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Evaluation of Nutrition Intervention in the Senior Population

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**Abstract**

Average life expectancy has steadily increased with each passing year and is estimated to continue increasing in years to come. Reports show that the number of people aged 65 or older has increased from 6% of the population in the 1960's, to 12% in the year 2000, to 16% of the total population in 2015.<sup>1</sup> This number is expected to increase to almost 20% of the population by the year 2050.<sup>1</sup> Striving towards healthy aging can help the growing senior population to live the best possible life in their later years. Nutrition education is one area of learning and practice that can help enhance the life of the geriatric population. Recent research suggests that national and state-sponsored programs that provide nutrition education and information to elders will help increase health of elders and reduce government medical costs for this population.<sup>3</sup> This pilot study analyzed the effect of nutrition intervention in a senior living facility to determine if a positive change occurred in nutrition awareness, education, and behavior in the senior population at the residence. The six-seminar nutrition series was delivered over a period of 6 months and the residents were asked to take part in a survey at the conclusion of the last seminar. Based on both paired and unpaired t-tests, the findings support a statistically significant change in the senior population of this study. Further research and nutrition programs are needed to assure that the nutritional knowledge and needs of the elder population are being met.

**Introduction**

Americans are living longer lives than ever and most healthcare systems have been striving to keep up with identification of needs for the elderly. Nutrition education programs, however, have straggled behind.<sup>2,3</sup> Since nutrition is such a crucial component of overall health,

and a vital part of each organ system's functions, it is necessary to increase nutrition education and awareness in this senior population. While longer life expectancies are definitely considered a positive progression, it must be remembered that those additional years are not always maintained in good health. Healthy aging is the development and maintenance of optimal mental, social, and physical well-being and function in older adults.<sup>2</sup> Striving towards healthy aging can help the growing senior population to live the best possible life in their later years. Nutrition education is one area of learning and practice that can help enhance the life of the geriatric population. Recent research suggests that national and state-sponsored programs that provide nutrition education and information to elders will help increase health of elders and reduce government medical costs for this population.<sup>3</sup> Healthy aging can be achieved through communities, facilities, and health services that provide programs and education designed to help prevent or minimize disease.<sup>2</sup> One such facility that prides themselves on the concept of healthy aging is the Five Star Premier Residences of Plantation, the location where this study took place.

This project implemented a six-seminar mini-nutrition series at the Five Star Premier Residences in Plantation, Florida. There were six 1-hour long seminars a month from September through February and all residents were encouraged to attend. A one-time anonymous survey was given at the end of the last seminar that asked participants to rate certain questions on their nutritional lifestyle habits pre- and post the nutrition education series. Upon completion of the nutrition seminar series, data was analyzed to determine change in nutrition awareness, education, and behavior in the senior population at the residence.

## Literature Review

Physiological aging, comorbidities, medication, lifestyle, and the various conditions related to such, predisposes the geriatric population to undernutrition.<sup>4</sup> Aging is associated with an increased risk of malnutrition, decreased nutrient intake, unintentional weight loss and sarcopenia, all of which can lead to frailty, functional disability and increased mortality.<sup>4</sup> The aging population has also placed a heavy burden on healthcare systems across the globe, and also on individuals, family members, and society.<sup>1</sup> Since the global population of people aged over 60 years old is only going to continue growing, now is the time to start addressing a problem that may worsen with the years.

The etiology of malnutrition in the geriatric population is complicated as there are many factors involved such as insufficient caloric and protein intake, micronutrient deficiencies, improper hydration status, genetics, and lack of exercise.<sup>4</sup> Because of this complex etiology, specific treatment is difficult, and evidence of effective action is limited. However, dietary intervention has been supported as a means of making a positive, healthy difference for elderly well-being as seen in some research.

