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Nutrition Knowledge, Choices, Attitudes, Bmi, And Height And Weight Perception Among Mississippi Firefighters

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NUTRITION KNOWLEDGE, CHOICES, ATTITUDES, BMI, AND HEIGHT AND WEIGHT PERCEPTION AMONG MISSISSIPPI FIREFIGHTERS

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by

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ABSTRACT

The purpose of this study was to determine the nutrition knowledge, nutrition choices, nutrition attitudes, height and weight perception, and current body mass indices (BMI) of recruits at the Mississippi Fire Academy in Jackson, Mississippi and professional firefighters with the Oxford Fire Department in Oxford, Mississippi. All participants were asked directly by in-person visits to complete a voluntary questionnaire to assess their dietary knowledge, choices, and attitudes, body mass indices, and height and weight perception. Recruits varied in age from 18-65 plus years. It was predicted that firefighters would have on average a high BMI, indicating a large prevalence of overweight or obese firefighters, due to the prevalence of obesity among firefighters found in the literature. Results indicated that there was no correlation between BMI and nutrition knowledge, or BMI or activity level. The average nutrition knowledge score was 44 percent, and the majority of participants were overweight (44.8%) or obese (46.7%).

DEDICATION

This thesis is dedicated to the men and women in the fire service who risk their lives daily, and therefore deserve and require the utmost in healthcare and nutrition services.

ACKNOWLEDGEMENTS

I would like to express my gratitude to my advisor, Dr. Melinda Valliant, and to my committee members, Dr. Hyun-Woo Joung, Dr. Charlotte Oakley, and Dr. Knight. In addition, I would like to thank my fellow graduate students for their support.

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CHAPTER 1: INTRODUCTION

Health and wellness is becoming increasing popular focus for the American population. As this topic becomes increasingly more common, it is important to consider how health affects not only individuals but also professions as a whole. Firefighting is one such profession to consider. The impact of health and wellness on firefighters and other high-risk professions is often overlooked, as evidenced by the lack of publications on the topic and gap in the literature (Jahnke et al., 2012). Because the work of firefighters often involves intense physical activity, the health of firefighters is of the utmost importance to those in the community as well as on an individual level. Currently, there are two common negative health trends in the firefighting profession. The first is the prevalence of obesity and the second is the occurrence of cardiovascular disease. In the present paper, the possible causes and instance of obesity and cardiovascular disease among firefighters is investigated, and findings on nutrition knowledge, choices, attitudes, height and weight perception, and BMI tendencies among Mississippi firefighters will be discussed.

CHAPTER 2: LITERATURE REVIEW

Hypotheses

1) Firefighters' nutrition knowledge score will below 60%, indicating inadequate nutrition knowledge.

2) Firefighters' will choose sources other than a registered dietitian when ranking top three nutrition sources they rely on, feel comfortable approaching and would recommend regarding nutrition information.

3) Participants will have a poor understanding (less than 5 on the Likert scale) of their nutritional needs.

4) Participants will indicate that it is not important (less than 5 on the Likert scale) to adhere to healthy diet.

5) Participants will indicate a poor quality of their current eating habits (less than 5 on the Likert scale).

6) Nutrition knowledge of firefighters in this study will be negatively correlated with BMI.

7) BMI will be negatively correlated with activity level.

8) Firefighters' perceived weight will be different than their actual weight.

9) Firefighters' perceived height will be different than their actual height.

Food Environment

While there are no reports on the nutrition knowledge of firefighters, a couple of studies (Jahnke, 2012; Dobson 2013), looked at the food environment of fire stations. Many firefighters admitted that the food environment in the firehouse was concerning, and that poor diet was common (Jahnke et al, 2012). Additionally, it was noted that the eating environment of firehouses is ingrained in tradition and individuals are disinclined to change, and that poor diet is under-recognized as a significant concern in firefighter health (Jahnke et al., 2012). Furthermore, family style meals, large portion sizes, high caloric snacks, and eating out together as a fire station are common customs (Dobson et al., 2013).

