An Evaluation of the Healthfulness of the Hospital Food Environment

by

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ABSTRACT

Though nurses may have knowledge about the health promoting benefits of a healthy diet, many do not consume enough fruits or vegetables. For hospital shift nurses to achieve healthy eating while at work, environmental barriers were reportedly the most challenging to overcome. To better understand the hospital food environment from the nurses' perspective, two mechanisms for workplace food acquisition were studied: 1.) hospital consumer food environment, which includes cafeterias, vending machines, and gift shops; and 2.) free food at work.

Through observations of 31 South Carolina hospitals using the Hospital Nutrition Environment Scan (HNES), descriptive data was collected to illuminate the healthfulness of hospital consumer food environments across the state. The presence of health-promoting practices and environmental barriers of importance to nurses were observed and aggregated to provide an overall assessment. Scores and observations were also compared between groups according to hospital size, urbanization, and teaching status.

Free food at work was investigated through a concept analysis and an exploratory electronic survey of hospital nurses from across the United States. Prevalence, consumption, location, and sources of free food were the primary areas of interest for quantifying the problem of free food at work for hospital nurses. Additionally, personal, nursing, and hospital demographics; self-efficacy for diet; and regular fruit and vegetable intake were also measured and used to compare differences in free food availability and consumption.

Findings revealed that hospital food environments from the nurses' perspective needed additional health-promoting practices implemented. Specifically, the hospital consumer food environment lacked 24/7 access to fruits and vegetables but had an overabundance of access to unhealthy foods. Similarly, free food at work was provided often and nearby but typically consisted of high energy, low nutrient density foods. Even though nurses recognized free food as a less healthy option, they regularly consumed it when available. This study adds to our knowledge on the health status of hospital food environments as experienced by nurses.

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CHAPTER 1

INTRODUCTION

Chronic disease affects 60% of American adults, accounts for 90% of annual healthcare costs, and occupies eight of the top ten causes of death in the United States (U.S.) (Centers for Disease Control and Prevention [CDC], 2014; CDC & National Center for Chronic Disease Prevention and Health Promotion [NCCDPHP], 2020). Much of the morbidity due to chronic disease is largely preventable through healthy lifestyle behaviors including healthy dietary patterns (CDC, 2014). The standard American diet, which is high in processed foods and deficient in health promoting foods like fruits and vegetables has been identified as the most important risk factor associated with the leading causes of death and disability in the U.S. (Murray et al., 2013). The vast majority of Americans (about 91%) do not meet the minimum daily intake recommendations of 2.5-3 cups of vegetables and two cups of fruits per day (Lee-Kwan et al., 2017). Additionally, about 65.9% of American adults have overweight and obesity which are dietary-related conditions that increase the risk for chronic disease development (CDC, 2018a).

Much like the poor dietary behaviors seen in the general population, American nurses also succumb to the same pitfalls. Registered Nurses (RNs) receive education on proper nutrition to promote health and regularly provide nutrition information to patients.

Yet, about 84% reported not meeting daily recommendations for fruit and vegetable consumption, and an estimated 55-60% were affected by overweight or obesity (American Nurses Association, 2017; Han et al., 2011; Krussig et al., 2012). Nurses with chronic disease, overweight, and obesity, should be of major concern due to the potential impacts on healthcare provision. Obesity alone may be adversely impacting job performance, work-related injury, and absenteeism (Jordan et al., 2015; Krussig et al., 2012). RNs, at about 2.7 million, constitute the largest group of healthcare professionals in the U.S., and most work in hospitals (62.2% or about 1.7 million) (United States Department of Labor: Bureau of Labor Statistics, 2015). Furthermore, nurses in hospitals already encounter many occupational health and safety risks such as musculoskeletal injury, chemical exposures, violence, and sharp medical objects (Occupational Safety and Health Administration, 2013). In fact, hospital employees suffer from work-related injuries and illness more than construction or manufacturing industry workers (Occupational Safety and Health Administration, 2013). Shift work, or rotational job schedules of 10 to 12 hours duration, is another occupational risk for hospital nurses. Shift work is widely used in hospitals, and has been associated with obesity and unhealthy eating in various industries and in nursing (Amani & Gill, 2013; Han et al., 2011; Wong et al., 2010). Considering the various risks to nurses' health inherent in the hospital setting, adding chronic illness risk through poor dietary practices should be vigorously avoided.

Though about 81.7% of hospitals reported offering some type of Workplace Health Promoting Program (WHPP), few have targeted nurses for any kind of health behavior change and even fewer have targeted nurses' dietary behaviors (Chan & Perry,

2012; Mulder et al., 2020; Torquati et al., 2017). Of the programs that addressed diet, none focused on workplace influences on dietary behaviors. To better understand why nurses are not eating enough fruits and vegetables, comprehensive assessments of the workplace facilitators and barriers were needed.

Previous Research on Hospital Shift Nurses' Workplace Dietary Behaviors

To explore influences on hospital nurses' dietary behaviors while at work, a qualitative, descriptive study was undertaken in South Carolina in 2017-2018 (Horton Dias & Dawson, 2020). Twenty-one hospital shift nurses were interviewed regarding their workplace dietary behaviors and influences. Data was analyzed using thematic analysis and the Theoretical Domains Framework (TDF), which is a comprehensive framework of 14 theoretical domains based on behavioral change theories and implementation science (Atkins et al., 2017; Braun & Clarke, 2014). The theoretical domains of the TDF are knowledge, skills, social/professional role and identity, beliefs and capabilities, optimism, beliefs about consequences, reinforcement, intentions, goals, memory attention and decision processes, environmental context and resources, social influences, emotion, and behavioral regulation (Atkins et al., 2017).

For hospital nurses, barriers to healthy eating were experienced more often than facilitators. Influences within all 14 TDF domains were reported, meaning that many influences played on hospital nurses' dietary choices. Some of the primary TDF constructs of relevance to hospital shift nurses' workplace eating habits were "environmental context and resources" and "social/professional role and identity" (Horton Dias & Dawson, 2020). Environmental influences included factors in the built food environment (e.g., cafeteria, vending machines, break room, free food) and staffing

resources. Social/professional role and identity influences included nurses' unique role in patient care and the accompanying expectations and limitations on behavior. Leadership's role in setting unit priorities was another important influence in the social/professional role/identity domain. In addition to influences categorized within the TDF, four major themes were identified as barriers: "(a) Nursing roles and responsibilities restrict freedom of movement and minimize individual control over dietary practices; (b) The hospital food environment is oppressively unhealthy; (c) Free food is currency and influences consumption; and (d) Shift work is a major barrier to healthy eating" (Horton Dias & Dawson, 2020). Nurses reported putting patient care needs ahead of their own self-care needs, which limited their ability to take adequate breaks, increased stress levels, and influenced their food choices. Another nursing specific barrier was related to nurses' unique role in patient care provision. Nurses were required to obtain coverage for patient care when going off the unit or taking a break. This role specific requirement restricted how far (distance restriction) or how long (time restriction) nurses could be away from patients during a twelve-hour shift. Because nurses were restricted by time and place during long shifts, the hospital food environment emerged as a substantial influence on their dietary choices (Horton Dias & Dawson, 2020).

In the hospital food environment, nurses reported ready access to unhealthy foods located nearby in vending machines and often provided for free in the break room and nurse stations (Horton Dias & Dawson, 2020). Free foods given to nurses from many sources were reportedly unhealthy foods, but nurses had difficulty in refusing these foods when available. Healthy foods, such as fruits and vegetables, were typically only

available in hospital cafeterias which were further away and limited to a few hours each day during cafeteria hours of operation. While nurses were working 24/7, some hospitals had no retail food options on nights/weekends except for vending machines. Nurses also perceived that healthy foods for sale, such as salad and fresh cut fruit, were considerably more expensive than less healthy options (Horton Dias & Dawson, 2020). Limited data was available to quantify the extent of the environmental barriers in hospitals that nurses reported but was needed before improvements in the hospital food environment could be implemented.

Hospital Consumer Food Environments

The hospital food environment refers to all available food sources within hospitals. Assessing hospital food environments for nursing specific influences should consider the mechanisms of food acquisition for nurses. Three predominant mechanisms persist: 1.) food for purchase within the hospital (e.g., cafeteria, vending machine, gift shop); 2.) free food provided within the hospital (e.g., food given for free by peers, clients, vendors, etc.); 3.) food obtained from outside the hospital (e.g., brought from home, food delivery, outside restaurants and stores). Hospital *consumer* food environments refer to the first mechanism, where foods are purchased inside the hospital (e.g., cafeterias, vending machines, gift shops) and can be measured for promoting healthy food choices by what food options, prices, and placement are encountered by consumers (Glanz et al., 2005; Winston et al., 2013b). Few studies have quantitively measured the hospital consumer food environment including cafeterias and vending machines across a state or region (Amerson et al., 2014; Derrick, Bellini, & Spelman, 2015; Dojeiji et al., 2017; McDonald et al., 2006; Winston et al., 2013a). The lack of data

leaves large gaps in knowledge about the current use of recommended environmental practices to promote healthy choices across hospitals of varying sizes, types, and ownership. Descriptive statistics on measurable variables in hospital consumer food environments would highlight the extent of the problem by measuring ways in which hospital food environments are already promoting healthy habits and areas needing immediate attention. Interventions that engineer built environments to influence unconscious dietary choices, also known as behavioral design, have been tested and found to be effective and efficient with statistically significant behavioral changes in "increased fruit/vegetable consumption, increased sales of healthy options, and reduction in calories purchased" (Allan et al., 2017; National Collaborative on Childhood Obesity Research, 2017). With over 7,000 hospitals in the U.S., each with a consumer food environment, the potential to influence consumers' dietary behaviors through environmental interventions should be optimized.

Free Food at Work

Another mechanism by which hospital nurses acquire food while at work was from free food that was provided by various groups and individuals. Free food at work has not been conceptually defined in the literature and has been rarely studied. One recent national study of workplace food acquisitions found that free food at work averaged over 1,200 calories per employee per week, and accounted for 68.5% of all calories obtained at work (Onufrak et al., 2019b). Another recent workplace survey found that cake (and other kinds of sweet dessert foods) were frequently shared and consumed at work (Walker & Flannery, 2020). According to reports by nurses, availability and consumption of free foods may occur even more frequently in hospitals (Horton Dias & Dawson,

2020; Monaghan et al., 2018). Further investigation of free food at work as a concept and its characteristics were needed to better understand the hospital food environment and the ways in which the environment influences nurses' dietary behaviors.

Nurses reported that environmental barriers were of the most influential on dietary behaviors but at times also were influenced by social and emotional situational contexts (Horton Dias & Dawson, 2020). Therefore, self-efficacy, which is an individual's confidence in their ability to perform certain behaviors (Bandura, 1977), could factor into nurses' decisions to consume or not to consume free food at work. Measures of self-efficacy for diet, or the belief in being able to eat healthy in various social situations and emotional states, have been associated with actual dietary behaviors (Sallis et al., 1988; Sheeran et al., 2016). Because free food might occur during various social situations and emotional states, assessing self-efficacy for diet could help explain free food consumption. In addition to self-efficacy for diet, measuring actual dietary intake would also be an important consideration for assessing environmental impacts on dietary behaviors. Low fruit and vegetable consumption has been associated with chronic disease development, therefore measures of fruit and vegetable intake can serve as a baseline nutrition assessment of dietary quality (Murray et al., 2013; Thompson et al., 2002).