One such research study, conducted in an older adult community, consisted of weekly classes based on medical nutrition therapy and a science-based education curriculum for participants older than 55 years of age. The sessions featured food demos and tasting, as well as interactive presentations and discussions for the senior participants.<sup>5</sup> Results demonstrated that participants were more willing to try new foods, and more knowledgeable in food safety and nutrition label reading.<sup>5</sup>

A literature review of eight eligible studies related to nutrition education and assessment for older adults living at home also evaluated the importance and outcome of nutrition intervention in the senior population.<sup>6</sup> Of those eight studies, 3 were specifically designed to assess and improve nutritional status, as well as to reduce mortality rates among older adults.<sup>6</sup> Though the studies showed results that ranged from not statistically significant to moderate differences in improvement in nutritional status, it can be argued that a change in knowledge did occur.<sup>6</sup> Overall, the study pointed out several barriers to proper nutrition education for this population such as lack of evidence-based learning opportunities and undereducated nurses or home care workers.<sup>6</sup>

Another study assessed a dietitian's influence on the dietary habits of older adults living in Greece. This research project was conducted with over 1500 men and women over the age of 65 to study the effects of the implementation of nutrition services within the healthcare system.<sup>7</sup> Sociodemographic, clinical, and lifestyle characteristics were recorded for each participant and this information was gathered through the use of surveys and questionnaires.<sup>7</sup> The conclusion of the study found that implementing nutritional services within the healthcare system seemed to contribute to healthier dietary habits among older adults that may lead to a better quality of life.<sup>7</sup>

A randomized controlled trial studied the risk of malnutrition for dependent elderly patients receiving home care after a nutrition education intervention.<sup>8</sup> Ten primary care centers were used in this study and all participants were over the age of 65.<sup>8</sup> The difference in this study was the fact that it was the caregivers of these individual patients that were given the nutrition education sessions for 6 months as opposed to the patients themselves.<sup>8</sup> The study was measured primarily through the use of the Mini Nutritional Assessment test, though diet intake,

anthropometrics, and biochemical data were recorded as well.<sup>8</sup> It was concluded that those senior participants whose caregivers underwent the nutrition education intervention showed slower or halted nutritional decline and reduced risk of malnutrition.<sup>8</sup>

With the number of elder people set to grow even more in the years to come, a global health crisis may arise unless action is taken soon. There needs to be increased awareness of the importance of nutrition education, as well as established interventions, before the problem inevitably worsens.<sup>2</sup> The mentioned research studies support the fact that nutrition education interventions can help to make a difference in the senior population's health care and quality of life.

## **Methodology**

This project consisted of a six-seminar mini-nutrition series and the nutrition series was open to all residents at the facility. All were encouraged to attend via word of mouth, flyers, and monthly newsletters. The project began with an identification of an appropriate setting and population, followed by the preparation of a senior-based nutrition program. The detailed methodology and timeline for this project can be seen in Table 1.

As stated, this project comprised of six nutrition seminars. Each seminar touched upon a different subject of nutrition that related specifically to this senior population. The seminar topics, dates, and relation to this population can be seen in Table 2. The format of all the seminars were fairly similar and the standard template can be seen in Table 3. Each seminar started off with a snack related to the topic of the day and each presentation highlighted how that food item connected to the topic. Each seminar included an interactive PowerPoint presentation

ranging from 20-30 slides covering the important matters of each topic. There was also an array of activities at each seminar to further engage the participants and keep them focused. Such activities included word searches, games, video clips, food demos, and chair exercises. Each presentation ended with a quiz to review the main points of each day's topic. Attendees were awarded items such as planners, post-it notes, and pens for participating in the short quizzes. The floor was always open for questions so that the seniors could ask any nutrition related questions they may have had. Before exit, there was a raffle in which three of the attendees would win a \$10 Amazon gift card. This was done to help keep attendance up for the seminars to follow. Each attendee would also go home with a take-home flyer to remember the day's discussion.

Data was collected through the use of a one-time survey that was given at the end of the final seminar. The survey format consisted of Likert scale and multiple-choice questions. There was also an area on the survey for any additional comments that the participants may have wished to add. Numerical data was measured based on level of change between pre- and post-results. Each survey result was assigned a unique anonymous identification. Data responses were then collected into a spreadsheet and coded for statistical analysis using a specific software. The information was then analyzed to measure perceived change in lifestyle habits. Participation in the survey was voluntary and an informative disclosure statement was included on the first page of the survey.