Shift Work

Shift work has been correlated with obesity and other health concerns (Salgado-Delgado et al., 2013). Previous studies have even linked shift work with type 2 diabetes (Zimburg, Fernandes, Crispim, Tufik, Tulio de Mellio, 2012). It has been suggested that this association occurs due to a disturbance in circadian rhythms. Salgado-Delgado et al., (2013) looked at the link between circadian disruption and obesity, and how it related to shift work. In this study, one group of male rats were exposed to forced activity during the rest phase, and food intake was mandated, while the other group was exposed to forced activity and food intake during the active phase. This study concluded that forced activity and food intake during the rest phase correlated positively with desynchronization within the liver, which in turn may lead to metabolic syndrome and obesity during shift work in humans (Salgado-Delgado et al., 2013). Firefighters work in shifts, often on duty for 24 hours and then off duty for 24 hours or more. This information linking shift work with obesity is important, because firefighters often receive calls during their “rest phase” and this may make them more vulnerable to eating more and gaining

weight. While the majority of this review will focus on the health habits of firefighters, the correlation between shift work and obesity should not be overlooked.

Obesity and Health

There is also a prevalence of obesity among male firefighters. Caban et al., (2001), utilized the National Health Interview Surveys from 1997-2002 and found that among 41 US professions, firefighters and police officers ranked third in prevalence of obesity, with 30% having a BMI, of ≥ 30 kg. According to a study by Choi et al., (2011), firefighters and police officers have the third highest obesity rate among 41 male professions in the United States. Previous National Health Interview Surveys from 1986-1994 had indicated that these occupations had ranked fifth, with an obesity prevalence of 18%, indicating that the rate of obesity in these occupations has increased (Choi et al., 2011).

Another study by (Poston et al., 2011) concluded that there was a high prevalence of overweight (with a BMI ≥ 25) and obese (with a BMI ≥ 30) career (79.5%; 33.5%) and volunteer (78.4%; 43.2%) firefighters, and that the prevalence of obesity among firefighters was greater than for the US population. In addition to the previously discussed correlation between shift-work and obesity (Salgedo-Delgado et al., 2013), and the poor diet habits among firefighters (Jahnke et al., 2012), another study by (Choi et al., 2011) discussed the fact that firefighter work has shifted away from structural fire calls and towards emergency medical response since 1978, lessening physical activity. In that study, researchers examined working conditions, health behaviors, and obesity in firefighters. Members of a focus group accompanied firefighters on calls during 24- hour shifts, and it was found that firefighters who take on additional shifts, have a high number of calls, and have poor social relationships at work are often at greater risk for being obese (Choi et al., 2011). Additionally, the focus group in observed there were “slow” and

"busy" fire stations and firefighters were more likely to be obese at the "slow" stations due to reduced work related physical activity and a more sedentary lifestyle (Choi et al., 2011). With an increase in the prevalence of obesity among firefighters, it is not surprising that there is also a trend in cardiovascular disease among firefighters.

Cardiovascular Disease

Carey, Bernard, and Thevenin (2009), found that non-sustained ventricular tachycardia occurred in three of the 28 participants, or in 11% of the firefighters, which is significantly higher than in general populations. Additionally, researchers of that study looked at high resolution 12-lead electrocardiograms of on-duty professional firefighters. That study noted that both personal and workplace factors contribute to coronary artery disease in firefighters (Carey et al., 200). It was also noted in that study that although firefighters are required to pass a fitness test at the start of their careers, there is no follow-up test and no national requirement for them to maintain their physical fitness (Carey et al., 2009). The authors concluded that non-sustained ventricle tachycardia took place despite activity or time of day (Carey et al., 2009). Furthermore, researchers recommended replacing traditional exercise programs that focus on cardiovascular health with programs that address all aspects of health (Carey et al., 2009). In a case control study, Kales, Soteriades, Costas, and Christian, (2012), found that most on-duty coronary heart attacks occur in firefighters with causal coronary heart disease and that better fitness promotion and screening could prevent premature deaths. Additionally, Baur, Christophi, Tsismenakis, and Kales (2012), looked at the cardiorespiratory fitness (CRF) among career firefighters and found that although CRF declines with increasing age, this decline was less among firefighters who engaged in regular exercise and maintained healthy weights. Smith et al., (2012) indicated that obesity and cardiovascular disease influence individual health of firefighters, which is critical not

only for a firefighter's own wellbeing, but also for public safety. The increase in obesity among firefighters has become a widespread concern for the fire service (Smith et al., 2012). Additionally, Smith et al., 2012, indicated that obesity is positively correlated with cardiovascular disease mortality and that cardiovascular disease is the primary cause of duty-related death among firefighters. With an increase in obesity and cardiovascular disease among firefighters, several studies have implemented programs to try to combat this prevalence.