Study Purpose and Research Aims

The purpose of this study was to measure the primary influences on nurses' dietary behaviors in the hospital food environment. This study was innovative in that it 1) quantitatively measured workplace environmental barriers specific to hospital nurses; 2) was the first known study to observe and aggregate a description of the hospital consumer

food environment across a Southeastern U.S. state, South Carolina; and 3) was the first known to explore the free food at work concept and measure defining characteristics of free food for nurses in hospitals. The knowledge gained by this study can inform workplace wellness programs, hospital administrative and food policies, public health policy, and nursing education. The specific aims of this study were to:

1. Assess food access, availability, location, and affordability in South Carolina hospital consumer food environments.
2. Explore the concept of free food in the hospital setting by assessing prevalence, quality, and sources of free food available to nurses.
3. Assess hospital nurses' dietary behaviors and self-efficacy beliefs and their associations with free food consumption.

Theoretical Framework

Hospitals are unique environments with internal cultures, structures, and politics, and can be conceptualized as organizational communities. This study was guided by an adapted Model of Community Nutrition Environments (Glanz et al., 2005), which delineates environmental variables in food environments for measurement. The tools used in this study were based on the Model of Community Nutrition Environments and represent the various constructs and relationships described in the model (Winston et al., 2013b).

The organizational nutrition environment concept, which includes the workplace setting, was not originally defined in the Model of Community Nutrition Environments due to the variances between types of workplace settings and their internal governance and structures (Glanz et al., 2005). Although workplace environments differ widely, settings of the same industry type typically share common features and workflows, which would allow for more generalizable assessments. This is true of hospitals, though of

differing specialty and ownership, share similarities in types of retail venues available on site. To evaluate hospital consumer food environments, the Model was adapted and operationalized as a situation-specific theory (Figure 1.1). Because the Model of Community Nutrition Environments has been shown to be a testable mid-range theory through the use of its many model-based tools, it offers a solid foundation for situation-specific adaptation (Glanz et al., 2005, Glanz et al., 2007; Saelens et al., 2007). Though designed for communities where people live, some minor adaptations extend its relevance to the workplace setting. Indeed, a setting specific tool for hospitals was developed and validated based on the Model (Hospital Nutrition Environment Scan, HNES) (Winston et al., 2013b). Next, the environmental level concepts will be described in detail.

Environmental Variables

Workplace Food Environment. Workplace food environment encompasses all food sources that are available to employees in the workplace, including type, location, and accessibility (Glanz et al., 2005). Type of food source would encompass the various venues through which employees acquire food while at work (e.g., vending machine, cafeteria). Various retail food venues such as cafeterias, vending machines, restaurants, and coffee shops may be on premises. As with the original community model, measures of location and accessibility (hours of operation) also apply to the workplace environment. Location may be a particularly important influencer for job roles, such as nurses, that have limited breaks and for workplaces in rural areas. Accessibility, or hours of operation, can also be very important for employees that work long shifts, nights, weekends, and holidays (e.g., nurses).

Recent research findings revealed free food as a common source of food for many employees and has been added to this adapted model as a variable in the workplace food environment (Horton Dias & Dawson, 2020; Onufrak et al., 2019b) (Figure 1.1). Free food in the workplace represents a unique concept with psychological and social connotations that may influence dietary behaviors in a manner unlike free food in other settings (e.g., food banks in communities). Free food in the workplace has not been widely studied. Initial findings suggest that free food in the workplace is of low nutritional quality (Onufrak et al., 2019b). Free food characteristics and prevalence may vary by setting and industry. Extensive exploration is needed to define free food characteristics, such as type of food offered, location of free food, and access to free food.

Consumer Food Environment. The consumer food environment in the original community model represents availability, price, promotion, placement, and nutrition information/labeling of foods for purchase within communities (Glanz et al., 2005). Availability refers to the presence of food options for sale within the venue. Availability also refers to the ratio of less healthy options compared with the presence of healthier options. Price represents the listed price of food items. Promotion accounts for marketing strategies within the establishment such as free beverage with food purchase or a featured meal of the day. The placement variable measures the location of items within the venue, such as location of water at or above eye level and food items for sale at the point of purchase. Finally, nutrition information/labeling represents any nutrition information such as calories, fat content, and sodium content provided on food items or menus and the designation of healthier food items through a symbol or label. All of these variables

(availability, price, promotion, placement, and nutrition information/labeling) are relevant to the workplace environment, particularly hospitals where cafeterias and vending machines are common. Assessment of the workplace consumer food environment should follow the same procedures as when assessed in the community (Glanz et al., 2007; Saelens et al., 2007; Voss et al., 2012). Healthy food options may be available, but if not affordable, promoted, labeled, or placed conspicuously, unhealthy foods may be more often chosen. All the workplace consumer food environment variables are included in the hospital assessment tool, HNES (Winston et al., 2013b).

Free Food in the Workplace

Based on findings from interviews with 21 hospital shift work nurses in South Carolina, certain characteristics of free food were defined but need further investigation (Horton Dias & Dawson, 2020). Nurses reported that free foods were often: 1) low nutritional quality, 2) frequently available, 3) located near or on nursing units, and 4) provided by many sources. Nurses also reported the presence of free food at work influenced their consumption. The characteristics of free food for hospital nurses have not been quantitatively evaluated. Exploration of free food characteristics through a self-report survey of hospital nurses will be based on the qualitative research findings to assess quality, prevalence, location, and sources.

Methods

Aim 1. Assess food access, availability, location, and affordability in South Carolina hospital consumer food environments.

To assess the South Carolina hospital consumer food environment, a valid and reliable observational tool was used to measure hospitals across the state. The Hospital

Nutrition Environment Scan for Cafeterias, Vending Machines, and Gift Shops (HNES) was developed based on the several established and theoretically-derived Nutrition Environment Measures Scans (NEMS) for restaurants, stores, and vending machines (Glanz et al., 2005; Glanz et al., 2007; Saelens et al., 2007; Voss et al., 2012; Winston et al., 2013b). Measurements of the hospital consumer food environments were according to NEMS protocols and training and scored according to the HNES tool. Scores were aggregated for each venue type across the sample and as a composite score. Frequencies of observed recommended environmental practices that promote healthy choices were also measured. Chi-square tests of association, independent t-tests, and one-way ANOVA were used to compare HNES scores and frequencies of dichotomous variables by hospital size, urbanization, and teaching status.

In addition to standard measures on the HNES, availability and prices of fruits/vegetables in vending machines and washed/cut fruits and vegetables in cafeterias were also observed. Because even short distances were barriers for hospital shift nurses (Horton Dias & Dawson, 2020), descriptions of where food was available for purchase (e.g., vending, cafeteria) within the hospitals were observed. Observations on the location of the nearest fruit/vegetable in relation to nursing units were also collected.

Aim 2. Explore the concept of free food in the hospital setting by assessing prevalence, quality, and sources of free food available to nurses.

No established tool exists to evaluate the free food at work phenomenon in any population or work setting. A short exploratory mixed methods survey was developed based on reported characteristics of free food by hospital nurses (Horton Dias & Dawson, 2020). Face validity was established prior to distribution by a panel of experts including

nurse researchers, a Registered Dietician, and practicing hospital nurses. Demographic information was collected but no personal identifiers were used. University of South Carolina IRB exemption was attained prior to recruitment. See Appendix A for survey questions. The anonymous, electronic, one-time survey was available to any hospital RN in the U.S. working at least 50% of the time in a hospital. Frequencies of demographics and free food characteristics were calculated and described. Chi-square tests of association were used to compare free food availability and consumption by various personal, nursing, and hospital demographics.

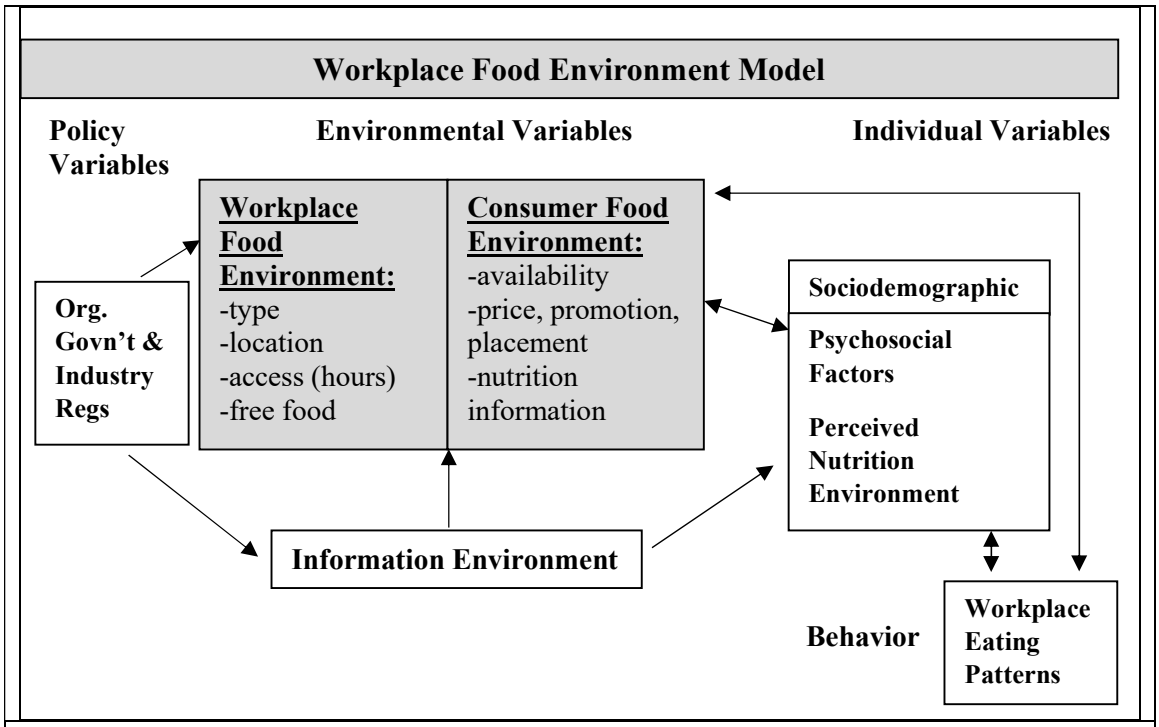
Aim 3. Assess hospital nurses' dietary behaviors and self-efficacy beliefs and their associations with free food consumption.

As part of the free food survey, hospital nurses' dietary behaviors were measured using two validated dietary behavior screeners to test the strength of influence that free food had on consumption. One was the National Institutes of Health Eating at America's Table Study Quick Food Scan (Thompson et al., 2002). This self-report screener focuses on fruit and vegetable consumption during the previous month including type and amount. The second screener was the Self-Efficacy for Diet survey (Sallis et al., 1988). This screener assesses emotional and situational influences on perceived self-efficacy for eating a "healthy" diet, thus, provided information on the nurses' perceived self-efficacy to eat healthy during times that free food might be available.

