	Fajita Wrap	Hot Gobbler	Greek Salad	Caesar Salad		Tuscan	Tuna	Territorial	Cranberry	Reuben	Fajita Salad	Sunflower		
1	1323	n=48 3.6	n=44 3.3	n=10 7.7	n=38 2.9	n=65 4.9	n=26 2.0	n=19 1.4	n=10 7.7	<b>33.50</b>	n=28 2.1	n=26 2.0	n=58 4.4	n=38 2.9	n=11 0.8	n=37 2.8	n=22 1.7	<b>16.70</b>	n=676 <b>49.8%</b>
2	1642	n=41 2.5	n=26 1.6	n=98 6.0	n=56 3.4	n=38 2.3	n=36 2.2	n=34 2.1	n=98 6.0	<b>26.10</b>	n=23 1.4	n=39 2.4	n=81 4.9	n=56 3.4	n=10 0.6	n=51 3.1	n=33 2.0	<b>17.80</b>	n=905 <b>56.1%</b>
3	911	n=29 3.2	n=22 2.4	n=65 7.1	n=28 3.1	n=46 5.0	n=16 1.8	n=19 2.1	n=65 7.1	<b>31.80</b>	n=14 1.5	n=24 2.6	n=49 5.4	n=20 2.2	n=17 1.9	n=28 3.1	n=20 2.2	<b>18.90</b>	n=466 <b>49.3%</b>
4	1645	n=59 3.6	n=42 2.6	n=87 5.3	n=59 3.6	n=74 4.5	n=35 2.1	n=31 1.9	n=87 5.3	<b>28.90</b>	n=25 1.5	n=43 2.6	n=11 6.4	n=25 1.5	n=21 1.3	n=66 4.0	n=9 0.6	<b>17.90</b>	n=864 <b>53.2%</b>
5	1618	n=45 2.7	n=33 2.0	n=99 6.1	n=87 5.3	n=75 4.6	n=38 2.3	n=21 1.3	n=99 6.1	<b>30.40</b>	n=30 1.9	n=32 2.0	n=89 5.5	n=30 1.9	n=26 1.6	n=64 4.0	n=17 1.0	<b>17.90</b>	n=847 <b>52.0%</b>
6	1688	n=41 2.4	n=31 1.8	n=120 7.1	n=47 2.8	n=64 4.0	n=45 2.7	n=29 1.7	n=120 7.1	<b>29.60</b>	n=25 1.5	n=52 3.1	n=82 4.8	n=33 2.0	n=17 1.0	n=56 3.3	n=21 1.2	<b>16.90</b>	n=943 <b>56.0%</b>
7	1582	n=42 2.6	n=32 2.0	n=102 6.4	n=42 2.7	n=97 6.1	n=48 3.0	n=26 1.6	n=102 6.4	<b>30.80</b>	n=17 1.1	n=49 3.1	n=96 6.1	n=37 2.3	n=14 0.9	n=61 3.8	n=23 1.5	<b>18.80</b>	n=809 <b>51.0%</b>
8	1697	n=50 2.9	n=55 3.2	n=120 7.1	n=50 2.9	n=78 4.6	n=45 2.7	n=46 2.7	n=120 7.1	<b>33.20</b>	n=18 1.1	n=49 2.9	n=90 5.3	n=52 3.1	n=14 0.8	n=38 2.2	n=27 1.6	<b>17.00</b>	n=860 <b>51.0%</b>
9	1671	n=32 1.9	n=33 2.0	n=131 7.8	n=40 2.4	n=80 4.8	n=40 2.4	n=45 2.7	n=131 7.8	<b>31.80</b>	n=17 1.0	n=45 2.7	n=101 6.0	n=35 2.1	n=15 0.9	n=48 2.9	n=22 1.3	<b>16.90</b>	n=886 <b>53.0%</b>
10	1094	n=24 2.2	n=24 2.2	n=67 6.1	n=35 3.2	n=50 4.6	n=26 2.4	n=20 1.8	n=67 6.1	<b>28.60</b>	n=23 2.1	n=46 4.2	n=71 6.5	n=25 2.3	n=4 0.4	n=37 3.4	n=14 1.3	<b>20.20</b>	n=556 <b>51.0%</b>

## **DISCUSSION**

This study involved the analysis of the influence of nutrition information on a restaurant menu, and the effect that the nutrition information would have on restaurant patron's perception of healthfulness for selected menu items. Through the treatment of adding nutrition information to a restaurant menu and monitoring changes in sales as well as surveying restaurant patron's perceptions of healthfulness, the researchers aspired to make a contribution to the literature. The following discussion focuses on the conclusions and applications drawn from the analysis of the survey responses and the sales data gathered.

### **Survey Data**

Distribution of the survey to restaurant patrons enabled researchers to identify influence of restaurant choices, knowledge of nutrition, eating habits and behaviors, frequency of meals eaten away from home, and perceptions of healthfulness for the survey respondents. Since the surveys were hand delivered, the response and completion rate for the surveys was very high. Overall, 286 surveys were completed, 143 in the pre treatment period, and 143 in the post treatment period of the research timeframe.

### *Demographics*

The demographic data for the survey respondents did not vary between pre treatment and post treatment periods (Table 3). Although a greater variety in participants was desired by the researchers to increase generalizability, these demographics were somewhat expected due to the demographics of Oregon State University. Also, a slightly higher female response (58.7% and 59.4%) was also expected, due to the competing restaurants in the vicinity of Pangea, which may be more likely to appeal to the male population (41). However, the greater amount of female response also poses the question, are females more interested in nutrition and making healthful choices than males? Eating behavior results for both the pre treatment and post treatment period were also expected, due to the nature of the overall population at Oregon State University.

### *Influences of Restaurant Choice*

The influences of restaurant choice results (Table 5) expressed that convenience of location of a restaurant had the highest amount of influence on selection of a restaurant. This finding is consistent with the literature (12). The availability of healthful choices was listed as the second highest influence on restaurant choice for both the pre treatment and post treatment groups. This suggests that healthy options are rather important to these subjects, and is a factor that is considered when choosing a restaurant. Considering the high percentage of females



involved in this study, it can also be suggested that the availability of healthful choices in a restaurant is very important to females in the age range of 18-24. Other influences rated by the respondents: ambiance, amount of food for price, menu variety, and quick service all received very similar scores by both the pre treatment and post treatment survey respondents. This suggests that these influences may be considered overall when choosing a restaurant, and that the pre and post treatment groups are no different and can be considered representative of the typical population of this college university restaurant. Due to the nature of this college university restaurant service style, or being a quick serve restaurant, the high ranking for ambiance was surprising. However, this is consistent with the findings of a study by Reed that stated ambiance as being the second reason in a list of ten primary reasons for eating at specific establishments (42).