Programs

A few studies (Carey et al., 2011; Mackinnon et al., 2010; Ranby et al., 2011) have looked at the effectiveness of health promotion programs among firefighters. Carey et al., (2011) conducted an investigation in which firefighters adhered to a low glycemic diet based on the Mediterranean and DASH diet and consisting of 50% vegetables and fruits, 30% proteins, and 20% carbohydrates. Firefighters were also placed in a scheduled supervised training program. Firefighters adhering to this plan successfully improved anthropometric a measures and lowered metabolic syndrome risk factors (Carey et al., 2011). Mackinnon et al., (2010) examined the effects of a worksite health promotion program for firefighters and found that firefighters were comparable to US adults in body weight, and that the average BMI at baseline was 27.7, which was higher than the nationwide average of 26.6 (MacKinnon et al., 2010). Additionally, at baseline participants' consumption of fruits and vegetables was 5.6 servings per day and 28% of participants consumed less than 5 servings a day compared to the national average of 23% for adult males (MacKinnon et al., 2010). Furthermore, daily intakes of fruits and vegetables were approximately one serving greater per day than at baseline (Mackinnon et al., 2010).

Another study by Ranby et al., (2011), examined a healthy lifestyle program called Promoting Healthy Lifestyles: Alternative Models' Effects (PHLAME). This program had an

intervention group, which taught the benefits of healthy eating and regular exercise, and a control group. It was found that participants in the intervention group increased fruit and vegetable consumption (Ranby et al., 2011).

Height and Weight Perception

Baur et al., 2012, looked at weight perception of male career firefighters and its association with cardiovascular risk factors. In this study, 68% of firefighters underestimated their BMI categories and were therefore less likely to appreciate the negative outcomes of their extra weight (Baur et al, 2012). This study was the only one found that addressed weight perception of firefighters. No studies were found that addressed height perception of firefighters.

Summary

It is well documented that firefighters are at an increased risk for developing cardiovascular disease. Additionally, there is a history of obesity and poor dietary choices among firefighters, which is rooted in traditional firehouse eating and might also be linked to shift work (Jahnke et al., 2012; Salgedo-Delgado et al., 2013). Lastly, nutrition and intervention programs may be beneficial to firefighters, improving their eating habits, frequency of exercise, and attitudes towards eating (Carey et al., 2011; Mackinnon et al., 2010; Ranby et al., 2011). Since the research in this area is lacking, additional investigation is needed to fill the knowledge gaps and obtain a better grasp of the relationship between the prevalence of obesity and cardiovascular disease and causation.

CHAPTER 3: METHODS

Purpose of study

The purpose of this study was to determine the nutrition knowledge, nutrition choices, nutrition attitudes, height and weight perception, and current body mass indices (BMI) of recruits at the Mississippi Fire Academy in Jackson, Mississippi and professional firefighters with the Oxford Fire Department in Oxford, Mississippi.

Participants

Participants in this study included all willing recruits attending the Mississippi Fire Academy located in Jackson, Mississippi, as well as all willing professional firefighters employed with the Oxford Fire Department. The Fire Academy has approximately 30 recruits. The Oxford Fire Department has 60 firefighters and four fire departments.

Procedure

All participants were tested in the same room, both at the Academy and then at the Oxford Fire Department. All participants signed a consent form to complete a survey questionnaire (found in the appendix). Participants were given approximately 30 minutes to complete the survey. The survey was not coded in any way to ensure anonymity. Participants were asked to record height and weight, and height and weight was also measured at the completion of the survey. After completion of the survey and height and weight measurements taken, participants placed the survey in a blank envelope.

Design

Participants were asked to complete the survey, which consisted of a demographic section, nutrition knowledge section, nutrition attitudes section, and nutrition choices section. The self reported height and weight requested on the survey was compared to actual height measured in inches to the nearest eighth of an inch and pounds measured to the nearest pound. BMI was calculated for each participant through collected height and weight measurements. Various hypotheses were tested, and it was determined if self-perceived measurements were accurate.