Summary

This multi-method study of the hospital food environment focused on the nurses' perspective and the environmental barriers for healthy eating they experienced while at work. Observing hospitals of varying size, ownership, type, and urbanization from across

South Carolina provided a valuable snapshot of hospital consumer food environment conditions. The conceptual exploration of free food at work adds to our knowledge on the phenomenon and can serve as the basis for further theoretical development. The quantitative exploration of free food at work illuminated the extent of the problem by assessing frequency, consumption, and other defining characteristics. Chapter 1 provided an introduction to this completed research through a summary of the relevant scientific literature, purpose, aims, and methodology. Chapter 2 consists of a literature review and conceptual analysis manuscript on the concept of free food at work and has been submitted to *Workplace Health & Safety.* Chapters 3 and 4 consist of two manuscripts reporting the research findings from this dissertation work. The Chapter 3 manuscript reports on the observations of South Carolina hospital consumer food environments using the HNES and was prepared for submission to *American Journal of Preventive Medicine*. The Chapter 4 manuscript reports on the results of the free food at work exploratory survey for U.S. hospital nurses and was prepared for submission to *Research in Nursing and Health*. Chapter 5 consists of study conclusions and recommendations for practice, education, and future research.



Adapted from Glanz, K., Sallis, J. F., Saelens, B. E., & Frank, L. D. (2005). Healthy Nutrition Environments: Concepts and Measures. *American Journal of Health Promotion, 19*(5), 330-333. 10.4278/0890-1171-19.5.330

Figure 1.1 Workplace Food Environment Model

CHAPTER 2

FREE FOOD AT WORK: A CONCEPT ANALYSIS[1]

[1]Horton Dias, C., Dawson, R. M., Abshire, D. A., Harris, D., Wirth, M. D. Submitted to *Workplace Health & Safety*, 10/24/2020

Abstract

Background: Free food consumed in the workplace is a reportedly common occurrence and potential source of extra calories, added sugar, unhealthy fats, and sodium. Free food at work as a concept for scientific study has not been previously analyzed or defined but is needed to differentiate free food from other food sources in the workplace and to propel further study and theory development.

Methods: A concept analysis of free food at work was conducted using the Walker and Avant framework. After a literature review was conducted, the concept, its defining attributes including antecedents, consequents, and empirical referents were identified and explained.

Findings: Free food at work is defined as food that is available for consumption in the workplace at no financial cost to employees. Antecedents are sources of and reasons for free food provision. Consequents include influence on consumption, behaviors, attitudes, emotions, and health outcomes. Additional measurable aspects of the concept and implications are discussed.

Conclusions: The concept of free food at work was analyzed; defining attributes and empirical referents were presented. Identifying the impact of free food at work is an issue requiring consideration for occupational health program implementation.

Background

The World Health Organization (WHO) and the Centers for Disease Prevention and Control (CDC) in the United States (U.S.) have endorsed the workplace as "a priority setting for health promotion" (CDC, 2019; WHO, 2017). Over the past several decades, a growing number of employers have also recognized the financial value of a healthy

workforce, resulting in workplace health promoting programs (WHPPs) that focus on improving employee health and wellness. Many WHPPs target dietary behaviors, as proper nutrition is a foundational necessity in long-term health promotion and prevention of chronic disease (Geaney et al., 2013; Mhurchu, Aston, & Jebb, 2010).

Though employees experience multi-level socio-ecological influences on workplace dietary behaviors (Geaney et al., 2013), environmental-level influences such as how employees acquire food in the workplace is one significant factor for consideration (Onufrak et al., 2019a, 2019b). Especially when developing WHPPs that target dietary behaviors, assessing the workplace norms on food acquisition is important for a more tailored approach to interventions (Onufrak et al., 2019a, 2019b).

Some employees may acquire food while at work differently than at home or in community settings. Depending on setting and job role, some workplaces allow substantial time and resources for employees to eat off-site, while others provide on-site purchase options. Employees may bring food from home while others may have food delivered to the work site. In many workplace settings, free food, or food that is available to employees in the workplace at no financial cost, is another common way to acquire food (Onufrak et al., 2019b), but has been rarely researched. Free food has been cited as a common occurrence in the popular media (Bratskeir, 2017; Green, 2019; Krishna, 2019), and mentioned in several qualitative works (Blake et al., 2009; Horton Dias & Dawson, 2020; Monaghan et al., 2018; Nicholls et al., 2017; Strickland et al., 2015; Tabak et al., 2018), but no concept, theory, or empirical referents for free food in the workplace have been defined in the scientific literature. Furthermore, the terminology used for the phenomenon is inconsistent. The lack of coherent conceptual terminology and definitive

parameters limits the scientific examination of this phenomenon and its potential implications on employee health. Free food likely has implications of health and wellbeing for all employees who still report to a "workplace".

The purpose of this concept analysis is to propose a structured concept of free food within the context of the workplace and to provide empirical referents, which are the measurable aspects of the concept, to spur further research and theoretical development regarding workplace dietary behaviors in all settings while highlighting considerations particular to healthcare settings.

Methods

Concept analysis yields a working definition from which empirical referents (measurable aspects) are acquired for further research and theoretical development. Due to the novel nature of free food as a theoretical concept in the scientific literature, the broad and iterative approach for concept analysis from Walker and Avant (2005) was the best fit for initial exploration of a new concept. The following steps were taken in this concept analysis of free food in the workplace: 1) select a concept, 2) determine purpose of analysis, 3) identify all uses of the concept, 4) determine defining attributes, 5) develop a model case, 6) develop borderline and contrary cases, 7) identify antecedents and consequents, and 8) define empirical referents (Walker & Avant, 2005).

Literature Search

A literature search was conducted in June and July 2020 using PubMed, CINAHL, and GoogleScholar databases. Additionally, Google.com search engine was used to search the popular media for additional terminology used to describe the phenomenon and to find grey literature reports not available through GoogleScholar

search. Grey literature refers to formal documents independently published by public and private entities and include non-peer-reviewed reports, studies, surveys, meeting summaries, and position papers. Because this concept has not been uniformly named or defined and to capture the broadest results, many search terms and combinations were used: “free food”, “free food at work”, “free food” AND “work”, “free food” AND “workplace”, “food” AND “gift”, “food” AND “gift” AND “work”, “free lunch” AND “work”, “free meal” AND “work”, “free snack” AND “work”, “office cake”, “cake culture”, “food sharing”, and “food offering”. Searches were conducted in English and without date limitations to produce wide ranging results. Grey literature publications and scientific peer-reviewed literature were included if they (a) were written in English, (b) mentioned free food (any edible offered without financial cost), and (c) occur within the workplace setting. Finally, references from relevant publications were screened for inclusion. See Figure 2.1 for literature search strategy diagram.

Results

Identify all uses of the concept

Thirty-nine publications met inclusion criteria. See Table 2.1 for included publications and identification of which conceptual aspects of free food at work were represented in each. Discussion on free food at work has occurred most often in the popular media, however, free food at work, as a theoretical concept for scientific study, has not been consistently defined and rarely explored in the scientific literature. Various names have been used to describe the phenomenon such as “free food” (Onufrak et al., 2019), “gifted food” (Nicholls et al., 2017), and “food offering” (Hamburg, Finkenauer, & Schuengel, 2014). The following is an examination of the different names used to

describe this phenomenon and an explanation of the label and definition we propose based on the critical attributes of the concept.

Hamburg et al. (2014) used the term "food offering" to describe food that was offered from one individual or group to another. However, the term "food offering" specifically referred to an interpersonal interaction, which may not always apply in the workplace, and did not delineate differences according to situational context (i.e., between family vs. between coworkers). In a commentary on Hamburg et al. (2014), the concept was re-named "food sharing" and again did not address the social implications of different settings in which free food occurs (i.e., work vs. church) (Alley, 2014). Both terms "food sharing" and "food offering" suggest a focus on the action and interaction of sharing or offering food. While important elements of the free food concept, these terms do not fully express all aspects of the concept. Furthermore, "food offering" could be understood in a religious or ritualistic context, while "food sharing" may suggest the act of eating/drinking in the presence of others. "Food sharing" has also been used in a charity type capacity (Schanes & Stagl, 2019). Therefore, these terms are not general or basic enough to capture all aspects of the concept that need further study.

"Free lunch" and "free meals" were often used to describe the meals provided for free in office and healthcare settings (Davar, 2008; Fadare et al., 2018; Krishna, 2019; Saul, 2006; Schwartz & Woloshin, 2019; Steinbrook, 2017; Straand & Cooper, 2018; Wall & Brown, 2007). Because "lunch" or "meal" typically included a full meal with beverages, it was appropriate to use these terms. However, free food at work can often be candy, drinks, or snacks rather than a meal, therefore, "free lunch" or "free meal" are not inclusive enough to capture all occurrences of the phenomenon.

Studies on the consumption of free chocolates provided to healthcare workers in hospitals assessed different aspects of the concept without a conceptual term, theory, or definition (Cheung, 2003; Gajendragadkar et al., 2013). The consumption of free sweet and ultra-processed foods was deemed "cake culture" by the Royal College of Surgeons Faculty of Dental Surgery in the United Kingdom in a position statement to decrease sugar consumption in the workplace (Royal College of Surgeons, 2016). Subsequently, Walker and Flannery (2020) studied the frequency and perceived social and health consequences of consumption of sweet foods in the workplace and called the phenomenon "office cake" or "OC". Here office cake was defined as "cakes or other sweet foods (biscuits, pastries and confectionery) provided by employees or managers to share with colleagues" (Walker & Flannery, 2020). This definition captures only part of the free food at work phenomenon that needs study as free food may include other types of foods that are not sweet (ie. potato chips and pizza) and can be provided by other sources beyond employees and management. Further, "office cake" describes free food only in the office setting. In several studies examining the workplace influences on nurses' dietary behaviors, the phenomenon of free food was mentioned but called by a variety of terms. Monaghan et al. (2018) spoke of the phenomenon and labeled it "food donations". Nicholls et al. (2017) described how junk foods and chocolates were "shared", "gifted", and "readily available". Food "donations" or "gifted food" can mean charity and are the terms often used when describing free food provided to address food insecurity (e.g., free food from food banks). Free food in the workplace may be provided as a charitable donation but is probably not the most common occurrence. Free food at work occurs for a wide variety of reasons, therefore, a more general term would connote

a more inclusive concept that would allow for the study of various reasons why free food is provided at work.

The term "free food" has been most appropriately used in describing this concept, however no definition of the term was found. Onufrak et al. (2019b) contributed the first quantitative examination of foods and beverages commonly acquired by employees in the workplace (both purchased and free). In this work, the authors named the food acquired without employee monetary costs as "free food". "Free food" was mentioned in three separate studies that examined the workplace dietary behaviors of low-wage workers but the term was not described or studied further (Blake et al., 2009; Strickland et al., 2015; Tabak et al., 2018). Pressel (2014) described the abundance of "free food" available in U.S. hospitals and remarked on the surprising lack of scientific literature on the subject with a call for inquiry into the effects of free food on healthcare employees' health. "Free food" and "free food at work" were the most commonly used terms in the popular media (Cleveland Clinic, 2019; Findling, 2018; Krishna, 2019; Spear, 2018).

The various labels and loosely defined attributes of the free food concept requires further scientific exploration. Subsequently, we propose a concept name, attributes, antecedents, consequences, exemplary cases, and empirical referents for testing.