There was one difference in the ratings of restaurant influence between the pre and post treatment survey respondents. This was in regards to the menu item-selling price, and was found to have greater influence on the post treatment survey respondents. Both treatment groups gave menu item selling price an overall high rating, affirming the importance of price to the consumer when choosing a restaurant. However, the difference between respondents indicates that while many individuals who frequent restaurants are sensitive to price, this sensitivity varies from individual to individual and may increase at certain times periods. Since the respondents were mostly undergraduate students, menu item price sensitivity may be more of a concern during the end of the term than in the middle of the term. Therefore, higher menu prices may be allotted and accepted at certain times for these research participants.

### ***Nutrition Knowledge***

Both pre-treatment and post treatment respondents rated their nutrition knowledge to be rather expansive (Table 6). However, given that fast food establishments are the most popular restaurants for the most prominent age group (18-24) present in this study (12), individuals may either be overconfident in their knowledge of nutrition or simply make food choices that are not consistent with the knowledge that they possess. Also, a significant difference was found between undergraduate students and graduate students in regards to their nutrition knowledge. This suggests that as education level increases, individuals in this study believe that their knowledge of nutrition is also more expansive. Perhaps as individuals age and earn a higher level of education; they become more aware or confident of their nutrition knowledge. However, given the current rates of obesity both in Oregon and nationwide (11), it could be suggested that as individuals age they assume that their understanding of nutrition becomes greater but this knowledge does not impact food choices.

### ***Menu Choice Practices of Survey Respondents***

Survey respondents in both the pre and post treatment periods stated that their most common practice when eating away from home was to examine nutrition information when provided and to change their mind about food choices after seeing nutrition information (Table 7). However, neither group rated this practice as being

highly likely and was instead just a more somewhat likely rating. Therefore, although research participants indicate they are more likely to say they have these practices, it is possible that it won't actually be a practice when eating away from home. This suggests that the application of nutrition information to the restaurant menu may not be the most effective method of persuading individuals to make healthier choices when eating away from home. Some studies have found success in using menu description and focus on palatability to promote healthy food selections (28). Perhaps such a method would be more effective than nutrition information on the menu. However, although the scores for both the pre and post treatment survey respondents for menu choice practices when eating away from home were in the scale's mid-range, the mean scores do suggest that these respondents would be somewhat likely to examine nutrition information supplied and use this information to determine a healthier menu choice when dining away from home. This implies that although the menu may not be the most effective method for supplying nutrition information, the nutrition information itself is useful and inspected.

Correlation results depicted several gender differences regarding food choice practices. Females were found to be much more likely to select smaller portion sizes and to not consume all food served than males. Alternately, males were found to be much more likely than females to purchase an up-sized meal. This again suggests that female survey respondents are more concerned with healthy eating when consuming food away from home.

Optimistically, the practice that respondents were least likely to utilize was to purchase an up-sized meal. This suggests that the research participants are somewhat

aware of portion sizes, and may not be swayed by food marketing into ordering the largest size for the “best value” (20).

### *Frequency of Meals Consumed Away From Home*

Surprisingly, the frequency of meals consumed away from home by both pre treatment and post treatment survey respondents were reported to be rather low (Table 8). Although there were slight differences between the two groups, overall the mean of meals eaten away from home on weekdays was  $1.21 \pm 1.2$ , and the mean meals eaten away from home on weekends was  $.91 \pm 1.07$ . This is somewhat lower than what the USDA has found, or that the daily average number of meals eaten away from home is 1.94 (43). Although the researchers expected a higher frequency of meals eaten away from home, these findings are consistent with the literature that states that the number of meals eaten away from home is directly related to income level and amount of disposable income (44). Studies have found that meals eaten away from home increases dramatically when the household’s income is higher than \$30,000 annually (2). Since the majority of these participants were undergraduate students in a lower age range, their income level is lower than professional working households, and is not high enough to support a higher frequency of meals eaten away from home. Participants also seemed more inclined to eat meals (in all frequencies) away from home during the week instead of the weekend. This finding hints also hints at the relationship between eating meals away from home and time constraints, since more meals away from home were consumed during weekdays (2).

However, even with the lower income of students, the researchers were surprised by the low frequencies of meals consumed away from home for the research participants. This greatly differs from other research studies that have found the age group of 18-39 for both males and females to be the largest consumers of meals away from home (45) This discrepancy could be from a misunderstanding on behalf of the survey respondents' definition of a "meal away from home". Since many students frequently consume meals at various dining halls on campus, and may not have a kitchen to prepare food if living on campus, meals consumed in the dining halls may not be considered "eating out". Therefore, while the researchers had the impression that any meals away from home are meals that were not prepared by the individual, this may not be the definition held by the research participants.

### ***Healthfulness Ratings of Menu Items***

Although the healthfulness ratings did differ slightly between the pre treatment and post treatment survey respondents, the only significant differences in healthfulness ratings were found on the target menu entrée items (Table 9). The target menu entrée items were supplied with nutrition information as the treatment of this research project.

The Turkey Focaccia sandwich received a significantly higher rating for perception of healthfulness from survey respondents in the pre treatment group than survey respondents in the post treatment group who were supplied with nutritional information. Since this can be considered a higher calorie entrée (666 calories), this

decrease in healthfulness rating reflects the examining of the nutritional information and suggests that participants may not have been aware of the actual nutrition content of this entrée.

The Caesar Wrap entrée was rated with a significantly lower perception of healthfulness by respondents in the pre treatment group than in the post treatment group. Unlike the Turkey Focaccia sandwich, the Caesar Wrap can be considered a lower calorie entrée (340 calories). Therefore, when provided with the nutrition information, participants realized this entrée was healthier than some of the other entrees on the menu.

The Greek Veggie Salad and the Sunflower Garden Salad were both given higher ratings for perception of healthfulness in the pre treatment group than in the post treatment group, with a significant difference in healthfulness ratings for the Greek Veggie Salad. Although both salads can be considered to be lower calorie entrees (382 calories, and 340 calories, respectively), these decreases in healthfulness rating may also reflect the examining of the nutritional information provided. Since the two salads received the highest healthfulness perception ratings in both pre and post treatment groups, it can be suggested that restaurant patrons may assume that all salads can be considered healthy due to the high quantity of vegetables present in the dish. However, the change in rating of perception of healthfulness does reflect a re-evaluation of this assumption on behalf of the consumer.