For the nutrition knowledge score, participants were asked a series of nutrition related questions which were coded as either correct or incorrect, with each correct answer choice getting a value of 1, and each incorrect choice getting a value of 0. The average score was noted, and a score of 60% or less was associated with inadequate nutrition knowledge.

For nutrition choices, participants ranked their top three sources that they rely on, feel comfortable approaching, and would recommend for garnering nutrition information. For nutrition attitude, participants ranked a series of questions using a Likert scale, involving understanding of nutrition needs, importance of adhering to a healthy diet, and quality of present eating habits. Additional variables included self-reported height and weight, measured height and weight, BMI, calculated by the researcher, and demographic data.

Instrument

This study used a previously created and validated survey used in a study by (Torres-McGehee et. al., 2012) with edits to pertain to the lifestyle of firefighters. This survey used a 10-point Likert scale to rank nutrition attitude answers (1 = not at all, 5 = fairly well, 10 = extremely well). Nutrition choices were ranked by participants first, second, and third choice (1= first

choice, 2=second choice, 3=third choice). The nutrition knowledge section of the survey included macronutrients and micronutrients (n=4), supplements and performance (n=4), weight management and eating disorders (n=4), and hydration (n=4). All domains were equally weighted, and a score above 60% was categorized as adequate nutrition knowledge, whereas a score below 60% was categorized as inadequate nutrition knowledge. Height and weight was measured using a SECA® CE-0123 stadiometer and a Homemedics® SC-501 digital scale.

Analysis

SPSS statistical software version 22 was used to analyze data. Data analysis included frequency tests, one-sample *t*-test, paired sample *t*-tests, and Pearson's Correlation tests.

Variables

Variables in this study included nutrition knowledge, nutrition choices, nutrition attitudes, height and weight perception, demographic data, and BMI. Self reported height and weight were compared to measured height and weight, and body mass indices were obtained. Demographic data included the following: level of education, varying majors and minors, number of nutrition classes participants have taken, if nutrition programs were sponsored by the fire department, educational resources made available by the fire department, access to a registered dietitian through the Fire Department (yes or no), common 1, 2, and 3rd choices among firefighters, activity level, age, number of years employed as a firefighter, relationship status, ethnicity, household income, and other jobs outside of firefighting.

CHAPTER 4: RESULTS

Demographics

In total, 87 firefighters took part in this survey. As indicated in Table 1 below, the majority of participants fell between the age ranges of 25 to 34 (47.1%), 35 to 44 (23%), or 18 to 24 (18.4%). Only 1.1% made up the 55 to 64 age range, and there were no participants above the age of 65. Additionally, the majority of participants were white (69.3%), or African American (28.2%). There was one Asian participant in this survey, and no Hispanics. Over half participants were married (52.3%), 45% were single, only 3.5% were divorced and 1.2% were separated.

Most participants (44.8%) completed some college, although only (16.1%) had a bachelor's degree. Additionally, 12.6% had an associate's degree, but none had completed post-graduate work or held a master's degree.

Most participants had been employed as a firefighter for 1 to 5 years (34.9%), zero years (19.8%), 5 to 10 years (18.6%), 10 to 20 years (15.1%), and 10.5% had been employed more than 20 years. Additionally, over half (57.5%) of participants were concurrently employed in a field outside of firefighting. It can be deduced that the participants who had zero years of employment were recruits at the Fire Academy who had not yet applied for employment. Annual household income was also asked on this survey, and 25% of participants selected an income range of 25,000 to 34,999, with 22.5% selecting 75,000 to 99,999 and 13.8% selecting below 25,000. Table 1 summarizes demographic results.