The data from the surveys was inputted into an excel spreadsheet. Each participant, question, and answer were given a numerical value that was then analyzed through calculations



for t-test pairing, averages, and p values. Further detail on data analysis can be found in the next section of this paper.

**Table 1. Methodology & Timeline**

<u>Date</u>	<u>Task</u>
July 2018	Identification of appropriate setting and population to meet the goals of this project. The Lifelong Learning Institute (a NSU outreach service) already had an existing relationship with Five Star Premier Residences.
July-August 2018	The project design was reviewed and refined with the guidance of attending faculty and presented for approval.
August 2018	Permission to conduct survey-based research from the participating site was obtained in a formal letter.
August 2018	Orientation to site and meeting with potential participants and staff. The room where seminars will take place was observed for resource planning purposes.

September 2018	Completion of CITI training for human subjects.
September 2018	Completion and submission of drafting content for IRB approval.
September 2018- February 2019	6 nutrition seminars will be completed.
November 2018	Validation of survey tool.
February 2019	At the completion of the last nutrition session, participants will be invited to voluntarily complete a survey questionnaire at the end of class.
February 2019	Numerical data will be tallied and analyzed using the statistical software to measure perceived change in lifestyle habits related to nutrition education series.

**Table 2. Nutrition Seminar Topics**

Date	Seminar Topic	Relation to Senior Population
September 7, 2018	Happy Hour Hydration	Physiological changes that occur in the body with age can put the elderly at increased risk of dehydration. <sup>8</sup> Dehydration is

		<p>one of the most common causes of hospitalization after the age of 65.<sup>8</sup> More than 60% of the population over the age of 65 is not meeting recommendations for fluid intake.<sup>8</sup></p>
<p>October 5, 2018</p>	<p>Memory Foods</p>	<p>Age-related cognitive decline is a main predictor of disability among elderly people, and with the continued expansion of the aging population and the increase in life expectancy, the prevalence of mild cognitive impairment and dementia have increased.<sup>4</sup></p> <p>Proper nutrition has supported prevention, or a delayed onset, of cognitive decline and dementia.<sup>4</sup></p>

<p>November 2, 2018</p>	<p>Nutrition &amp; The Immune System</p>	<p>Upper respiratory illnesses such as the flu and the pneumonia are a leading cause of hospitalization for the elderly population.<sup>1</sup> Proper diet and intake of macro &amp; micronutrients is lacking in the senior population and this can lead to a decline in immune system function.<sup>3</sup></p>
<p>December 7, 2018</p>	<p>Building A Healthy Plate</p>	<p>Many seniors are not aware of what foods, and how much, they should be eating. The seminar will review MyPlate for seniors as recommended by the Academy of Nutrition and Dietetics.</p>
<p>January 11, 2018</p>	<p>Nutrition &amp; Physical Activity</p>	<p>Nutrition and exercise go hand in hand at every age.</p>

		Nutrition and physical activity are two important components of healthy aging. <sup>2</sup>
February 8, 2018	Nutrition Made Easy	This seminar will be a comprehensive review of the other 5 seminars. Some new topics such as simplification of the reading of food labels and making healthy choices from the facility’s menu will be included.

**Table 3. Seminar Template**

1	Brief Introduction
2	Opening Activity (short game, video clip)
3	Snack
4	PowerPoint Presentation
5	Activity (game, word search, puzzle, exercise, etc.)
6	Review Quiz

7	Raffle
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### Data Analysis

The final study cohort consisted of a group of 13 male and female elders who lived at the senior facility. These 13 participants all partook in the anonymous survey; however, 1 person was excluded from data analysis as the survey was not completed in full. Data from the survey was coded into an excel spreadsheet as seen in Figure 1. All data was entered into the chart based on question number X and answer given prior to the start of the seminars (seen as QXA) or answer post seminars (seen as QXB). Participant 10 was excluded from analysis beyond this point. The numerical value was entered as answered for all questions of Likert scale format. Numerical values for given for categorical questions (for example, 1= None at all, 2= somewhat important, 3= moderately important, 3= very important).