Definition and Critical Attributes of Free Food at Work

Based on the dictionary definitions of "free" and "food", we propose that the concept is best named "free food". The definition of "free" is the first attribute of free food which denotes no financial cost or "without charge, for nothing, complimentary, gratuitous" (Dictionary.com, 2019). Food is defined as "any nourishing substance that is eaten, drunk, or otherwise taken into the body to sustain life, provide energy, promote

growth, etc." (Dictionary.com, 2019). Free food takes on varying characteristics according to social context (home versus church versus school), and this concept analysis is situated within the workplace. The workplace setting is a critical attribute of this concept and its implications. Free food in alternative settings would need to be studied separately. We propose "free food at work" best represents the concept for study in this analysis with the following definition: **food that is available for consumption in the workplace at no financial cost to employees.**

The location of free food in the workplace (e.g., breakroom, meeting room) is another critical attribute in need of further study. See Figure 2.2 for conceptual critical attributes. Location of food options has been shown to influence consumption in general population settings and initial examinations of proximity of drinks and snacks in the workplace suggest that location influences consumption (Baskin et al., 2016; Gorlin, Dhar, & Chance, 2014; Hunter et al., 2018) Additional research is needed to better understand how and to what extent location influences behavior. Occupations that operate in busy workflows may be particularly subjected to location restraints and may be more inclined to consume free foods when they are located close to work stations, such as was reported by hospital shift nurses where free food was often available nearby on the unit (Horton Dias & Dawson, 2020).

We theorize that the concept of free food at work means more than the individual components of "free" and "food", rather it also encompasses the psychological, physical, and social meanings of "food" and "free". As a result, free food at work imposes a significant influence over consumption. Food, a basic physiologic necessity, conveys many meanings beyond nutrition and is also consumed for enjoyment, nostalgia, comfort,

medicine, and celebration, among many other reasons (Cannon, 2008). Additionally, *free* is a powerful influencer of human behavior. Ariely (2010) and Anderson (2009) both describe the irrational influence of "free" on the human psyche that leads most to consume almost anything, even against our best interest, as long as it is offered at no financial cost. Humans seem ill equipped to calculate the non-financial costs associated with free items (Anderson, 2009; Ariely, 2010). The history of "free lunch" as a powerful marketing tool goes back to the U.S. gold rush when saloons began offering free lunch with drink purchase as a way to bring in business during the slow lunchtime hours (Anderson, 2009). Since then, the overwhelming appeal of free food has been harnessed by many who intend to influence behavior. To test the power of *free* on making irrational economic decisions, Shampanier, Mazar, and Ariely (2007) tested the consumption of very cheap versus free chocolates of varying quality. The first experimental group offered a common chocolate for one cent or a decadent chocolate in the same size for 15 cents. Both chocolates were significantly price reduced from usual, but the decadent chocolate for 15 cents was a better value given that it was the decadent choice. In this group, participants were able to discern the financial benefit when both chocolates required payment and more often purchased the decadent chocolate. The other two experimental groups offered the decadent chocolate at reduced prices (14 cents or 10 cents) or common chocolate for free. The students were much more likely to consume the common chocolate over the decadent chocolate when the common chocolate was free as opposed to one cent, even though in terms of economics, the decadent chocolate at any of the study prices (10, 14, and 15 cents) was a better deal (Shampanier, Mazar, & Ariely, 2007). Similarly, an observational study of free chocolates in a hospital break room

revealed the very short time before the chocolates were completely consumed (Gajendragadkar et al., 2013). Several commentaries on the overwhelming allure of free food, even for food items that usually would not be as enticing, have appeared in popular media (Bratskeir, 2017; Green, 2019; Rae, 2019; Vozza, 2019). With little scientific support they have speculated over irrational behaviors towards free food in the workplace with titles like "here's why you can't control yourself around free office food" (Bratskeir, 2017). Nurses have reported eating free chocolates regularly, even though they subsequently experienced negative feelings of wellbeing (Cheung, 2003). However, some have harnessed the power of free to promote health in the workplace. Employer provided food has the potential to address employee malnutrition, obesity, and chronic illness as illustrated through case reports from around the world (Wanjek, 2005), and could even impact job productivity (Bhatia, 2018). Increased fruit consumption was observed in workplace interventions that offered free fruit to employees (Alinia et al., 2010; Lake et al., 2016), and free lunch increased consumption of leafy greens and fruits while decreasing sugar intake in one intervention study (Makurat et al., 2018). More research is needed on the effects of healthy free food at work since some surveyed staff reportedly preferred nutrition education to free fruit at work (Street, Lacey, & Grambower, 2017).

Free food at work is a socially accepted currency that is exchanged for many reasons and from many sources. The types of free foods are often unhealthy indulgent or comfort foods and pose a unique influence over employee dietary behaviors (Horton Dias & Dawson, 2020; Onufrak et al., 2019b; Strickland et al., 2015; Tabak et al., 2018).

Antecedents

Antecedents of a concept are the components that must occur prior to the manifestation of the concept. For free food at work to occur, food must first be acquired by someone for some reason and then offered to employees. Free food is made available to employees for many reasons and from various sources, therefore, the antecedents of free food at work are: a) sources, or who is providing the free food; and b) reasons/intentions for providing free food. See Figure 2.2 for conceptual model including antecedents.

Management, coworkers, vendors, and customers are all potential sources of free food at work. Reasons for free food depend on the setting and source, but some of the most common reasons are: incentive for attending meetings/education (Horton Dias & Dawson, 2020; Segovis et al., 2007), celebration and comradery (Horton Dias & Dawson, 2020; Lake et al., 2016; Pressel, 2014), to boost morale and induce a fun atmosphere (Baldonado, 2015; Horton Dias & Dawson, 2020; Karl et al., 2005), and to show appreciation (Cheung, 2003; Horton Dias & Dawson, 2020; Pressel, 2014). Third party vendors, such as pharmaceutical and medical device companies in healthcare settings, provide free food in an effort to persuade providers' to prescribe certain drugs over others (Anderson, 2011; Schwartz & Woloshin, 2019; Steinbrook, 2017). Other businesses provide free food as a job perk and to build company loyalty (Findling, 2018; Priya Krishna, 2019). Additionally, public service industries where direct payment for service is not allowed, as with healthcare professionals, service recipients may offer free food as a gift and symbol of appreciation (Horton Dias & Dawson, 2020; Nicholls et al., 2017; Pressel, 2014). Recently due to the COVID19 pandemic, several chain restaurants in the

U.S. have joined in on showing appreciation to healthcare workers and first responders by offering free food (Jiang, 2020). Alternatively, givers of free food may have no intentions other than to avoid waste by dumping left-overs of less healthy foods from their homes onto coworkers, who are sure to consume the free food (e.g., left-over Halloween candy) (Vozza, 2019).

The many sources and reasons for free food at work need further exploration as each source may include various reasons depending on the situational context, thus influencing type of food provided and consumption. Next, the consequences of free food are discussed.

Consequences

Conceptual consequences are the results of the occurrence of the concept. It can be deduced that some of the motives for providing free food at work can also be interpreted as the consequences. Attendance at meetings/education increases with the promise of free food (Segovis et al., 2007). Givers of free food positively influence receivers' behaviors to their own benefit, (e.g., more prescriptions of brand name drugs by physicians) (Anderson, 2011; Brennan et al., 2006; Campbell et al., 2013). Employee recruitment, retention, and satisfaction are improved in companies with regular availability of free food (Baldonado, 2015; Blake et al., 2009; Findling, 2018; Krishna, 2019). Stress and negative emotions may be modulated through the act of giving and receiving free food (Hamburg et al., 2014). Finally, avoiding waste may be another reason for supplying free food at work (Vozza, 2019), which tends to result in food being consumed quickly (Gajendragadkar et al., 2013).

The giver of free food is likely to receive the intended result, but the consequences for the receiver are often more covert. Long-term health effects of regular free food consumption are not known. What little has been described in the literature suggests that free foods are often unhealthy and high calorie, which may contribute to overweight, obesity, and other metabolic chronic diseases (Onufrak et al., 2018). In certain occupations, behavioral changes as a result of receiving free food can pose ethical compromise as with physician prescribing practices (Steinbrook, 2017). Some employees who are concerned with eating healthy, may feel sabotaged, guilty, or shamed by free foods in the workplace (Cheung, 2003: Horton Dias & Dawson, 2020; Taber, 2014). More research is needed to determine the effects of free food on employees' health and wellbeing.

Application to Occupational Health Nursing

Nurses, registered dietitians, and interdisciplinary health professionals involved in workplace health promoting programs (WHPPs), need to understand the role of free food at work and its impact on employees' dietary behaviors. Walker and Avant (1995) recommend exemplars to demonstrate the application of the concept in practice. Following are a model case, borderline case, and contrary case for comparison.

Model Case

In the model case, all attributes, antecedents, and consequences are presented (Walker & Avant, 2005). Here free food is available in the workplace at no financial cost to the employees (critical attributes). The free food was acquired by a source and given to employees for a reason (antecedents), and the influence of free food on consumption is presented (consequences).

It's been a long shift with many critical issues and no time for breaks. Karen's coworker comes by to let her know that the manager has just delivered pizza to the break room for the staff. Karen remarks on how thoughtful it was of the manager to do that. Though Karen has been watching her diet in an attempt to lose weight, she's hungry and tired and the thought of hot pizza sounds delicious. Karen hurries to the break room to get a slice… or two.

Borderline Case

In the borderline case, some, but not all attributes, antecedents, and consequences are presented for comparison with the model case (Walker & Avant, 2005).

This year's office charity team has organized a bake sale for fundraising. A wide variety of home-baked desserts are wheeled on a cart throughout the office and generates a lot of excitement. Everyone is anxious to see and try a variety of treats while supporting a good cause. The team sells out after offering a "buy two, get one for free" special.

In this exemplar, free food at work is available but only with purchase. The influence of free food on consumption may be related to the price (free) and/or the reason for the presence of the free food (fundraising).

Contrary Case

The contrary case offers an alternate scenario where none of the concept attributes are presented.

During their lunch break, most company staff head out to nearby restaurants. Others work through their break and eat at their desks. Occasionally, a "brown

bag" meeting is planned and everyone brings in their own lunch from home or order delivery.

Empirical Referents

Empirical referents are the measurable aspects of a concept that can be tested. In order to better understand the workplace food environment and inform WHPPs focused on improving dietary behaviors, more research is needed on all attributes, antecedents, and consequences of free food at work. See Figure 2.2 for conceptually proposed empirical referents.

Little is known about the quantity, frequency, and types of free foods available in the workplace. In addition, do findings vary according to workplace setting? Free food needs to be examined for nutritional composition as in the preliminary work by Onufrak, et al. (2019b). What foods are most commonly given for free, and does the type of food vary by source, reason, or setting? Identifying free food quality and consumption can infer potential impacts of free food on health outcomes.

Location is another important variable for study of free food as proximity of snacks has been associated with influencing consumption (Baskin et al., 2016; Gorlin, Dhar, & Chance, 2014; Hunter et al., 2018). When free foods are available in the workplace, where are they located? Furthermore, how does proximity of free food influence consumption and how does consumption compare with foods for purchase in the same location? Which is the more powerful influencer for consumption, type of free food or location of free food?

Sources of free food and associated reasons for providing free food should also be evaluated and compared between workplace settings. Studying sources of and reasons for

free food (antecedents) can also lead to a better understanding of the consequences. Similarly, the influence of free food needs to be better measured. Important information includes to what extent do free foods influence behavior, relationships, attitudes, performance, and health, and are the effects related to source and situation. Amount and frequency of consumption are two potential measures of influence, particularly when compared to the same items available for purchase. Measuring behavioral changes (e.g., meeting attendance), perceptions (e.g., job satisfaction), or attitudes (e.g., loyalty) as a result of receipt of free food can also reveal the influence of free foods.

The health effects of free food at work are not known, but this is an important area for inquiry. If free foods at work are consumed often, are of poor nutritional value and add sugar, fat, and sodium to employees' diets, what are the long-term health effects and weight status of those employees? Alternatively, if healthy free foods are frequently consumed in the workplace, does that positively impact employee health? Finally, workplace food policies and guidelines on free food need testing to evaluate efficacy and to inform evidence-based programs.