Therefore, when nutrition information is supplied for target entrée menu items, they did result in lower perceptions of healthfulness ratings. Restaurant patrons were better able to evaluate the healthfulness of menu offerings. Research

participants in the post treatment period were able to determine which items were higher calorie and therefore less healthful menu entrée items. This difference in healthfulness ratings also suggests that the pre treatment participants are not aware of the nutrient composition of menu entrée items, as the literature has stated (5). Also, since significant differences were found between the perceptions of healthfulness for survey respondents between the pre and post treatment period, it can be concluded that the survey respondents must use calories, fat, protein, and carbohydrate composition to mean, or determine what is “healthy”.

Although an effect of the added nutrition information was seen for the healthfulness ratings of the target menu items, the presence of the nutrition information on the menu did not influence the perceptions of healthfulness for the non-target items. These findings differ from the results found by Burton, where it was found that nutrition information presented effected the perceptions of both target and non-target menu entrée items (30).

### ***Observing Nutritional Information***

Unfortunately, fewer than half of the individuals surveyed in the post treatment period (Table 10) observed the nutritional information presented on the restaurant menu. Although the healthfulness ratings were not affected by this lack of observation since the nutrition information was also included on the survey, the restaurant sales of target and non-target menu entrée items may have been only slightly influenced by the addition of the information. This is partially due to the fact

that many patrons who frequent this college campus restaurant are returning customers, and may not even look at the menu before ordering or order the same item at each visit to the restaurant. The researchers attempted to combat this issue with the addition of signage at key points around the restaurant, including the point of sale. However, either the signage was also not observed by the restaurant patrons, or was not an effective method to influence restaurant customers to examine nutritional information. The percentage of survey respondents that did report seeing the nutrition information added to the menu in this study was similar to the findings of Albright and Flora, who found that only 50% of survey respondents were aware of the added nutrition information (31). This reinforces that idea that presenting nutrition information on the menu may not be the most effective way to inform the consumer.

On the other hand, the possibility exists that the survey respondents of the post treatment period may not have been representative of the college campus restaurant and observations of nutrition information. Since every restaurant patron was not surveyed during the treatment portion of the research timeframe, it is unknown how many individuals truly observed the applied nutritional information. Therefore, a greater number than was represented by the survey results could have examined the provided nutrition information.

The problem of the research participants not observing the nutrition information may have been avoided had the researchers received permission from the restaurant management to highlight the nutrition information. However, either suggestions from the researchers of either a change in font color or size was not



approved by restaurant management. This was partially due to restricted menu space, but the addition of nutrition information to the menu and the possible effect on sales was a stated concern for the restaurant management.

### **Sales Data**

Fortunately, the overall volume of sales and purchase counts remained stable for both the pre and post treatment periods (Table 11). However, some significant differences were found in the purchase counts for a few of the target and non-target menu entrée items (Table 13).

Two target menu entrée items showed statistically significant differences in the purchase count between the pre and post treatment periods. Two high calorie menu entrees, the Turkey Focaccia sandwich (666 calories) and the Thai Peanut Wrap (509 calories), decreased in the purchase counts after the addition of nutritional information to these items on the menu. This suggests that of those restaurant patrons who did observe the nutrition information, some may have been deterred from ordering these menu items due to their high caloric nature. However, since only two of the eight target entrée menu items purchase counts were effected these changes may not be primarily due to the treatment, or addition of nutrition information. Also, other high calorie target entrée menu items did not show any change in purchase count, confounding the possible influence of the nutrition information. The change in purchase count that did occur could be attributed to weather changes and the influence it has on what restaurant patrons order (wanting something lighter as the

weather becomes warmer). Or, chance fluxuations in customer demand of specific items could also be responsible.

Some statistically significant changes were also seen in the purchase count of a few non-target menu items. One non-target menu item, the Pangea's Famous Tuna sandwich, had a significant increase in purchase count during the post treatment period of the study. This could be attributed to the addition of nutritional information to the menu forcing patrons to choose what may have been perceived to be a lower calorie item. It could also be an altered choice consequence to seeing the high caloric content of the two target entrée menu items discussed above. Therefore, the college restaurant patrons may have thought that the sandwich was a healthier option than the target entrée menu items, and therefore, a better choice. However, this was the only non-target entrée item that significantly increased in purchase count, which does not strengthen the argument that the increase was due to the addition of nutritional information to the menu.

Two non-target menu items also significantly decreased during the post treatment period, the Tuscan Veggie sandwich and the Reuben Bagel. It can be suggested that the decrease in the purchase count of these items is due to the nutritional frame or context that they were presented in. Both items were next to target menu entrée items that were classified as being high calorie. Additionally, to being located immediately below the Turkey Focaccia sandwich, the Tuscan Veggie sandwich also shared some similar ingredients. The nutritional frame of the Tuscan Veggie sandwich suggests that restaurant patrons were also deterred from this menu item in favor of another, more healthful item.

Therefore, due to nutritional frame, restaurant patrons may have associated the higher calorie content with these non-target menu items. These findings are consistent with the research of Burton, which also states the importance and effect of nutritional frame on perceptions of healthfulness and purchase behaviors of target and non-target menu entrée items. Restaurant patrons may have been deterred from these menu items in favor of another, more healthful item. This is further strengthened by the fact that the target menu item located above the Tuscan Veggie sandwich also experienced a decrease in purchase count. However, this relationship does not hold true for the decrease in purchase count for the Reuben Bagel, since the purchase count for the high calorie target entrée menu items surrounding it on the menu did not change. The significant decrease in purchase count for the Reuben Bagel may be attributed to the lack of popularity of this menu item, and that a very small change in purchase count would be needed to reach significance. However, the purchase count change for the Reuben Bagel could be attributed to the nutritional context.

Conversely, unlike other changes found, the changes in purchase count for the Tuscan Veggie sandwich and the Reuben Bagel were not supported by changes in purchase popularity (Table 14). This indicates that the sales of the Tuscan Veggie sandwich and the Reuben Bagel in did not decrease in proportion to total purchase counts. Therefore, this finding is less significant, since it could have been a result of random variations in sales.

## Null Hypotheses

As the focus of this research study, four primary research hypotheses and three secondary research hypothesis were considered. Using the overall results and discussion of these results, some conclusions can be drawn relating to these hypotheses.

### *Primary Research Hypotheses:*

**Null Hypothesis H01: The addition of nutritional information to selected items on the Pangea menu will not result in changes in the sales for that item.**

Although two target menu entrée items did show changes in the purchase count between the pre and post treatment periods, six of the target menu entrée items did not show any change. Although the change in the two items does suggest that nutritional information may have had a slight effect on purchase count of the menu items, this relationship was not constant among all target menu entrée items, and is confounded by the lack of observation of the nutritional information. Therefore, this null hypothesis was not rejected. However, if null hypotheses would have been stated for each target entrée menu item, as opposed to all target entrée menu items as a whole, then two of the hypotheses pertaining to the Turkey Focaccia sandwich and the Thai Peanut wrap would have been rejected, since significant differences were found in the sales of these two target entrée menu items.