**Figure 1. All Survey Data**

Participant	Q1A	Q1B	Q2A	Q2B	Q3A	Q3B	Q4A	Q4B	Q5A	Q5B	Q6A	Q6B	Q7A	Q7B
P1	4	5	4	4	4	4	2	2	4	4	4	4	6	6
P2	3	5	3	4	3	4	2	3	2	3	2	3	5	1
P3	2	4	4	4	3	4	2	3	2	3	3	3	2,4	5
P4	4	5	3	4	3	4	2	3	3	4	2	3	3	3
P5	3	5	4	4	4	4	2	2	2	2	3	3	3	3
P6	4	5	4	4	3	4	3	3	2	3	2	3	3	1
P7	4	5	4	4	3	4	2	2	3	4	2	3	1	1
P8	3	4	4	4	3	4	2	3	2	3	3	3	1	1
P9	4	5	3	4	4	4	2	4	2	2	3	3	5	3
P10	3	5	4	4									3	3
P11	3	4	3	4	4	4	4	4	2	2	3	3	1,3	2
P12	3	5	4	4	4	4	2	3	4	4	2	2	1	1
P13	4	4	3	4	3	4	3	3	3	3	2	2	4	4

The collected survey data was then analyzed by paired and unpaired t-tests. Results from both demonstrated p-values that indicated change which helped to validate the statistical significance of this project. Figure 2 depicts the data and results of the unpaired t-tests. Question 7 was excluded from this type of analysis as the question allowed for multiple answers and was not necessarily a question that followed up on knowledge or change and behavior due to the nutrition series. Question 7 will be discussed in the results portion of this paper.

The unpaired t-test seen in Figure 2 sorted the data by each participant's response to the questions before and after the intervention. Prior to the t-test calculation, the average for each question was calculated. There was an average increase from the group as a whole in every question asked, demonstrating that there was some sort of increase in knowledge or behavior after the nutrition series. For example, question 1 pertained to current knowledge of nutrition recommendations for the senior population based on a Likert scale of 1-5. The group's average prior to the seminar was 3.42, but after the nutrition series that value increased to 4.67.

There was also statistically significant p-values seen for the questions, specifically questions 1-4 in which all the p-values were less than 0.05. Question 1, pertaining to current knowledge of senior nutrition resulted in a p-value of 0.00004. Question 2, pertaining to perceived relationship between nutrition and overall health resulted in a p-value of 0.0171. Question 3, pertaining to perceived relationship between nutrition and immune health resulted in a p-value of 0.0269. Question 4, pertaining to consumption of fruits and vegetables per day resulted in a p-value of 0.0415. These p-values indicate that there was a change in knowledge and behavior in this population.

**Figure 2. Unpaired T-Test Results**

Record Number	Participant	Before/After	Q1	Q2	Q3	Q4	Q5	Q6
1	P1	Before	4	4	4	2	4	4
3	P2	Before	3	3	3	2	2	2
5	P3	Before	2	4	3	2	2	3
7	P4	Before	4	3	3	2	3	2
9	P5	Before	3	4	4	2	2	3
11	P6	Before	4	4	3	3	2	2
13	P7	Before	4	4	3	2	3	2
15	P8	Before	3	4	3	2	2	3
17	P9	Before	4	3	4	2	2	3
19	P11	Before	3	3	4	4	2	3
21	P12	Before	3	4	4	2	4	2
23	P13	Before	4	3	4	3	3	2
2	P1	After	5	4	4	2	4	4
4	P2	After	5	4	4	3	3	3
6	P3	After	4	4	4	3	3	3
8	P4	After	5	4	4	3	4	3
10	P5	After	5	4	4	2	2	3
12	P6	After	5	4	4	3	3	3
14	P7	After	5	4	4	2	4	3
16	P8	After	4	4	4	3	3	3
18	P9	After	5	4	4	4	2	3
20	P11	After	4	4	4	4	2	3
22	P12	After	5	4	4	3	4	2
24	P13	After	4	4	3	3	3	2
Average before			3.42	3.58	3.50	2.33	2.58	2.58
StDev before			0.67	0.51	0.52	0.65	0.79	0.67
Average after			4.67	4.00	3.92	2.92	3.08	2.92
StDev after			0.49	0.00	0.29	0.67	0.79	0.51
p value (<0.05)			0.0000406	0.0171805	0.0269631	0.0415191	0.1367264	0.1859096