Discussion

As a result of the COVID-19 pandemic and the need for social distancing, many workplaces have shifted from a central location to home. For essential workers, however, the workplace has remained in the same location. Healthcare workers, particularly those in hospitals, continue to report to their workplaces with increased risk to their personal health and wellbeing. Though various workplace health and safety challenges may require prioritization, such as personal protective equipment use training, worker nutritional health should continue to call the attention of occupational health

practitioners. Proper nutrition can boost the immune system and provide both short-term and long-term health benefits (Calder et al., 2020; Gibson et al., 2012; Slawson, Fitzgerald, & Morgan, 2013). The prospect of preventing chronic disease is a significant reason for encouraging proper nutrition through workplace interventions as those with chronic illnesses are more likely to experience detrimental effects from COVID-19 (Butler & Barrientos, 2020; Yang et al., 2020). Furthermore, proper nutrition can boost energy, mood, and feelings of wellbeing, which are of particular importance in the time of COVID-19 (Opie et al., 2017; Sarris et al., 2015).

Free food is an important food source that is a common occurrence in the workplace but has been rarely studied. Thirty-two percent of surveyed employers in the private sector reported providing free food (snacks including beverages) for employees in 2018, which was an increase from the four previous years (Society for Human Resource Management, 2018), and 16.8% of employees in one national sample reported consuming free food at work (Onufrak et al., 2019). For employees who consumed free foods at work, they contributed to over 1,200 Kcal per person per week, and accounted for 68.5% of all calories obtained at work (Onufrak et al., 2019). The leading types of free foods consumed were foods high in fat, sodium, sugar, and empty calories (pizza, sandwiches, soft drinks, cookies/brownies) (Onufrak et al., 2019). Depending on workplace setting, the frequency of occurrence and number of additional Kcal probably varies. Particularly in the hospital setting, nurses and doctors reported free food was common and rarely a healthy option (Horton Dias & Dawson, 2020; Pressel, 2014). Chocolates, in particular, are so common on hospital units during the holidays that some have recommended healthier foods be gifted instead (Keogh, 2014). Assessments of sources, frequency, type,

and associated nutritional quality of free foods are needed in order to tailor WHPPs to the particular barriers in the specific setting/industry.

Moreover, the long-term effects of free food at work on employee health is not known. If free food at work is contributing to obesity and chronic illness, employers will ultimately suffer financial losses in insurance premiums, job productivity, and absenteeism (Kudel, Huang, & Ganguly, 2018; Lehnert et al., 2013; Shrestha et al., 2016). Especially in industries where the workforce is over-worked or under-staffed, to better support healthy behaviors, attention needs to be paid to the quality and quantity of free food at work. Stressful work conditions in office-based worksites reportedly increase consumption of less healthy foods (Clohessy, Walasek, & Meyer, 2019). Hospital nurses, in particular, reported stressful shifts with little time for breaks and ultimately exhaustion which depleted their resolve to acquire and eat healthy foods during and after shifts (Horton Dias & Dawson, 2020). The ready availability of free foods at work became a major impediment for hospital nurses to choose healthy foods (Horton Dias & Dawson, 2020). For stressed employees, the influence of free food may be especially strong and needs special consideration.

Though employees gain free food at no financial cost, it is unlikely that there are truly no costs. Gifts carry significance in social contexts and, as theorized by Marcel Mauss in 1925, are representations of social contracts that create reciprocal behaviors and attitudes (Mauss, 1990). To what extent free food influences employees' behaviors and wellbeing is not currently known, though initial investigations suggest that frequent consumption can negatively affect feelings of wellbeing (Cheung, 2003; Walker & Flannery, 2020). Givers of free food may have various motives and according to the

situational context, free food could produce varying responses. Occupational health professionals need to evaluate free food in the workplace to be able to design and implement appropriate interventions in WHPPs.

Currently, guidelines for healthier workplace food environments, including food in meetings, are available from the Centers for Disease Control and Prevention (U.S. Department of Health and Human Services, CDC, & Healthier Worksite Initiative, n. d.) and initial surveillance suggests that these policies are still not widely adopted with 18.6% of surveyed employees from various sectors reporting a workplace policy for offering healthy foods at meetings (Onufrak et al., 2018). In a survey of U.S. hospitals, of those that had workplace wellness programs, 57.2% included a policy for healthy foods at meetings (Mulder et al., 2020)). Further, the guidelines do not address free food at work from other sources (e.g., peers, clients). More research is needed to test the efficacy of various policies and guidelines on free food in the workplace.

Certain industries also need to consider the ethical implications of free food at work, particularly based on the source of free food. Clearly, monetary gifts or high-value kickbacks are regarded as unethical in many professions. However, since the mid-2000s, attention has focused on the influence of small gifts and free food on physician prescribing reciprocity and has highlighted some potential ethical dilemmas (Anderson, 2011; Schwartz & Woloshin, 2019; Steinbrook, 2017). As a result, national guidelines and policy restrictions have been enacted to limit gift giving practices from pharmaceutical and medical device companies to prescribers. However, free food continues to account for the most common small gifts given totaling at 166.75 million dollars in the U.S. in 2016 (Hadland, Krieger, & Marshall, 2017; McNeill et al., 2006;

Schwartz & Woloshin, 2019), and associations between industry-sponsored meals and increased brand-name prescribing continue to be found (DeJong et al., 2016).

Free food at work is a concept that needs attention and study due to its emergence as a commonly experienced phenomenon. The availability of free food at work could be influencing employees' consumption, behaviors, perceptions, and potentially their health and wellbeing. Theoretical development of free food within the workplace food environment is needed to guide research and inform effective WHPPs and workplace policies.

Conclusion

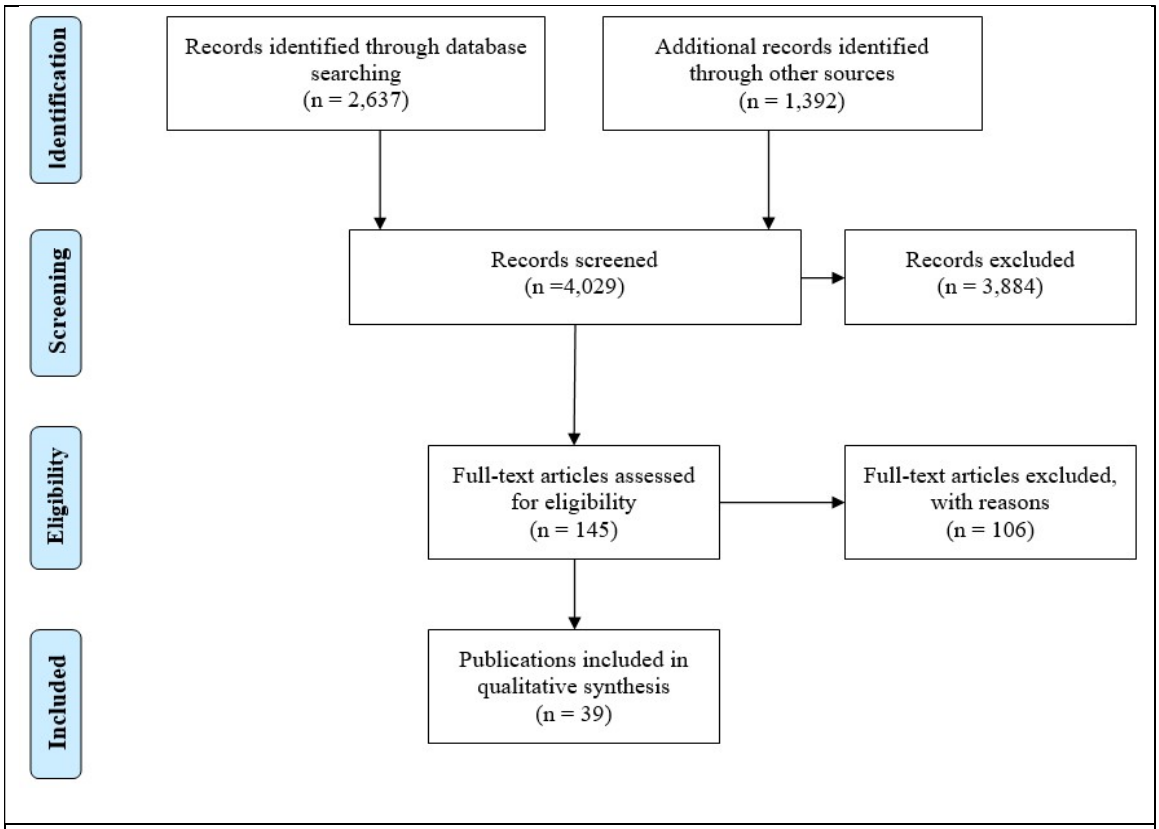
Free food at work is a phenomenon that many have experienced but has not been previously conceptualized and rarely assessed. Here we propose a theoretically derived concept of free food for further scientific exploration. Free food at work is a concept separate from free food in other settings (home, church, community). The attributes of free food may have some overlap with other settings, but the antecedents and consequences should be evaluated as related to the workplace. Identifying interventions that improve employees' health-promoting dietary behaviors can have many benefits for population health. In order to understand the various workplace influences on dietary behaviors, free food needs special attention. Assessing free food quantity, quality, influence, and sources are all important variables in the pursuit of workplace food environment research.

Table 2.1 Representations of Free food at Work Concept in the Literature

	Critical Attributes (quality/quantity, frequency, location of free food)	**Antecedents** (sources and reasons for free food)	**Consequences** (influence, effects, outcomes)
Publication			
Cleveland Clinic. (2019)	✓		✓
Society for Human Resource Management. (2018)	✓		
Wanjek, C. (2005)	✓	✓	✓
Peer-reviewed Literature			
Alinia, S., Lassen, A. D., Krogholm, K. S., Christensen, T., Hels, O. H., & Tetens, I. (2010)			✓
Anderson, J. (2011)			✓
Baskin, E., Gorlin, M., Chance, Z., Novemsky, N., Dhar, R., Huskey, K., & Hatzis, M. (2016)			✓
Baldonado, A. M. (2015)		✓	
Bhatia, P. (2018)		✓	✓
Brennan, T. A., Rothman, D. J., Blank, L., Blumenthal, D., Chimonas, S. C., Cohen, J. J., . . . Smelser, N. (2006)			✓
Blake, C. E., Devine, C. M., Wethington, E., Jastran, M., Farrell, T. J., & Bisogni, C. A. (2009).	✓	✓	
Campbell, E. G., Pham-Kanter, G., Vogeli, C., & Iezzoni, L. I. (2013)	✓		✓
Cheung, S. T. (2003)	✓		✓
Clohessy, S., Walasek, L., & Meyer, C. (2019)	✓		
Davar, M. (2008)	✓		✓
DeJong, C., Aguilar, T., Tseng, C.-W., Lin, G. A., Boscardin, W. J., & Dudley, R. A. (2016)	✓		✓
Fadare, J. O., Oshikoya, K. A., Ogunleye, O. O., Desalu, O. O.,	✓		