Table 1

Demographic Profile of the Survey (N=87)

Characteristics	Category	*N*	%
Age	18-24	16	18.4
	25-34	41	47.1
	35-44	20	23
	45-54	9	10.3
	55-64	1	1.1
	65 plus	0	0
Ethnicity	African American	24	28.2
	Asian	1	1.2
	Hispanic	0	0
	Pacific Islander	1	1.2
	White	59	69.3
Marital Status	Single	37	43
	Married	45	52.3
	Divorced	3	3.5
	Separated	1	1.2
Level of education	Some high school	2	2.3
	High school graduate	19	21.8
	Some college	39	44.8
	Associate degree	11	12.6
	Bachelor's degree	14	16.1
	Master's degree	0	0
	Phd, law or medical degree	1	1.1
	Other advanced degree	0	1.1
Number of years employed as a firefighter	0	17	19.8
	1-5	30	34.9
	5-10	16	18.6
	10-20	13	15.1
	> 20	9	10.5

Table 1 (Continued)

Characteristics	Category	*N*	%
Employed in another field	Yes	50	57.5
	No	35	40.2
Annual household income	Less than 25,000	11	13.8
	25,000 to 34,999	20	25
	35,000 to 49,000	17	21.3
	50,000 to 74,999	7	8.8
	75,000 to 99,999	18	22.5
	100,000 to 149,999	6	7.5
	150,000 or more	1	1.3

Nutrition Education Background

In addition to the demographic data mentioned above, nutritional background data was also collected. Questions asked included college health and/or nutrition courses taken (if attended college), past attendance at nutrition programs and dates attended, if nutrition program was sponsored by the fire department, educational resources made available by the fire department, and access to a registered dietitian. According to the survey, 21.8% of participants had attended an educational nutrition program in the past, while the majority, 73.6%, had not. Additionally, 77.4% of participants had not taken a college nutrition course if attended college, 9.4% had taken one nutrition course, 7.5% had taken two, 1.9% had taken three and 3.8% had taken four nutrition courses. Furthermore, the majority of participants (64.2%) had not taken any college health courses, with only 15.1% having taken one health course, 9.4% having taken two health courses, 7.5% having taken three, and only 3.8% having taken four. Only 5% of the participants who had taken a nutrition course, had done so in the past six months, 10% had taken one in the past year, 10% had taken one four to five years ago, and 35% had taken a nutrition courses over five years ago. Fifteen percent of participants who had taken a nutrition course noted it was sponsored by the fire department, while 80% noted it was not sponsored by the fire department.

The firefighters were also asked whether they had access to educational nutrition resources through their fire department (including videos, sponsored programs, a registered dietitian or nutritionist, nutrition literature such as pamphlets or brochures, or none at all). Only 1.1% noted they had access to videos, 2.3% noted they had access to sponsored programs, and 65% indicated they had no educational resources available at this time.

Additionally, 87.3% of firefighters said they did not have access to a registered dietitian. Table 2 summarizes these results.

Table 2

Nutrition education background of MS firefighters

Question	Category	*N*	*%*
Past educational nutrition program attendance	Yes	19	21.8
	No	64	73.6
College nutrition courses take (if attended college)	0	41	77.4
	1	5	9.4
	2	1	7.5
	3	1	1.9
	4	2	3.8
College heath courses take (if attended college)	0	34	64.2
	1	8	15.1
	2	5	9.4
	3	4	7.5
	16	2	3.8
Educational resources made available by the Fire Department	Videos	1	1.1
	Sponsored Programs	2	2.3
	Registered Dietitian	0	0
	Nutrition Literature	5	5.7
	Nutritionist	0	0
	None at this time	57	65
Access to Registered Dietitian/ Nutritionist for firefighters?	Yes	10	12.7
	No	69	87.3

Nutrition Knowledge

Because of relationship trends between cardiovascular disease and obesity and the lack of nutrition knowledge throughout the literature, nutrition knowledge among firefighters was investigated in this study. It was hypothesized that the majority of firefighters would have a nutrition knowledge score below 60 percent, indicating inadequate nutrition knowledge. This hypothesis was predicted due to the prevalence of documentation of obesity among firefighters in the literature.

A one-sample *t*-test was run to determine whether nutrition knowledge was adequate, defined as 60 percent or above, or inadequate, defined as below 60 percent. There were no outliers in the data, as assessed by inspection of the box plot. Mean nutrition knowledge score ($M = 0.44$, $SD = 0.15$) was lower than the estimated passing score of 60%, a statistically meaningful difference of 0.44, 95% CI [59.5 - 59.6], $t(85) = -3655.6$, $p < .05$. The average nutrition knowledge score was 44%, with the highest score being 73%, and the lowest score being seven percent. This test correctly supported the hypothesis that the majority of firefighters would have a nutrition knowledge score below 60%, indicating that the majority of firefighters have inadequate nutrition knowledge. There was a statistically significant difference between the means ($p < .05$), therefore, the hypothesis was accepted.