**Null Hypothesis H02: There will be no difference in item sales for individual item between weeks before treatment and weeks after treatment.**

It was found that there was no difference in item sales for individual items between the pre treatment weeks and the post treatment weeks. Therefore, conclusions regarding the stability of the effect of the treatment, or if the effect of the treatment reduces over time cannot be made. This null hypothesis was not rejected.

**Null Hypothesis H03: There will be no difference in sales ratios, or the sale of menu items relative to total sales, between items with nutritional information and those without information, when examined during the before and after treatment sessions.**

A difference in sales and purchase count was found for a five of the target and non-target entrée menu items before and after the treatment, or addition of nutritional information. Although not all target and non-target entrée items exhibited a change in the purchase count, for those items that did exhibit a change in the purchase count it can be highly suggested that the change was a result of the nutritional information supplied. Therefore, this hypothesis was rejected.

**Null Hypothesis H04: There will be no difference in the mean sales per week for the items labeled with nutritional information.**

It was found that there was no difference in the mean sales per week for the items labeled with nutritional information. Therefore, this hypothesis was not rejected.

***Secondary Research Hypotheses:***

**Null Hypothesis H05: There will be no difference in scores of mean healthfulness rating between the pre-treatment and post-treatment periods.**

It was shown that a difference occurred in the ratings of healthfulness between the pre treatment and post treatment periods, but only for the target menu entrée items or items that provided nutritional information. Therefore, the addition of nutritional information did affect the perception of healthfulness for those menu items. As a result, this null hypothesis is rejected due to the changes in perception of healthfulness.

**Null Hypothesis H06: There will be no relationship between the calories, carbohydrates, fat, and protein content and healthfulness ratings on target menu items.**

No relationship was found between the calories, carbohydrates, fat, and protein content and healthfulness ratings on target menu items. Therefore, it cannot

be determined which of the nutrient information supplied had a greater effect on perception of healthfulness ratings. This hypothesis was not rejected.

**Null Hypothesis H07: There will be no difference between mean menu ratings of healthfulness between target and non-target menu items during the pre-treatment and post-treatment periods.**

Although no difference was found in the ratings of non-target menu entrée items, a significant difference was found between mean ratings of healthfulness for some target menu items between pre and post treatment research periods. For that reason, it is believed that the nutritional information on target menu entrée items did impact the perception of healthfulness ratings of these target items. Therefore, this null hypothesis is rejected.

## CONCLUSIONS

### **Summary**

This research study examined if and to what extent the application of nutritional information (total calories, and grams of macronutrients per serving) presented on the menu and at the point of sale influences selections of and rating of healthfulness of menu items in one college campus restaurant.

The study also involved surveying patrons of an Oregon State University campus restaurant both before (pre-treatment) and after (post-treatment) the addition of nutritional information for six target and four non-target entrée items. A total of 286 surveys (n= 143 pre-treatment, n=143 post treatment) from randomly selected patrons were completed and returned. Data analysis included descriptive statistics, and associations between variables through the use of regression correlations and chi-squared analysis.

Menu item sales were also gathered from point of sale (POS) receipts and Micros software systems to be analyzed. Mean total sales and transactions were not different for the duration of the study but did vary for the menu items. Comparisons of mean sales and purchase popularity between target and non-target menu items for all weeks of both pre and post treatments were made.

The pre treatment and post treatment survey respondents were very similar, and found to be primarily 18-24 year old females at an undergraduate level at the University.



Survey respondents were also very similar in identifying influences of restaurant choices. Both pre treatment and post treatment survey respondents rated convenience of location the highest and ambiance the least influence on daily restaurant choices. Significant differences were noted between the influences of menu item selling price, with the post-treatment respondents rating item price to be more of an influence than the pre-treatment respondents, suggesting that price sensitivity fluctuates over time. Both pre treatment and post treatment respondents also rated their knowledge of nutrition as being fairly high.

Among the pre treatment survey respondents the most common food choice practice was to change their mind about a food choice after seeing nutrition information with the second most common habit being to examine nutrition information when provided, although both habits were not scored very highly. The post treatment survey respondents also listed the most common habit as examining nutrition information when provided, with the second most common being to change their mind about food choices after seeing nutrition information. However, these scores were again in the mid-range of the scale, as opposed to being highly likely to portray these habits.

Significant differences were found for some of the healthfulness ratings of some menu entrees. These differences only occurred on target menu entrees, or those entrees that were supplied with nutrition information. The Turkey Focaccia sandwich was rated with a higher perception of healthfulness before nutrition information was added. Due to the nature of this entrée being high calorie, this decrease in healthfulness rating reflects the examining of the nutrition information and suggests

that participants may not have been aware of the actual nutritional content of this entrée. Alternatively, the Caesar Wrap entrée was rated with a lower perception of healthfulness before the addition of nutritional information showing that it was a low calorie entrée. Therefore, when provided with the nutrition information, participants realized this entrée was healthier than some of the other entrees on the menu.

The Greek Veggie Salad was rated with a higher perception of healthfulness before the addition of nutrition information. Although the salad can be considered to be a lower calorie entree, the decrease in healthfulness rating reflects the examining of the nutrition information. Since the two salads received the highest healthfulness perception ratings in both pre and post treatment groups, restaurant patrons may assume that all salads can be considered healthy due to the high quantity of vegetables present in the dish. However, the change in rating of perception of healthfulness for the Greek Veggie Salad does reflect a re-evaluation of this assumption on behalf of the consumer.

Due to the low frequency of individuals noting the nutrition information on the menu, few conclusions can be made about the changes in sales data. However, some changes were observed. The purchase counts for Turkey Focaccia as well as the Thai Peanut Wrap were found to have significantly decreased after the addition of nutrition information. This was determined to be a result of the added nutrition information. Due to the high caloric nature of this item, restaurant patrons may have been deterred from consuming this menu item and instead made a different selection from the menu.

One non-target menu entrée item, the Pangea Famous Tuna sandwich was found to significantly increase after the addition of nutrition information. This increase could have occurred due to the significant decrease in the two-target menu items discussed prior if restaurant patrons chose this entrée under the impression that it was a healthier option, and therefore a better choice.

Two non-target menu entrée items also significantly decreased in count sold between the pre treatment and post treatment periods, due to the nutritional context of these items. Since the Tuscan Veggie sandwich was located immediately below the Turkey Focaccia sandwich on the menu, and shared some similar ingredients, it can be suggested that restaurant patrons were deterred from this menu item in favor of another, more healthful item. Similar assumptions can be made regarding the decrease in the purchase counts of the Reuben Bagel, since it is also located between two target menu items that are both classified as being high calorie. However, the significance of the decrease in purchase count of the Reuben Bagel may be due to the fact that this menu item is one of the least popular, and very little change in count sold is needed to obtain significance.