Ferrario, A., Enwere, O. O., . . . Godman, B. (2018).			
Gajendragadkar, P. R., Moualed, D. J., Nicolson, P. L. R., Adjei, F. D., Cakebread, H. E., Duehmke, R. M., & Martin, C. A. (2013)	✓		
Gorlin, M., Dhar, R., & Chance, Z. (2014)			✓
Hadland, S. E., Krieger, M. S., & Marshall, B. D. L. (2017)	✓		
Horton Dias, C., & Dawson, R. M. (2020)	✓	✓	✓
Jutel, A., & Menkes, D. B. (2009)	✓		✓
Karl, K., Peluchette, J., Hall, L., & Harland, L. (2005)	✓	✓	
Keogh, K. (2014)	✓		
Lake, A. A., Smith, S. A., Bryant, C. E., Alinia, S., Brandt, K., Seal, C. J., & Tetens, I. (2016)	✓		
Makurat, J., Kretz, E. C., Wieringa, F. T., Chamnan, C., & Krawinkel, M. B. (2018).	✓		
McNeill, P. M., Kerridge, I. H., Henry, D. A., Stokes, B., Hill, S. R., Newby, D., . . . Henderson, K. M. (2006)	✓		
Monaghan, T., Dinour, L., Liou, D., & Shefchik, M. (2018)	✓		
Nicholls, R., Perry, L., Duffield, C., Gallagher, R., & Pierce, H. (2017)	✓		
Onufrak, S. J., Zaganjor, H., Pan, L., Lee-Kwan, S. H., Park, S., & Harris, D. M. (2019)	✓		
Pressel, D. M. (2014)	✓		✓
Royal College of Surgeons, & Faculty of Dental Surgery. (2016)	✓	✓	✓
Schwartz, L. M., & Woloshin, S. (2019)	✓		
Segovis, C. M., Mueller, P. S., Rethlefsen, M. L., LaRusso, N.	✓		✓

F., Litin, S. C., Tefferi, A., & Habermann, T. M. (2007)			
Steinbrook, R. (2017)	✓		✓
Street, T. D., Lacey, S. J., & Grambower, J. A. (2017)		✓	
Strickland, J. R., Eyler, A. A., Purnell, J. Q., Kinghorn, A. M., Herrick, C., & Evanoff, B. A. (2015)	✓		
Tabak, R. G., Strickland, J. R., Stein, R. I., Dart, H., Colditz, G. A., Kirk, B., . . . Evanoff, B. A. (2018)	✓		
Walker, L., & Flannery, O. (2020).	✓	✓	✓
Wall, L. L., & Brown, D. (2007)			✓



[a] Moher, D., Liberati, A., Tetzlaff, J., Altman, D. G., & The, P. G. (2009). Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement. *PLOS Medicine, 6*(7), e1000097. 10.1371/journal.pmed.1000097

Figure 2.1 Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA[a]) diagram

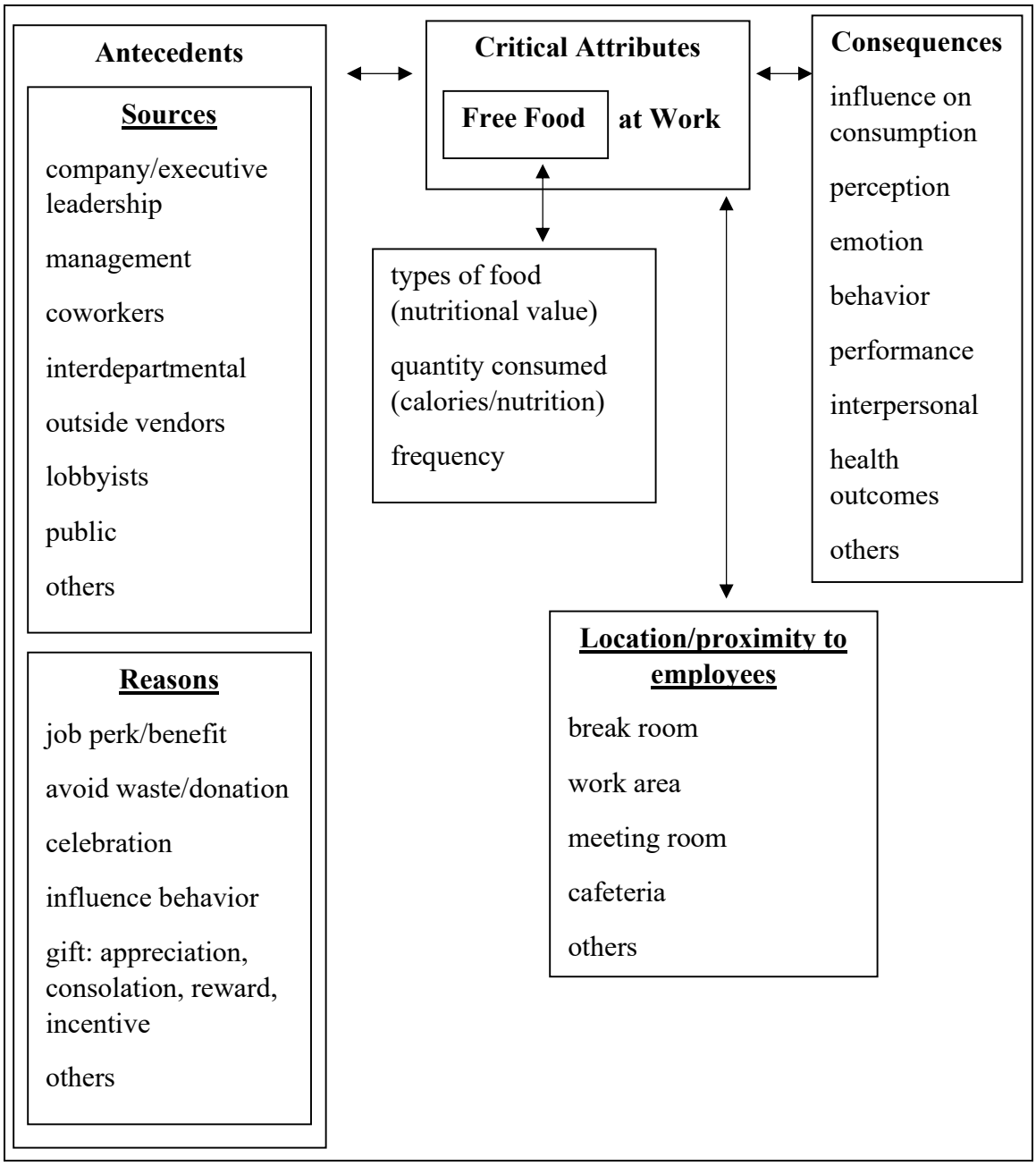


Figure 2.2 Free Food at Work Conceptual Model

CHAPTER 3

AN EVALUATION OF THE HOSPITAL CONSUMER FOOD ENVIRONMENT FROM THE NURSES' PERSPECTIVE[1]

[1]Horton Dias, C., Dawson, R. M., Abshire, D. A., Wirth, M. D., Harris, D. To be submitted to *American Journal of Preventive Medicine*.

Abstract

Introduction: Workplace food environments can influence dietary choices, which over time can impact health. Hospitals are important workplaces for nurses but limited empirical data is available regarding the healthfulness of hospital consumer food environments.

Methods: Using the Hospital Nutrition Environment Scan (HNES), cafeterias, vending machines, and gift shops in hospitals of varying size, urbanization, and teaching status were observed. This cross-sectional study focused on measuring the primary environmental barriers reported by nurses: availability of healthy food options; access (hours of operation); affordability of healthy food options compared to less healthy ones; and; location of healthy foods in relation to the units where nurses worked.

Results: Thirty-one hospitals in South Carolina were observed from December 2019 to February 2020. Total HNES scores were low and on average achieved only 27% of possible points, indicating less healthy food environments. Average cafeteria scores were low, achieving 36% of possible points. Vending machines and gift shops achieved only 21% (vending machine) and 9% (gift shops) of possible points. Small hospitals with 100 beds or less had lower average cafeteria score (22.4±10.3) than extra-large hospitals with more than 500 beds (42±5.2, $p<0.01$). Small hospitals also had lower total HNES scores (34.4±17.1) compared to extra-large hospitals (61.0±14.4, $p=0.02$). Data regarding availability, access, affordability, and location were also reported.

Conclusions: Hospital retail food venues need to increase availability of healthy options, especially fruits and vegetables, while reducing less healthy options. More access to healthy foods on nights and weekends, and subsidizing costs for healthy foods could improve the healthfulness of hospital consumer food environments.

Introduction

Dietary behaviors are complex and influenced by factors on multiple socio-ecological levels. Built food environments, which include elements like product placement, pricing, and available options, have attracted attention for their potential role in perpetuating obesogenic environments (Glanz, 2009; Townshend & Lake, 2017). The workplace has become a primary environment of interest for interventions aimed at improving diets since many adults spend a significant amount of time in the workplace and typically consume food/drink during that time (Gardner et al., 2014; Onufrak et al., 2019). Environmental interventions such as behavioral design strategies that include increasing availability of healthy options, product placement, promotion, and pricing, can facilitate employees' selection of healthier food purchases (Bucher et al., 2016; Gorlin, Dhar, & Chance, 2014; Rozin et al., 2011; Velema et al., 2018).

The hospital is one particular workplace of interest, where in the United States (U.S.) alone, more than 6.3 million employees interact with hospital environments every year (CDC, 2017). U.S. hospitals often have cafeterias, vending machines, gift and/or coffee shops on site, which form the hospital consumer food environment (Winston et al., 2013b). Several qualitative studies have identified the hospital environment as a barrier to healthy eating for nurses (Horton Dias & Dawson, 2020; Monaghan et al., 2018; Nicholls et al., 2017). In South Carolina, where 65% of nurses work in hospitals and 60.6% have overweight or obesity, nurses reported the hospital food environment as the primary barrier to healthy eating while at work (Horton Dias & Dawson, 2020; Krussig et al., 2012; Office of Healthcare Workforce Research for Nursing, 2011). Limited cafeteria hours, disproportionate availability of less healthy foods, higher prices for healthy foods,

and the long distances to acquire healthy foods were all barriers cited by hospital nurses (Horton Dias & Dawson, 2020).

While only about 40-42% of U.S. hospitals have a current policy for either offering healthy foods or increasing the ratio of healthy food options, 93% of hospitals reported offering healthy foods in cafeterias and vending machines (Health Research & Educational Trust, 2016; Mulder et al., 2020). Due to the unique role and responsibility of hospital nurses, however, even small barriers in the environment present substantial challenges for nurses (Horton Dias & Dawson, 2020; Monaghan et al., 2018). For example, hospital nurses cannot leave the unit without coverage of patient care duties by another nurse who also retains responsibility for their own patient assignment during that time. Nurses, therefore, must return quickly and cannot spend excess time traveling for food acquisition (Horton Dias & Dawson, 2020; Monaghan et al., 2018). Likewise, hospital nurses work around the clock, on weekends, and holidays; however, consumer venues like cafeterias are not open all the time. Because of restrictions on distance and limited hours of operation for cafeterias, nurses use closer vending machines to acquire foods/beverages during work hours, which raises concerns about food quality and availability of adequate healthy foods options (Horton Dias & Dawson, 2020). Furthermore, nurses complained about the differences in prices for healthier foods, such as from the salad bar, compared to less healthy options of burgers and fries (Horton Dias & Dawson, 2020).