A paired t-test was also conducted to examine the change in each participant's results (as opposed to the group as a whole with the unpaired t-test). The paired t-test was also conducted for each question 1-6 as shown in Figure 3. P-values showed a statistically significant change with all values being less than 0.05 for all questions. Interestingly, the p-values for paired and unpaired questions 1-4 results were rather close in value (i.e. question 2: unpaired p-value = 0.01718, paired p-value = 0.01718; question 3: unpaired p-value = 0.0269, paired p-value = 0.0024). The similarity in results of the unpaired and paired t-tests helped to prove the validity of the significant results.

**Figure 3. Paired T-Test**

Participant	Q1A	Q1B	Q2A	Q2B	Q3A	Q3B	Q4A	Q4B	Q5A	Q5B	Q6A	Q6B
P1	4	5	4	4	4	4	2	2	4	4	4	4
P2	3	5	3	4	3	4	2	3	2	3	2	3
P3	2	4	4	4	3	4	2	3	2	3	3	3
P4	4	5	3	4	3	4	2	3	3	4	2	3
P5	3	5	4	4	4	4	2	2	2	2	3	3
P6	4	5	4	4	3	4	3	3	2	3	2	3
P7	4	5	4	4	3	4	2	2	3	4	2	3
P8	3	4	4	4	3	4	2	3	2	3	3	3
P9	4	5	3	4	4	4	2	4	2	2	3	3
P11	3	4	3	4	4	4	4	4	2	2	3	3
P12	3	5	4	4	4	4	2	3	4	4	2	2
P13	4	4	3	4	3	4	3	3	3	3	2	2
P-Value	0.0000 23718		0.01 718		0.002 375		0.011 603		0.006 872		0.038 814	

## Discussion

Though this study was small, it was seen that nutrition intervention, such as this nutrition seminar series, is a feasible way to heighten nutrition knowledge, attitude, and behavior in the ever-growing senior population. Based on the analysis of the survey questions, it was found that it took just six 1-hour seminars to see an increased rating of knowledge of nutrition recommendations for the senior population (unpaired and paired p-values of 0.0000). This was the most statistically significant change seen in this study group. This question most likely displayed the smallest p-value, and thus the greatest significant change, since the question was more general than the following survey questions which were all more specific. Since each seminar highlighted a different topic, the population was able to gain basic knowledge in several different aspects of overall health and well-being. One participant responded in the feedback area stating that the “information was very helpful and has made me more aware of what I should and should not be eating.” The layout of the seminars was designed to incorporate a variety of activity and media to help keep the audience engaged and attentive to the information being presented. Another feedback comment highlighted this by stating that “the seminars were very enjoyable and informative.”

The participants also displayed a positive change in question 2- attitude about the relationship between nutrition and overall health (unpaired and paired p-values of .017). Each seminar tied nutrition to its role in a multitude of functions in the body such as disease prevention, memory boosting, waste removal, and much more. It was discussed that recent research found that elders who consumed more nutritious foods lowered their risk of cognitive decline by nearly 25% compared to those with less healthy diets.<sup>9</sup> Seniors are considered a vulnerable population when it comes to immune system health, so we discussed what vitamins and foods can help strength immune health.<sup>3</sup> One possible explanation for this result is that the

audience likely picked up on the connection between different components of well-being and nutrition and changed their perception, for the better, of just how important nutrition is for overall health. This is supported by some of the participants' comments on the questionnaire such as "this information was very helpful and showed me what I should and should not eat and how what I eat affects my whole body."

While there was a substantial difference seen in perception of the relationship between nutrition and the immune system, it was the knowledge change that showed the least significance (unpaired p-value .027 and paired p-value .012). This is perhaps due to the fact that immune health and nutrition was covered in just one seminar and that seminar was closer to the beginning of the series (Seminar 3: Nutrition & The Immune System). This topic is of importance because micronutrient malnutrition is common in the elder population and there is a link between this and increased risk of illness and/or disease.<sup>3</sup> One participant did comment that "new information was learned about the importance of nutrition for a high leveled immune system."