A frequency test was also run to determine what percentages of the population had certain knowledge scores. According to the results of this test, 2.4% scored less than 20%, 34.8% scored between 20-39%, 39.6% scored between 40-59%, and 23.3% scored 60% or above. Table 3 summarizes findings.

Table 3

Nutrition knowledge scores among MS firefighters

Score (%)	*N*	%
Less than 20%	2	2.4
20-39%	30	34.8
40-59%	34	39.6
60% or above	20	23.3

Nutrition Choices

Nutrition choices was another variable assessed in this study. It was hypothesized that firefighters would choose sources other than a registered dietitian when ranking top three nutrition resources they rely on, feel comfortable approaching and would recommend regarding nutrition information. This was predicted due to a documented lack of nutrition knowledge among firefighters in the literature. Answer choices included the following: 1) academic journals, 2) athletic trainer, 3) coaches, 4) registered dietitian, 5) friends, 6) college nutrition classes, 7) parents, 8) magazines, 9) strength and conditioning specialist, 10.) team physician, 11.) internet, and12.) other (asked to specify). The top three choices the majority of participants selected for nutrition and diet information included the internet (39.3%), as their first choice, magazines (45.1%) as their second choice, and friends (38.6%) as their third choice. The top three resources the majority of participants selected they would feel most comfortable approaching included friends (33.9%), as their first choice, magazines (39%) as their second choice, and parents (40%) as their third choice. The top three sources participants chose to recommend to other firefighters included a registered dietitian being the first choice (71.1%), magazines being the second choice (28.6%), and a strength and conditioning specialist being the third choice (28%). While participants did not pick a registered dietitian as one of their top three sources for relying on or approaching for nutrition information, they did select the answer choice of registered dietitian as the first choice to recommend to other firefighters. Thus, this hypothesis was only partially accepted, as participants would recommend a registered dietitian. Table 4 summarizes findings.

Table 4

Top three choices for nutrition information among MS firefighters

Ranking	Rely On (%)	Comfortable approaching (%)	Would Recommend (%)
First Choice	Internet (39.3%)	Friends (33.9%)	Registered dietitian (71.1%)
Second Choice	Magazines (45.1%)	Magazines (39%)	Magazines (28.6%)
Third Choice	Friends (38.6%)	Parents (40%)	Strength and conditioning specialist (28%)

Attitude toward nutrition

Attitudes toward nutrition among firefighters was measured with the following questions, using a 10-point Likert scale: 1) "Indicate how well you understand firefighter's nutritional needs, '0' being not at all, '5' being fairly well, '10' being extremely well, 2) Indicate how important you think it is for firefighters to adhere to a healthy diet, '0' being not at all, being important, and '10' being extremely important, 3) Indicate the quality of your present eating habits, '0' being poor, '5' being good, and '10' being excellent. It was predicted that participants would have a poor understanding (less than 5 on the Likert scale) of their nutritional needs, that participants would indicate that it is not important (5 or less than 5 on the Likert scale) to adhere to healthy diet, and also that participants would indicate a poor quality of their current eating habits (less than 5 on the Likert scale).

Perception of Understanding

A one-sample *t*-test was run to determine how well firefighters perceived their understanding of their nutritional needs, as defined by a score of 5.0. Due to the eating environment discussed in the literature (Jahnke 2012; Dobson 2013), it was predicted that firefighters would have a poor understanding of their nutritional needs. Mean understanding score ($M = 6.76$, $SD = 2.76$) was higher than the expected score of '5', or fairly well, a statistically mean difference of 1.75, 95% CI [1.3-2.2], than a normal understanding score of 5.0, $t(86) = 7.253$, $p < .05$. There was a statistically significant difference between means ($p < .05$) and, therefore, it can be determined that participants perceived they had a good understanding of their nutritional needs. Thus, the null hypothesis was accepted and the alternate hypothesis was rejected.