While nurses have reported that the hospital food environment is a barrier for healthy eating, objective data on hospital consumer food environments is lacking. Objective data is needed to measure the use of health promoting environmental practices

and to guide implementation of targeted interventions. Greater insight about the hospital consumer food environment is particularly important in the Southeastern states, which have high rates of diet-related conditions such as overweight/obesity, hypertension, diabetes, and heart disease (CDC & National Center for Health Statistics, 2018). Due to the COVID-19 pandemic, protecting nurses' health is more important than ever, and supporting a healthy diet while at work could help (Allan et al., 2017; Torquati et al., 2017). A healthy diet boosts the immune system and helps prevent chronic disease development, both of which are important in diminishing the severity of COVID-19 symptoms (Butler & Barrientos, 2020; Calder et al., 2020; Gibson et al., 2012; Slawson et al., 2013; Yang et al., 2020). Nurses working long shifts may not have the time to plan, prepare, and bring healthy foods to work, and purchasing foods becomes the preferred option (Horton Dias & Dawson, 2020). Optimizing the hospital consumer food environment in a way that promotes healthy decisions while addressing the barriers experienced by shift nurses, has potential to impact health (Allan et al., 2017).

The purpose of this study was to measure the consumer food environment in hospitals across South Carolina to quantify environmental practices currently in use and identify recommended practices still needing implementation. Special attention was given to the primary environmental barriers reported by nurses in previous studies and the conceptual definitions of each based on nutrition environment research: accessibility, availability, affordability, and location (Glanz et al., 2005). A secondary analysis was also conducted based on differences found in community food environments. Due to evidence that availability of healthy food options is limited in rural communities (Dubowitz et al., 2015; Zenk et al., 2015; Zenk et al., 2014), we compared rural-urban

differences in the hospital consumer food environment to see if limited access to healthy foods was also an issue within hospitals. Small stores have been found to carry fewer healthy food options, therefore, we compared hospitals of varying sizes with healthy food environment measures (Zenk et al., 2015; Zenk et al., 2014). Teaching hospitals are affiliated with medical education programs which could impact product demand and available resources for food service. Therefore, teaching status was analyzed to see if differences in the food environment existed based on teaching hospital designation. We hypothesized that rural hospitals would have less healthy environment scores, as would smaller hospitals, and non-teaching hospitals.

Methods

Study Sample

This cross-sectional observation study was exempted by a university institutional review board and reported according to STROBE guidelines. A list of South Carolina hospitals was obtained from the publicly available Homeland Infrastructure Foundation-Level Data (HIFLD) dataset on U.S. hospitals (U.S. Department of Homeland Security, Oak Ridge National Laboratory, Geographic Information Science and Technology Group, National Geospatial-Intelligence Agency, & Homeland Security Infrastructure Program Team, 2018). The HIFLD dataset included hospital name, address, county, type, number of beds, and website for hospitals in all U.S. states and territories. Duplicate addresses were eliminated. Closed, psychiatric, correctional, and hospitals located inside a larger hospital (rehab, long-term acute care) were excluded, leaving 83 hospitals that could potentially be observed. Hospitals were then categorized by hospital sizes based on number of hospital beds obtained from the HIFLD and grouped according to the

parameters established by the Hospital Nutrition Environment Scan for Cafeterias, Vending Machines, and Gift Shops (HNES) survey tool (U.S. Department of Homeland Security et al., 2018; Winston et al., 2013b). HNES hospital size categories were: 1.) small, 1-100 beds; 2.) medium, 101-300 beds; 3.) large, 301-500; 4.) extra-large, >500 beds. Urbanization was determined using the hospital address zip code and RUCA designation (Bennett et al., 2019). Hospitals in zip codes with a non-metropolitan RUCA code (four to ten) were classified as rural and the remainder were urban (Bennett et al., 2019). A list of SC teaching hospitals was obtained from the Centers for Medicare and Medicaid Services (2019) and used to delineate hospital teaching status. To capture representative data from hospitals of varying size, ownership, urbanization, teaching status, and regions within the state, thirty-one hospitals were purposively selected for observation.

South Carolina hospitals were observed from December 2019 to February 2020. Prior to on-site observations, hospital websites were reviewed to gather any available information on the consumer food environment. Some data such as hours of operation, pricing specials, and menu offerings were collected from the websites but verified during on-site observation. Observations occurred during lunch or dinner times when the cafeteria was open. Only areas that were publicly accessible were observed.

Measures

The Hospital Nutrition Environment Scan for Cafeterias, Vending Machines, and Gift Shops (HNES) was the primary tool used in this study and is a valid and reliable observational tool based on theoretical concepts and measures of the Nutrition Environment Measures Scan (NEMS) for restaurants, stores, and vending machines

(Glanz et al., 2007; Saelens et al., 2007; Voss et al., 2012; Winston et al., 2013b). NEMS training, which is recommended to use the HNES, was completed in September 2019 by the lead researcher who conducted all observations. Foods and beverages were classified as "healthy" or "less healthy" according to the NEMS protocols for stores and restaurants which were based on the Dietary Guidelines for Americans (Glanz et al., 2007; Saelens et al., 2007), and the NEMS-Vending protocol which was based on the Health and Sustainability Guidelines for Federal Concessions and Vending Operations from Health and Human Services and General Services Administration (Voss et al., 2012). The HNES includes measures of accessibility, availability, and affordability based on NEMS concepts (Glanz et al., 2005). Within the hospital consumer food environment, accessibility is measured by the hours of operation for retail venues. Availability refers to options offered within venues and the proportion of healthy foods among all options. Availability of healthy options was measured by the presence of items representing components of a healthy diet (e.g., fruits, vegetables, whole grains, low-sugar, low-sodium, and low-fat foods/beverages) and according to the guidelines designated by NEMS protocols, and proportions were measured by the number of healthy options divided by the total number of options (Glanz et al., 2007; Saelens et al., 2007; Voss et al., 2012). Affordability refers to price comparisons between healthy and less healthy items of comparable size and food/beverage type (e.g., price of healthy granola bar versus candy bar).

The HNES is divided into three venue types: 1) cafeterias, 2) vending machines, and 3) gift shops (including coffee carts and snack shops), with each section further divided into subsections and consisting of both categorical and continuous variables

(Winston et al., 2013b). Not all observations are scored; however, point scoring ranges from -3 to 3 based on varying degrees of healthfulness for select items. For example, for the question "are there unhealthy options near the point-of-purchase", an answer of "no" carries 3 points. However, if the answer was "yes", the number of unhealthy options were scored from -1 for one to five items up to -3 for more than 20 items. Composite scores for each venue type and subsection can be calculated, as can an overall hospital composite score by summation of all sections (minimum score -43, maximum score 174 points). Higher scores indicate a healthier food environment. The cafeteria section carries a maximum of 86 points and is subdivided into subsections: 1) facilitators/barriers to healthy eating, 2) grab-and-go items, 3) main menu options, and 4) point-of-purchase prompts (Winston et al., 2013b). If a hospital had more than one cafeteria open at the time of survey, the larger cafeteria was scored. The vending machine section has a maximum of 56 points and measures both food and beverage machines with two subsections: 1) facilitators/barriers to healthy eating, and 2) access to healthy options (Winston et al., 2013b). Food and beverage vending located on or near nursing units were scored if available, otherwise food and beverage vending located near the cafeteria were scored. The gift shop section accounts for 32 maximum points and subsections include: 1) media and marketing of healthy items, 2) access to healthy options, and 3) point-of-purchase assessment (Winston et al., 2013b). Coffee carts and snack shops were surveyed in lieu of the gift shop if open at the time of scan.

Additional environmental barriers reported by hospital shift nurses, such as location of healthy foods and lack of access to fruits and vegetables were also measured (Horton Dias & Dawson, 2020).

Location

Observations were made regarding the location of vending machines, cafeterias, and fruits and vegetables for sale in relation to nursing units.

Fruits/Vegetables

Observations were made for the presence and price of grab-and-go packaged fresh cut fruit and vegetables in cafeterias not located on the salad bar. Vending machines and gift shops were observed for the presence and price of any fruit or vegetable.

Statistical Analysis

Descriptive statistics of frequencies or means with standard deviations were calculated using SPSS v.27 for each venue section (cafeteria, vending machines, and gift shops), subsections, and individual observations across the entire sample as well as compiled as an overall composite score (IBM Corp., 2019). Percentages of the maximum potential scores were calculated for each venue type and subsection to indicate the level of adherence to recommended environmental practices. Differences between groups for hospital sizes, urbanization, and teaching status were analyzed for continuous dependent variables of scores and prices by independent samples t-test or one-way analysis of variance (ANOVA). Assumptions for normality and equal variances were assessed. Mann Whitney U was used to compare means when assumptions were not met. Categorical variables of hours of operation and available food options were analyzed by χ^2 or Fisher's exact test as appropriate. All significance levels were set at $P < 0.05$.

Results

Thirty-one hospital consumer food environments in South Carolina were assessed using the HNES. See Table 3.1 for hospital demographic information. Most hospitals

were non-teaching (71%), general acute care hospitals (90.3%) with 101-300 beds (35.5%) in urban zip codes (71%), but with adequate representation from rural (29%), teaching (29%), and varying sized hospitals (range 25 to 845 beds). All 31 hospitals had at least one cafeteria and vending machine. Three hospitals had no gift shop.

The aggregate hospital sample achieved an average of 46.3±14.9 points out of a maximum potential of 174 points for all sections combined. In other words, these hospital consumer food environments met only 27% of the recommended environmental practices measured by the HNES. The highest total HNES score for an individual hospital was a 79, or 45% of healthy consumer food environment measures achieved. Composite HNES scores (summation of all sections) were compared between groups for urbanization, teaching status, and hospital size. Only differences in average composite scores by hospital size reached statistical significance. Small hospital (≤100 beds) composite scores were lower (34.4±17.1) than extra-large hospitals (>500 beds) (61.0±14.4, p=0.02).

SC hospitals scored poorly in all venue types and subsections, with only one subsection meeting more than 50% of healthy food environment measures (cafeteria grab-and-go subsection=51% achieved). See Table 3.2 for HNES scores by venue type, subsections, and composite.

Cafeterias

The highest cafeteria score was 49 out of a possible 86 points, which was 57% of healthy measures achieved, and the lowest cafeteria score was 11, or 13% achieved. Cafeteria scores were compared between urbanization, teaching status, and hospital size, but only hospital size was statistically significant. Small hospitals with 100 beds or less

had a lower average cafeteria score than extra-large hospitals with more than 500 beds (22.4±10.3 vs. 42±5.2, $p<0.01$).

Vending Machines

The average vending machine score was 11.6±6.0 out of a possible 56 points, or 21% of the healthy measures achieved. Vending machine scores ranged from a high of 23 (41% achieved) to a low of 4 points (7% achieved).

Gift Shops

The average gift shop score was 2.9±4.0 out of a possible 32 points. Therefore, only about 9% of the recommended environmental practices for gift shops were in use.

Access

On-site cafeterias and vending machines were publicly accessible at all 31 hospitals, and vending machines were accessible 24/7. Hours of operation for cafeterias varied by facility. All were open for breakfast and lunch during weekdays. Seventy-one percent (n=22) were open for weekday dinner but only 26% (n=8) were open late night (between 11pm to 2am). Cafeterias were closed all weekend in nine facilities (29%) and open for limited hours in 15 facilities (48%). Of cafeterias that offered service on weekends (n=22), six cafeterias were closed for dinner (27%) and 15 cafeterias were closed for late night (68%). Significant differences were shown for hours of operation by teaching status and hospital size. Small hospital cafeterias were more often closed for late night on weekdays compared to large hospitals (82.6% vs. 17.4%, $p<0.01$). Teaching hospitals were more likely to be open late night on weekdays versus non-teaching hospitals (62.5% vs. 37.5%, $p=0.03$).