Differences were also found for two menu entrée items regarding purchase popularity. The Turkey Focaccia sandwich decreased in popularity while Pangea's Tuna sandwich increased over the periods of the research timeframe. These changes in purchase popularity match the changes observed in overall purchase count.

Overall, this research study confirms that restaurant patron's ratings of healthfulness are affected when provided with nutrition information, and are much more apt to appropriately rate healthfulness when provided with this nutrition

information. Although these research findings also suggest that nutrition information present on a restaurant menu effect purchase choice as well, strong conclusions cannot be drawn due to the small number of participants who were aware of the addition of nutrition information.

### **Recommendations for Future Research**

Many opportunities exist for future research regarding the application of nutrition information to a restaurant menu, and the possible affect that this information may have on sales.

While some questions were answered through the process of this research study, results were limited to a small sample of the Oregon State University students. Therefore, future studies into the effect of nutrition information on the restaurant menu should attempt to involve a sample group large and diverse enough that the results can be generalized to a greater overall population. Also, a larger sample with a range of age and cultural groups could offer many insights into methods to influence restaurant patrons to make healthier decisions when consuming food away from home. There is a very good possibility that the effectiveness of the presentation of nutrition information will vary between different age groups ad various cultural backgrounds. Therefore, the implementation of one overall technique may not be the most effective way to reach different groups.

Also, different methods of presenting menu item nutrition information should be analyzed for efficiency and customer perception. Presenting nutrition information

on the menu may not be as effective as offering a pamphlet, booklet, including hints on healthfulness in the menu description of restaurant offerings, providing large, accessible signage to patrons, or expressing the information in some other way. However, since no research study was found that compares these methods for providing nutrition information, further research is necessary.

This study also found that although changes may occur in sales count of specific items, the overall sales volumes of the restaurant did not change during the research period. Therefore, it can be highly suggested that the addition of nutrition information in a restaurant setting will not greatly effect overall sales volume. However, confirming this finding will require additional research over a longer time frame. In addition, a longer research timeframe could also allow for the evaluation of the effect of the nutrition information over time. Will it have a greater impact over time, or will the effect of the nutrition information fade with time?

In order to have a greater understanding of restaurant patron's personal perception of what is "healthy", this term was never specifically defined for any of the survey respondents. This allowed for truly subjective responses on the survey, although no significant findings were established regarding what information was most important to the survey respondents when determining how healthy a menu item was. Therefore, further research into determining the understanding of "healthy" and how items are determined to be healthy is needed.

In addition to determining what information is necessary for restaurant patrons to effectively evaluate the healthfulness of menu items, the effectiveness of the nutritional frame should also be further analyzed. Do menu items have an impact on

the perceptions of others? Burton and Creyer found that the nutritional frame does effect perceptions, but their research was not performed in a restaurant setting (30). The effect of the nutritional frame was also suggested to effect perceptions in this research study, however additional studies are necessary to determine the impact that truly occurs due to the nutritional frame. This will also assist in determining if nutrition information should be listed for all menu items or only chosen menu items.

Additionally, factors influencing restaurant choice should also be further examined to determine interactions among factors. Also environmental interventions should be analyzed to see if variations in effectiveness are found among different restaurant types, such as: fast food, family-style service, buffet, and many others. Also variations in eating occasions and customer base should be further examined to determine their influence on restaurant and menu choices.

Also, studies have found that those most likely to examine nutrition information regarding total fat, saturated fat, and cholesterol are those individuals who consume less of these nutrients than other individuals (46). Therefore, innovative approaches will be required to encourage those individuals with unhealthy dietary habits to examine supplied nutritional information and deter these consumers from choosing unhealthy menu options.

## LIMITATIONS

This research study presents several limitations. The first limitation is the small sample size of 286 patrons completing the questionnaire in one restaurant setting. This study did however; gather sales data and results for a ten-week period representing more than 10,000 transactions in the restaurant. Although good results were experienced with response rate for completed surveys, a larger population may have provided more insights. Also, another limitation of this study is that the respondents are not representative of any population group. The sample consisted of mostly college students, but cannot be generalized to this population due to the limited ethnicities of the research respondents.

Intentionally, the survey questions were designed to investigate research participant's perceptions of healthy food, without providing an operational definition for "healthfulness" for which they were asked to evaluate menu items. Without the definition, the study was able to get a real perception. The survey did provide data regarding influences of restaurant choices, behaviors when eating foods away from home, and meals away from home frequency, but no way to determine *actual* influences, behaviors, or frequency of meals that are *truly* consumed away from home.

Another limitation of this study is the inability to collect information without the subjects being influenced by the research process. The participants were inevitably aware that their answers are being recorded and analyzed, which may also affect the truthfulness of their response. Furthermore, due to time constraints,

participants may have rushed through the survey or not answer a question completely. Also, if a participant is sitting with a non-participant(s) the survey may become a topic of conversation, and the answers may reflect a consensus of the group instead of an individual's response.

The short timeframe of the study is also a limitation. Ten weeks may not be sufficient enough to see a response to the addition of nutrition information. It certainly is not a long enough time frame to examine a disappearance of the treatment effect.

Also, the participants in this study were volunteers and were primarily college students. There was no control group or comparison group made for the study. These factors contribute to difficulty in generalizing about the study outcomes.

Although random selection was attempted when requesting research participation it was not consistent. Often research participants would have questions or comments regarding the study, which would prevent the researcher from asking the next random individual to participate. However, the researchers felt that it was inappropriate to ignore these questions and would proceed to discuss the participation requirements until the individual was satisfied.

The method of gathering sales data was also a limitation. Although the majority of the data regarding sales was collected, a few days were missing due to register crashes, or missing register receipts. The sales data gathered also depends on the accuracy of the restaurant staff member using the register, and actually entering each order as the menu item that was desired by the customer.



Finally, overall results may have been very different had individuals observed or the nutrition information placed on the menu. However, since less than half (37.1%) observed the nutritional information very little effect occurred. The presentation of the nutritional information was partially influenced by the management of the restaurant; however, researchers were unable to persuade the management to allow the nutritional information to be more apparent.

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APPENDICIES

## Appendix A: Consent Letter



Nutrition and Food Management  
Oregon State University, 108 Milam Hall, Corvallis, Oregon 97331-5103  
Phone 541-737-3561 | Fax 541-737-6914 | [www.hhs.oregonstate.edu/nfm](http://www.hhs.oregonstate.edu/nfm)

Dear Pangea Patron:

You are invited to be in a research study among Pangea clientele. The purpose of this study is to examine the food choices that consumers make when eating meals away from home and also to gather general information regarding the patrons of Pangea. You were selected as a possible participant because of your presence today at Pangea restaurant. The purpose of this letter is to provide information you will need to assist your decision of whether or not you would like to participate in this study.