Importance

A one-sample *t*-test was also run to determine whether firefighters thought it was important to adhere to a healthy diet, as defined by an adherence score of 5.0 or greater. It was hypothesized that participants would think it was not important to adhere to a healthy diet, as evidenced by the finding of obesity and cardiovascular disease in the literature. The mean adherence score ($M = 6.76$, $SD = 2.26$), was significantly higher than the tested score of 5.0, a statistically significant difference of 1.759, 95% CI [1.28-2.24], than the tested score of 5.0, $t(86) = 1.759$, $p < .05$. There was also a significant difference between means ($p < .05$) and, therefore, it can be concluded that participants thought it was important to adhere to a healthy diet. Thus, the null hypothesis was accepted and the alternative was rejected.

A frequency test was also run to determine what percent of the survey population thought it was important or extremely important to adhere to a healthy diet. Data reported in Figure 2 indicates that the majority of firefighters thought it was important to extremely important to adhere to a healthy diet, with 5.7% selecting '5', or important, 9.2% selecting '7', 17.2% selecting '8', 21.8% selecting '9', and 43.7% selecting '10', or extremely important.

Quality

Finally, A one-sample *t*-test was run to determine whether the quality of eating habits among participants was less than '5', or 'good', as predicted. It was predicted that participants scores would be less than '5', due to a poor eating environment and the prevalence of obesity and cardiovascular disease in the literature. Mean quality score ($M = 5.69$, $SD = 1.83$), was higher than predicted quality score of 5, as statistically significant difference of 0.70, 95% CI, $t(86) = 3.524$, $p = < .05$. There was a statistically significant difference between means ($p < .05$) and,

therefore, it can be concluded that the majority of participants perceived that they had good eating habits. Thus, the null hypothesis was accepted.

A frequency test was also run to determine what percentage of the survey population indicated poor quality of eating habits. Data reported in Figure 3 indicates that the majority of firefighters said they had a good to excellent quality of eating habits, with 28.7% selecting '5', and 11.5% selecting '6', 20.7% selecting '7', and 11.5% selecting '8'. Conversely, only 1.1% of the survey selected 1.1, 3.4% selected '2', 5.7% selected '3', and 12.6% selected '4'.

Body mass index

Body mass index was also assessed. It was hypothesized that nutrition knowledge would be negatively correlated with BMI. A Pearson's Correlation test was run to determine if there was negative correlation between nutrition knowledge and BMI, and it was determined that there was a negative correlation between nutrition knowledge and BMI, $r = -.107$, $p = .325$, but it was not a significant correlation. Thus, the alternative hypothesis was rejected and the null hypothesis was accepted.

A frequency test was also run to look at the variation between in the population sample. Body mass indices of the sample ranged from 22 to 58, with a body mass index mean of 30, ($M = 30.4$). The table below indicates the varying body mass indices. The majority of the population (91.5%) had a BMI above 25, indicating a strong prevalence of overweight and obese firefighters, while only 7 participants (8.3%) had a normal BMI. Table 5 below summarizes frequency of body mass index.

Table 5

Body mass indices of MS firefighters

BMI	*N*	%
24 and below	7	8.3
25 to 29 (overweight)	39	44.8
30 and above (obese)	41	46.7

Activity Level

A Pearson's Correlation test was also run to see if there was a negative correlation between body mass index and activity level. It was hypothesized that as activity level increased, BMI would decrease. This was posited because of the correlation found in the literature (Choi et al, 2011) between "slow" and "busy" fire stations and obesity. It was determined that there was not a significant negative correlation, $r = -.174$, $p = .112$. Because there was not a significant level of correlation between BMI and activity level, the hypothesis was rejected. A frequency test was also run to determine the varying activity level percentages of the sample. Activity levels were coded as follows; 1 = little or no exercise, 2 = light exercise (one to three days a week), 3 = moderate exercise (three to five days a week), and 5 = extra active (very hard exercise or sports and a physical job. According the frequency test results, the majority of the survey population (47.4%) selected '3' as their activity level, indicating that they were moderately active, doing some form of moderate exercise or sports three to five days a week. This answer choice was followed by 24.7% selecting '2', or light exercise one to three days a week, and 22.4% selecting '4', or very active, with hard exercise or sports six to seven days a week. Only 2.5% of survey takers selected '5', or extra active, and only 2.4% selected '1', or sedentary.

Height and Weight Perception

Height and weight perception was also assessed in this study. It was hypothesized height and weight perception among participants would be inaccurate, based on the study in which BMI was underestimated (Baur et al., 2011). Participants were asked to fill out their height and weight, and at the completion of the survey, height and weight was measured for each participant.