The questions related to a change in behavior demonstrated a small amount of change, but each category did show an increased average change. The change in this category may have been minor as living in a facility, and thus being limited to available choices, may have made it difficult for the residents to put their new knowledge into action. This will be discussed as a limitation later in this paper. The most notable behavior change was in the amount of water or liquid consumed per day with a low p-value of 0.007. This is perhaps because of the fact that proper hydration was reviewed and reiterated in every seminar since the very first seminar- Hydration. One participant even commented that "I drink a lot more water," while another commented about one of the most notable aspects of the seminar as a whole was "how to drink

enough water.” Another mentioned “urine knowledge- did not know before” alluding to the hydration urine chart I included in presentations and take-home flyers that noted the colors of urine as hydration status indicators. Dehydration is one of the leading causes for hospitalization for people over the age of 65, so this topic was reviewed multiple times.<sup>8</sup>

There was a slight increase in the consumption of fruits and vegetables as seen by paired and unpaired p-values less than 0.05 (values of 0.012 and 0.042, respectively). There was also an overall change in average consumption of fruits and vegetables before and after the seminars. Perhaps reviewing the MyPlate diagram for seniors helped to enforce just how many fruits and vegetables people should be eating. The diagram clearly depicted that half of a person’s plate should comprise of fruits and vegetables and this visual aid may have helped the population to understand this. Also, when asked by a show of hands, almost no one had seen this updated USDA food guideline icon.

The final behavior related question, pertaining to physical activity, showed the least significant change with paired and unpaired p-values of 0.04 and 0.12, respectively. However, there was a slight overall average change and one participant even commented that “I do a lot of walking (now).” Physical activity has numerous health benefits, but many seniors feel that they are no longer capable of handling exercise.<sup>2</sup> In our seminar we reviewed the three components of an ideal senior exercise regimen- aerobic and endurance exercise, strength and resistance training, and stretching, flexibility, and balance.<sup>2</sup> We also discussed senior-friendly ways to achieve all these components such as chair exercises.

Perhaps more changes were not seen in the results because the residents live at this facility and are thus mostly limited to foods being served in their cafeteria. The last question of

the survey addressed this and asked residents to circle all the challenges that they face with eating healthier. The most common answers were “hard to shop,” “don’t like it,” and “other,” though “none” was also circled on some surveys as well. Some residents stated out loud that when they circled “don’t like it” they were referring to the “way it was cooked” at the facility. The most common issue was that the residents found it hard to shop. While the residents do have access to busses that take them to grocery stores, many still found it to be an inconvenience. Some circled “other” and left it blank, but some did jot down things such as “limited to residents meals,” “can’t check labels,” and “living in a facility” as their reasoning for selecting the “other” option. An ideal continuation of this project would be to work with the kitchen staff and facility manager to discuss meals and meal planning.

There were some limitations in this study. The main limitation was that there was no way to control if each participant came to every seminar. Since the seminars spanned a total of six months, it was hard to have the same people at each seminar. This could be because the residents had prior engagements, illness, or simply forgot to attend. One way to solve this may have been to have one seminar a week for 6 weeks rather than the one seminar a month. Another limitation was the fact that the residents could not necessarily put their new food knowledge into action as they were limited in food options by their cafeteria, as previously mentioned. Perhaps working together with the food management team at facility prior to the start of the seminars could have made a difference.

We want our elders to live their healthiest, happiest, best lives for as long as possible and we do not want something so simple as lack of awareness or education to hold them back from this. Future research and projects similar to this one should be conducted to help make a

difference in someone's quality of life. Ideally, similar programs would be implemented in other senior living facilities. With the number of older people set to grow even more in the next few years, we will face a global health crisis unless action is taken soon. There needs to be increased awareness of the importance of nutrition interventions as a measure of healthcare quality so that nutrition education programs and interventions can be established before the problem inevitably worsens.<sup>2</sup>

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