The purpose of this study is to examine the food choices that consumers make when eating meals away from home and also to gather general information regarding the patrons of Pangea. If you agree to be in this study, it will only take approximately 10 minutes. Your participation will involve the completion of a survey containing demographic and nutrition questions.

Please understand that we are not attempting to sell anything, or solicit you in any way. Your participation is completely voluntary, and you can refuse to answer any individual questions or discontinue the survey at any time.

The records of this study will be kept entirely confidential. In any sort of report that might be published, no information will be included that will make it possible to identify a subject. Research records will be stored securely and only researchers will have access to the records. Any forms that you will fill out during the study will only be viewed by the researcher, and will be destroyed upon completion of data analysis. There are no predicted or expected risks to answering these questions, and there are no direct benefits. However, your participation is extremely valued.

The researchers conducting this study are: Master's candidate Sherice Peacock and her advisor, Dr. Mary Cluskey. Questions are encouraged, and you may ask any questions you have now. Questions can also be sent to the researchers at the Department of Nutrition and Food Management, 108 Milam Hall, Corvallis, OR 97333, (541) 737-3561. If you have questions about your rights as a participant, please contact the Oregon State University Institutional Review Board (IRB) Human Protections Administrator, at (541) 737-3437 or by e-mail at [IRB@oregonstate.edu](mailto:IRB@oregonstate.edu).

Thank you for your help. We appreciate your cooperation.

Sincerely,

Sherice Peacock  
Master's Candidate/Student Researcher



# Appendix B: Pre Treatment Research Questionnaire

## Research Questionnaire

For the following questions, please circle the number that best represents your opinion.

1. How much influence do the following factors have on your day-to-day restaurant choices?

	None							A lot
Convenience of Location	0	1	2	3	4	5	6	7
Menu Item Selling Price	0	1	2	3	4	5	6	7
Ambiance of Restaurant	0	1	2	3	4	5	6	7
Amount of food for price	0	1	2	3	4	5	6	7
Amount of Menu Variety	0	1	2	3	4	5	6	7
Availability of Healthful Choices	0	1	2	3	4	5	6	7
Quick Service	0	1	2	3	4	5	6	7

2. How would you best summarize your knowledge of nutrition?

None								A lot
0	1	2	3	4	5	6	7	

3. When eating away from home, how likely are you to:

	Not Likely							Highly Likely
Purchase an "up-sized" or value meal	0	1	2	3	4	5	6	7
Examine nutritional information provided	0	1	2	3	4	5	6	7
Change mind about food choice after seeing nutrition information	0	1	2	3	4	5	6	7
Select a smaller portion when available	0	1	2	3	4	5	6	7
Not consume all food served	0	1	2	3	4	5	6	7

4. How many meals, not snacks, are purchased outside of the home on an average weekday and weekend day? Please place an X the appropriate box.

Weekday

<input type="checkbox"/>	Less than 1
<input type="checkbox"/>	1 per day
<input type="checkbox"/>	2 per day
<input type="checkbox"/>	3 per day
<input type="checkbox"/>	More than 3

Weekend

<input type="checkbox"/>	Less than 1
<input type="checkbox"/>	1 per day
<input type="checkbox"/>	2 per day
<input type="checkbox"/>	3 per day
<input type="checkbox"/>	More than 3

→  
Continued on back of page

5 Please rate how healthy you believe the following Pangea menu items to be:

	Not Healthy	0	1	2	3	4	5	6	7	Very Healthy
<b>Turkey Focaccia:</b> turkey breast, dilled Havarti cheese, roasted red pepper, carmalized onions, lettuce, herbed aioli on focaccia bread		0	1	2	3	4	5	6	7	
<b>Caesar Wrap:</b> chicken, parmesan cheese, romaine, with Caesar dressing in a tortilla		0	1	2	3	4	5	6	7	
<b>Territorial Club:</b> whole wheat tortilla with turkey breast, guacamole, sour cream, slasa, bacon, cheddar cheese, tomatoes, and lettuce		0	1	2	3	4	5	6	7	
<b>Hot Gobbler:</b> turkey breast, tomato, swiss cheese, and honey mustard atop two bagel halves		0	1	2	3	4	5	6	7	
<b>Pangea's Famous Tuna:</b> tuna salad with provolone and lettuce on multigrain bread		0	1	2	3	4	5	6	7	
<b>Reuben Bagel</b> corned beef, Swiss cheese, sauerkraut, Thousand Island dressing atop two bagle halves		0	1	2	3	4	5	6	7	
<b>Greek Veggie Salad</b> mixed greens, tomato, artichoke, onion, black olive, mushroom, roasted red pepper marinated in balsamic vinaigrette, feta chesse, and pine nuts		0	1	2	3	4	5	6	7	
<b>Sunflower Garden Salad</b> mixed greens, cucumbers, sunflower seeds, and tomatoes		0	1	2	3	4	5	6	7	

Please answer each of the following demographic questions by placing an X in the box next to the single best answer. Thank you again for your time!

6. Gender:

Male  
 Female

7. What did you order today? \_\_\_\_\_

Do you think this menu item is healthy?  
 Yes  No

8. Race/Ethnicity:

Black or African American  
 Hispanic or Latino  
 Asian or Pacific Islander  
 American Indian or Alaskan Native  
 Caucasian  
 Muticultural

9. University Status:

Undergraduate Student  
 Graduate Student  
 Faculty  
 Staff  
 Alumni  
 Other

10. Age:

Under 18  
 18-24  
 25-34  
 35-44  
 45-54  
 55 and over

11. Do any of the following affect your eating behavior?

Vegetarian  
 Vegan  
 Endurance Athlete/Athletic Competition  
 Religious or Cultural Restrictions  
 Medical dietary restrictions  
 None  
 Other (specify) \_\_\_\_\_

## Appendix C: Post Treatment Research Questionnaire

## Research Questionnaire

For the following questions, please circle the number that best represents your opinion.