A paired sample *t*-test was run between perceived height and actual height. The results from this test indicated that there was not a statistically significant difference between perceived height and actual height; $p = .631$. Additionally, there was not a statistically significant difference between perceived weight and actual weight; $p = .259$. Therefore, the null hypothesis was accepted and the alternate hypothesis was rejected.

CHAPTER 5: DISCUSSION

A lack of nutrition knowledge is prevalent among firefighters. The average nutrition knowledge score was 44%, the highest score was 73%, and the lowest score was 7%. Only 23.3% of firefighters passed with an adequate nutrition knowledge score of 60% or above. This may be due a lack of education: Out of the 48.8% of participants who attended college, only 16.1% had a bachelor's degree, and 77.4% of participants had never taken a nutrition course. Alternatively, this lack of knowledge may be due to a lack of resources made available to firefighters through their fire department: 65% of participants noted they had no nutrition education resources available, and 87.3% noted they did not have access to a registered dietitian.

As a result of this lack of resources, the top nutrition choices noted by participants is limited, with the top three sources firefighters rely on being the internet, magazines, and friends. The top three sources they feel comfortable approaching/using are friends, magazines, and parents. It is important to note, however, that the first choice participants would recommend to other firefighters was a registered dietitian.

It is also interesting to note that although the majority of the survey population did not have a nutrition knowledge score above 60 percent, the majority of participants ($M = 6.76$) perceived that they had a good understanding of their nutritional needs, with 19.5% selecting '5', or 'fairly well' on the Likert scale, 13.% selecting '6'. Additionally, participants indicated the importance of adhering to a healthy diet ($M = 6.76$), with a rank of '5' or more indicating importance. Furthermore, although the mean body mass index was 30 ($M = 30.4$) with 84.3% of

participants being with overweight or obese, the majority of firefighters indicated they had good quality of present eating habits ($M = 5.69$).

While there is presently a gap in the literature of nutrition knowledge among firefighters and other service profession personnel, this study well help to bridge that gap, and jumpstart a topic of discussion. There is a lack of nutrition knowledge among firefighters, and there they are limited nutrition education resources available to them. This lack of resources has influenced firefighters to select less than ideal options for relying on regarding nutrition and diet. Additionally, firefighters feel most comfortable approaching sources other than a registered dietitian, which indicates there might be a need to help them access local registered dietitians. There may be a willingness to access this resource, as firefighters chose a registered dietitian as their top choice for recommending to other firefighters.

The limitations to this study include a small sample size and no female participants. Also, the sample was not ethnically diverse.

While it may not be practical for firefighters to seek nutrition counseling from a registered dietitian on a regular basis, they may benefit from other opportunities as well. Various universities, for example, have independent organizations, such as the student dietetic association, which could allow students, under the guidance and supervision of a registered dietitian, to travel to local fire departments and provide some nutrition education and materials to firefighters. Additionally, many universities offer opportunities for graduate students to travel to local fire departments, police departments, and other institutions to provide nutrition education, under the guidance and supervision of a registered dietitian. Furthermore, while it was noted in this study that a majority of participants would recommend a registered dietitian, it may be hypothesized that a large number of firefighters are not fully aware of the full scope of what a

registered dietitian does, or may not know where to locate a registered dietitian. Therefore, it may be beneficial for local dietitians to travel to these local institutions explaining their services and where they may be located. These are among a few ideas that will hopefully jumpstart a new area of focus among first responder personnel, nutrition students, and nutrition professionals alike.

CHAPTER 6: CONCLUSION

This study is among the first to examine BMI and height and weight perception, and nutrition knowledge among Mississippi firefighters. As seen in the literature, the prevalence of obesity and cardiovascular disease among firefighters is common, but causation is lacking. While the link between nutrition knowledge and health is yet to be determined among Mississippi firefighters, this study will hopefully jumpstart a new area of focus, and aid in beginning to bridge a gap.

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APPENDIX

APPENDIX A: SURVEY FOR PARTICIPANTS

The survey used to gather data that has been presented in this thesis can be found in a supplemental file named **Firefighter Nutrition Knowledge Survey.docx**

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