1. How much influence do the following factors have on your day-to-day restaurant choices?

	None							A lot
	0	1	2	3	4	5	6	7
Convenience of Location	0	1	2	3	4	5	6	7
Menu Item Selling Price	0	1	2	3	4	5	6	7
Ambiance of Restaurant	0	1	2	3	4	5	6	7
Amount of food for price	0	1	2	3	4	5	6	7
Amount of Menu Variety	0	1	2	3	4	5	6	7
Availability of Healthful Choice	0	1	2	3	4	5	6	7
Quick Service	0	1	2	3	4	5	6	7

2. How would you best summarize your knowledge of nutrition?

None								A lot
0	1	2	3	4	5	6	7	

3. When eating away from home, how likely are you to:

	Not Likely							Highly Likely
	0	1	2	3	4	5	6	7
Purchase an "up-sized" or value meal	0	1	2	3	4	5	6	7
Examine nutritional information provided	0	1	2	3	4	5	6	7
Change mind about food choice after seeing nutrition information	0	1	2	3	4	5	6	7
Select a smaller portion when available	0	1	2	3	4	5	6	7
Not consume all food served	0	1	2	3	4	5	6	7

4. How many meals, not snacks, are purchased outside of the home on an average weekday and weekend day? Please place an X the appropriate box.

Weekday	
<input type="checkbox"/>	Less than 1
<input type="checkbox"/>	1 per day
<input type="checkbox"/>	2 per day
<input type="checkbox"/>	3 per day
<input type="checkbox"/>	More than 3

Weekend	
<input type="checkbox"/>	Less than 1
<input type="checkbox"/>	1 per day
<input type="checkbox"/>	2 per day
<input type="checkbox"/>	3 per day
<input type="checkbox"/>	More than 3

Continued on back of page →

5. Please rate how healthy you believe the following Pangea menu items to be:

		0	1	2	3	4	5	6	7
Cal: 666 Carbs: 69 Pro:48 Fat:22	<b>Turkey Focaccia:</b> turkey breast, dilled Havarti cheese, roasted pepper, caramelized onions, lettuce, and aioli	0	1	2	3	4	5	6	7
Cal: 340 Carbs: 12 Pro:29 Fat:20	<b>Caesar Wrap:</b> chicken, parmesan cheese, romaine, with Caesar dressing in a tortilla	0	1	2	3	4	5	6	7
	<b>Territorial Club:</b> wheat tortilla, turkey breast, guacamole, sour cream, salsa, bacon, cheddar cheese, tomatoes, and lettuce	0	1	2	3	4	5	6	7
	<b>Hot Gobbler:</b> turkey breast, tomato, swiss cheese, honey mustard atop two bagel halves	0	1	2	3	4	5	6	7
	<b>Pangea's Famous Tuna:</b> tuna salad with provolone and lettuce on multigrain bread	0	1	2	3	4	5	6	7
Cal: 570 Carbs: 68 Pro:28 Fat:22	<b>Reuben Bagel</b> corned beef, Swiss cheese, sauerkraut, Thousand Island dressing atop two bagel halves	0	1	2	3	4	5	6	7
Cal: 382 Carbs: 17 Pro:9 Fat:30	<b>Greek Veggie Salad</b> mixed greens, tomato, artichoke, onion, olive, mushroom, roasted red pepper marinated in balsamic vinaigrette, feta cheese, and pine nuts	0	1	2	3	4	5	6	7
Cal: 340 Carbs: 12 Pro:29 Fat:20	<b>Sunflower Garden Salad</b> mixed greens, cucumbers, sunflower seeds, and tomatoes	0	1	2	3	4	5	6	7

Please answer each of the following demographic questions by placing an X in the box next to the single best answer. Thank you again for your time!

6. Gender:

Male  
 Female

7. What did you order today?

Do you think this menu item is healthy?  
 Yes  No

8. Race/Ethnicity:

Black or African American  
 Hispanic or Latino  
 Asian or Pacific Islander  
 American Indian or Alaskan Native  
 Caucasian  
 Muticultural

9. University Status:

Undergraduate Student  
 Graduate Student  
 Faculty  
 Staff  
 Alumni  
 Other

10. Age:

Under 18  
 18-24  
 25-34  
 35-44  
 45-54  
 55 and over

11. Do any of the following affect your eating behavior?

Vegetarian  
 Vegan  
 Endurance Athlete/Athletic Competition  
 Religious or Cultural Restrictions  
 Medical dietary restrictions  
 None  
 Other (specify) \_\_\_\_\_

12. Did you observe the nutritional information on the Pangea menu?

Yes  No

## Appendix D: Pangea Menu with Nutrition Information

# PANGEA

## cafe

## Sandwiches

Turkey Focaccia: turkey breast, dilled Havarti cheese, roasted red pepper, caramelized onions, lettuce, herbed aioli on focaccia bread  
Calories:666 Carbs:69g Protein:48g Fat:22g \$4.55

Tuscan Veggie: tomato, artichoke, onion, black olive, mushroom, and roasted red pepper marinated in a balsamic vinaigrette, with provolone cheese, lettuce, herbed cream and goat cheese on a focaccia bread \$4.30

Pangea's Famous Tuna: tuna salad with provolone cheese and lettuce on multi-grain bread \$4.30

Classic: your choice of turkey or ham, Swiss or Tillamook cheddar cheese, tomatoes, lettuce, and honey mustard, on whole wheat bread \$4.30  
Calories:419 Carbs:52g Protein:18g Fat:16g

1/2 Sandwich &

Cup of Soup or Small Side Salad:  
Turkey Focaccia \$4.55  
Tuscan Veggie, Tuna or Classic \$4.30

MU Quad To Go: see our board for the sandwich of the day - wrapped and ready to go with chips and a tasty dessert \$4.95

## Wraps

Territorial Club: whole wheat tortilla with turkey breast, guacamole, sour cream, salsa, bacon, cheddar cheese, tomatoes & lettuce \$4.55

Caesar: chicken, parmesan cheese, and romaine with Caesar dressing in a spinach tortilla  
Calories:462 Carbs:35g Protein:31g Fat:22 \$4.30

Thai Peanut Wrap: shredded red cabbage, carrots, cucumbers, red pepper, cilantro, basil, peanuts, sesame Thai vinaigrette, spicy peanut sauce on a herbed wrap \$4.30  
Calories:509 Carbs:64g Protein:12g Fat:23g

Chicken Cranberry Salad Wrap: chicken, celery, dried cranberries in a lemon Italian herb mayonnaise, with crumbled bleu cheese, caramelized onions, lettuce, toasted sliced almonds in a whole wheat wrap \$4.55

## Drinks

Fountain Beverages \$ 1.25  
Bottled Beverages \$ 1.30  
Coffee \$ 1.25  
Hot Chocolate, Tea or Cider \$ .90  
Milk \$ .90  
Bottled Water \$ 1.00

## Hot Stuff

Chicken Fajita Wrap: grilled chicken, onions, peppers, mushroom, pepper jack cheese, served in a herbed wrap \$4.55  
Calories:543 Carbs:41g Protein:43g Fat:23g

Reuben Bagel: corned beef, Swiss cheese, sauerkraut, Thousand Island dressing atop two bagel halves \$4.55

Hot Gobbler: turkey breast, tomato & Swiss cheese with honey mustard atop two bagel halves \$4.30  
Calories:552 Carbs: 63g Protein:48g Fat:12g

Plate O' Pasta: a hearty serving of pasta served with a warm bread stick - see our daily board for today's choice \$3.85

Baked Potato: with three toppings - see our daily board for choices \$3.25

Soup: our soups change from day to day - please see the daily board for what's cooking  
Cup \$2.25  
Bowl 2.75

## Salads

\* Add chicken to any salad for just \$1.30

HOT Chicken Fajitas Salad: romaine lettuce, grilled chicken, onion, pepper, mushroom, pepper jack cheese, with a chipotle ranch dressing \$4.55

Greek Veggie Salad: mixed greens, tomato, artichoke, onion, black olive, mushroom, roasted red pepper marinated in balsamic vinaigrette, feta cheese, and toasted pine nuts  
Calories:382 Carbs:17g Protein:9g Fat:30g \$4.30

Chicken Caesar: romaine lettuce, chicken, parmesan cheese & croutons served with creamy Caesar dressing \$4.55  
Calories:340g Carbs:12g Protein:29g Fat:20g

Sunflower Garden Salad: mixed greens, cucumbers, sunflower seeds & tomatoes \$4.00

Side Salad: Smaller version of the Sunflower Garden Salad \$2.25

all salads served with a French breadstick choice of ranch, Italian, or balsamic vinaigrette (fat free dressing available upon request)

## Appendix E: Cash Register Report from POS System

3	6.90
TUNA	
#000130	2.4%
10	43.00
1/2TUNA	
#000131	.0%
6	13.80
BL TUNA	
#000140	4.0%
17	73.10
1/2TUNA	
#000141	.6%
5	11.50
GARDEN	
#000210	.9%
4	16.00
SNGARDEN	
#000220	2.5%
20	45.00
CAESAR	
#000230	8.0%
32	145.80
FAISALAD	
#000250	1.5%
6	27.30
KU/BUAD	
#000260	.5%
2	9.90
PANINI	
#000300	3.0%
12	54.60
BWL 51	
#000310	1.5%
10	27.50
CUP 51	
#000311	1.4%
11	24.75
BWL 52	
#000320	2.1%
14	38.50
CUP 52	
#000321	2.2%
18	40.50
SPECIAL	
#000330	4.9%
18	89.10
OPN FOOD	
#000350	13.1%
4	238.20
POTATO	
#000380	2.3%
14	41.30
BL TUNA	
#000410	1.4%
6	25.80
CAESAR	
#000420	4.7%
20	88.00
TERI TORI	
#000430	4.7%
17	86.45
REUBEN	
#000440	.5%
2	9.00
ADD/CHIX	

## Appendix F: Sales Report from Micros Database

## Sales Mix Summary

**Business Dates** 3/17/2005  
**Locations** 9700  
**Revenue Centers** Pangea  
**Order Types** All  
**Report Author** MICROS  
**Report Revision** 1.0.0.4

Item Group	Gross Sales	Item Discounts	Sales Less Item Disc	% Sales	Qty Sold	% Qty Sold	Average Price
<b>Total Item Sales:</b>	<b>1,057.75</b>	<b>0.00</b>	<b>1,057.75</b>	<b>100%</b>	<b>718</b>	<b>100%</b>	<b>1.47</b>
<b>MU Food</b>	<b>944.55</b>	<b>0.00</b>	<b>944.55</b>	<b>89.3%</b>	<b>424</b>	<b>59.1%</b>	<b>2.23</b>
Wraps	195.20	0.00	195.20	18.5%	44	6.1%	4.44
Sandwiches	179.15	0.00	179.15	16.9%	48	6.7%	3.73
Entrees	147.90	0.00	147.90	14.0%	34	4.7%	4.35
GnG Salads	127.95	0.00	127.95	12.1%	36	5.0%	3.55
Pasta	92.40	0.00	92.40	8.7%	24	3.3%	3.85
Soup	83.25	0.00	83.25	7.9%	33	4.6%	2.52
Bagel	58.10	0.00	58.10	5.5%	21	2.9%	2.77
Breakfast Foods	42.10	0.00	42.10	4.0%	12	1.7%	3.51
Cookies, Fresh	7.50	0.00	7.50	0.7%	10	1.4%	0.75
Dessert Foods	6.45	0.00	6.45	0.6%	3	0.4%	2.15
Side Items	2.60	0.00	2.60	0.2%	81	11.3%	0.03
Cheeses	1.05	0.00	1.05	0.1%	26	3.6%	0.04
Yogurt	0.90	0.00	0.90	0.1%	1	0.1%	0.90
Sauces	0.00	0.00	0.00	0.0%	51	7.1%	0.00
<b>MU Bev</b>	<b>108.35</b>	<b>0.00</b>	<b>108.35</b>	<b>10.2%</b>	<b>92</b>	<b>12.8%</b>	<b>1.18</b>
Fountain	47.50	0.00	47.50	4.5%	38	5.3%	1.25
Bottled Beverage	30.00	0.00	30.00	2.8%	24	3.3%	1.25
Bottled Water	14.00	0.00	14.00	1.3%	14	1.9%	1.00
Brewed Coffee	8.75	0.00	8.75	0.8%	7	1.0%	1.25
Hot Beverages	4.50	0.00	4.50	0.4%	5	0.7%	0.90
Dairy Products	3.60	0.00	3.60	0.3%	4	0.6%	0.90
<b>MU Grocery</b>	<b>3.85</b>	<b>0.00</b>	<b>3.85</b>	<b>0.4%</b>	<b>3</b>	<b>0.4%</b>	<b>1.28</b>
Produce(hnd frt)	2.80	0.00	2.80	0.3%	2	0.3%	1.40
Snacks Crunchy	1.05	0.00	1.05	0.1%	1	0.1%	1.05
<b>MU Gen Merch</b>	<b>1.00</b>	<b>0.00</b>	<b>1.00</b>	<b>0.1%</b>	<b>199</b>	<b>27.7%</b>	<b>0.01</b>
Miscellaneous	1.00	0.00	1.00	0.1%	1	0.1%	1.00
Pangea Tents	0.00	0.00	0.00	0.0%	198	27.6%	0.00

Top Selling Items (Net)	Gross Sales	Item Discounts	Sales Less Item Disc	% Sales	Qty
Special #1	108.90	0.00	108.90	10.30%	
Bow Tie	92.40	0.00	92.40	8.74%	
Caesar Wrap	64.50	0.00	64.50	6.10%	
Fountain Soda	47.50	0.00	47.50	4.49%	
Classic Tuna	47.30	0.00	47.30	4.47%	