Gift shops were open during breakfast and lunch hours in all hospitals (n=28). Seven gift shops (25%) were open early enough (6am to 7am) for night shift to have access. Twenty gift shops (71%) stayed open until dinner time (after 4pm). All 28 gift shops were closed overnight, though 12 (43%) were open late enough for night shift to access. Three gift shops were open until 7pm (11%), eight (29%) were open until 8-8:30pm, and one (4%) was open until 10pm. Gift shops were open at least a limited number of hours on one weekend day in 17 hospitals (61%).

Availability

Cafeterias

Most cafeterias offered at least one fruit (n=28, 90%), non-fried vegetable without sauce (n=26, 84%), healthy main entrée (n=20, 65%), healthy sandwich/wrap/burger (n=20, 65%), non-cream based soup (n=21, 68%), and low-fat baked chips (n=24, 77%). Most cafeterias had a salad bar (n=26, 84%) and at least one low-fat or fat free salad dressing (n=20, 65%). Most cafeterias did not offer any whole grain side without sauce (n=23, 74%) or grab-and-go fresh cut fruits or vegetables (n=21, 68%). Only one rural hospital offered a whole grain side and none offered a grab-and-go fruit or vegetable option. Grab-and-go fresh cut vegetables were not available in any of the teaching hospitals or large hospitals with greater than 300 beds.

While healthy options were available, less healthy options constituted a large portion of the available options. Higher sugar cereals and regular chips accounted for more than 50% of options in 94% (cereal, n=29) to 100% (chips, n=31) of hospital cafeterias. Similarly, less than 50% of bottled beverages and fountain sodas were a sugar free option in 90% (bottles, n=28) and 84% (fountain, n=26) of cafeterias. Of items for

sale at the point of purchase, most cafeterias sold less healthy snacks and candies (n=22, 71%), 13 cafeterias (42%) had fruit, and none had vegetables.

Vending Machines

Only three hospitals (10%) had any kind of fruit or vegetable in vending machines. Baked chips and healthy granola bars were available in 20 (65%) and 21 (68%) hospitals, while 100% of vending machines carried candy bars and regular chips. Ratios of available healthy to unhealthy foods were disproportional as nearly all hospital vending machines (n=30, 97%) had less than 25% of slots filled with healthy options.

Thirty-one hospital beverage vending machines carried diet sodas (100%), 28 had at least one slot for water (90%), and 17 vending machines had 100% juice (55%). Availability of unsweetened tea decreased down to 7 vending machines (23%) and only three carried a low-fat milk (10%). Sugar-sweetened sodas were available in 29 hospital vending machines (94%) as were energy drinks in 13 hospitals (42%).

Gift Shops

Most gift shops (n=24, 85.7%) sold only vending machine-like products such as candies, dry snacks, and cold bottled beverages, rather than grab-and-go items, hot foods, or hot beverages. Only six gift shops (21%) had a fruit or vegetable for sale.

Affordability

Cafeteria

Food costs varied widely for fruits and vegetables in hospital cafeterias. Whole pieces of fruit sold from 45 cents to $1.09 (US) each, with an average price of 81 cents. Vegetable sides ranged from 85 cents to $1.89 each, with an average price of $1.37. By comparison, a bag of regular chips cost from 59 cents to $1.49, with an average price of

$1.07. All 26 cafeterias that had salad bars were priced by weight, with an average price of 43 cents per ounce, or $6.88 per pound. Grab-and-go fresh cut fruits and vegetables were available in 10 cafeterias, with an average price of 54 cents per ounce for fruits and 76 cents per ounce for vegetables. Of the 20 cafeterias that had a healthy main entrée and sandwich/wrap/burger option, 90% (n=18) were priced the same or less than the comparable regular options while 10% (n=2) were more expensive.

Water was available for free in 30 cafeterias (97%), however a charge for the cup was imposed in 48% of cafeterias (n=15), with an average price of 11 cents (range $0.05 to $0.40).

Vending Machine

Though food vending machines carried many of the same items and were run by the same third-party vendor in at least seven hospitals (23%), prices varied widely between facilities. Candy bars sold for 60 cents to $1.75, with an average price of $1.25, while the healthy granola bar choice sold for 75 cents to $2.25, with an average of $1.30. When baked chips were available (n=20), they were priced more similarly to regular chip prices from 75 cents to $1.50 but the average price for regular chips was $1.05 and for baked chips it was $1.10. The difference in chip prices reached significance only according to urbanization. Rural vending machines sold regular chips for 21 cents cheaper than urban hospitals (0.91±0.2 vs. 1.11±0.2, p=0.03). Of the three vending machines that carried a fruit or vegetable, the average price was 31 cents per ounce, or $2.17 for a 7oz fruit cup.

Location

Cafeteria

Most cafeterias were located on the first floor of the hospital (n=25, 81%), while nursing units were located on every floor of the hospital, up to eight floors in this study. The closest fruit or vegetable option for sale was typically in the cafeteria (n=27).

Vending Machine

Beverage and food vending machines were located adjacent to cafeterias in 29 hospitals (94%), and at other locations throughout the hospital in all 31 hospitals. Sixteen of the 31 hospitals (52%) housed vending machines on floors where nursing units were located.

Gift Shops

Gift shops were located on the entrance floor in 25 hospitals with gift shops (89%).

Discussion

Cafeterias, vending machines, and gift shops contribute to the hospital consumer food environment where many employees acquire foods and beverages for consumption while at work. In this study, we evaluated South Carolina hospital consumer food environments for the current use of health promoting practices according to the HNES. Findings from this study verified what hospital nurses reported; vending machines were closer and more accessible at all hours but did not offer many healthy options and especially not fruits or vegetables. Ideally, hospital consumer food environments would be structured in a way that encourages healthy eating choices. Guidelines for healthier workplace food environments, like those from the CDC and the American Heart

Association, provide interventions that could help hospital environments become more health promoting (American Heart Association, 2019; CDC, 2018b). Changes in cafeteria and vending machine options, placement, and pricing could improve the healthfulness of the hospital consumer environment. Tools such as the HNES provide snapshot assessments that highlight the current environmental facilitators of healthy choices and barriers needing immediate attention. According to the findings in this study, South Carolina hospitals have opportunities to improve in several areas.

SC hospitals on average meet only 27% of HNES measures. Composite HNES scores were significantly lower in small hospitals. Most cafeterias met measures by offering at least one fruit, non-fried vegetables, healthy main entrées and sandwiches/wraps/burgers, non-cream-based soup, baked chips, salad bar, and low-fat salad dressings. However, most cafeteria shelves and coolers were packed with less healthy cereals, snacks, chips, sugar-sweetened beverages, and candies. Increasing proportions of healthy options has potential to influence consumers towards healthier purchases (Thorndike et al., 2012; Van Kleef, Otten, & van Trijp, 2012; Velema et al., 2018). Swapping out all breads, rice, and other processed sides to a whole grain alternative would be one way to improve the availability of healthy options. Removing candy and other less healthy options from the point-of-purchase while adding healthy items would also be an improvement as increased proportions, closer proximity, and conspicuous placement have been shown to nudge consumers towards healthier choices (Baskin et al., 2016; Bucher et al., 2016; Gorlin et al., 2014; Van Kleef et al., 2012). Additionally, for consideration, less healthy candy and snacks are readily available in vending machines and gift shops and do not add to the healthfulness of the foodscape.

Cafeterias need to offer more grab-and-go fruits and vegetables. Fresh cut fruit and vegetables were rarely available outside of the salad bar in cafeterias, which is of particular concern for nurses who reported inadequate time to wash and cut whole fruits during breaks and salad bars were not open at all hours (Horton Dias & Dawson, 2020). After March 2020, many hospital cafeterias closed self-serve salad bars completely due to the COVID-19 pandemic. Unless fresh, cut fruit and vegetables in grab-and-go packaging were introduced, access to fresh cut fruit and vegetables may now be diminished.

For nurses wanting to purchase healthy foods while at work, options were largely limited to the cafeteria. Fruits and vegetables for purchase were primarily located in the cafeteria, therefore were not always accessible due to limited hours of operation especially for those working on nights and weekends. An alternative option to increase 24/7 access and availability could be to stock cold vending machines or micro-markets with fruit and vegetable options. Two hospitals (6%) provided a badge-access, employee-only canteen that was accessible 24/7. Though, these canteens could not be observed for this study, they reportedly contained grab-and-go salads, sandwiches, wraps, fruits, and vegetables. Innovative alternatives to the standard cafeteria operating hours need further exploration for feasibility but could greatly improve access to healthy foods for nurses working nights and weekends. Finally, subsidizing cost of fruits and vegetables could make them a more desirable choice in both the cafeteria and vending machines.

Also for consideration are the location of healthy food options, as nurses may not be able to leave the nursing unit. In many hospitals, vending machines were located on or near nursing units but carried few healthy food and beverage options. Availability of

healthy foods and beverage options in vending machines need to be increased to help diminish barriers of access, availability, and distance for nurses.

Rural hospitals fared worse only in prices for regular chips, which were cheaper in rural vending machines. Five (55.5%) of the nine rural hospitals surveyed were also small hospitals with 100 beds or less but no interaction was detected. Small hospitals were more likely to have lower composite HNES scores, cafeteria scores, and fewer cafeteria hours of operation. Teaching hospitals had better access for late night cafeteria hours.

Limitations

Findings from this study should be interpreted in the context of several limitations. This cross-sectional observational study captured data during one visit at each hospital and therefore does not necessarily reflect cafeteria menu diversity that may occur during a given week. Further, this study occurred prior to the closure of hospitals to the public during the 2020 COVID-19 pandemic. Hospital consumer food environments have changed due to new infection control procedures, such as the closure of self-serve salad bars. Several of the surveyed hospitals had additional retail venues on premises operated by restaurant franchises. These venues most certainly contribute to the consumer food environment but were not observed due to limitations of the HNES tool and because restaurant franchises have set menus with little opportunity for alterations. Finally, this study occurred exclusively in South Carolina, where southern food cultural preferences influence menu options. Southern food often includes fried meats and vegetables and stewed/boiled vegetables cooked with fat and sodium (Latshaw, 2009). Findings cannot be generalized to hospitals in regions with very different cultural food preferences or

where local government regulations impose requirements on consumer food environments.

Conclusion

Though hospital consumer food environments may have some healthy items available for purchase, proportions of and access to healthy options need improvement to better address the environmental barriers reported by hospital shift nurses. To make hospital consumer food environments healthier and to diminish environmental barriers, fruit, vegetable, and other healthy food options need to be made available for purchase 24/7 in grab-and-go packaging for cheaper. Tools such as the HNES (Winston et al., 2013) and A Toolkit for Creating Healthy Hospital Environments: Making Healthier Food, Beverage, and Physical Activity Choices from the CDC (2020) should be used by hospitals to help implement recommended practices and meet baseline measures for healthy food environments.

Table 3.1 Demographic Data for Hospitals in Sample (N=31)

Sample Characteristics		
		n (%)
Hospital Specialty		
	General Acute Care	28 (90.3)
	Critical Access	2 (6.5)
	Women's/Children's	1 (3.2)
Teaching		
	Teaching	9 (29)
	Non-teaching	22 (71)
Size		
	1-100 beds	9 (29)
	101-300 beds	11 (35.5)
	301-500 beds	7 (22.6)
	>500 beds	4 (12.9)
Urbanization		
	Urban	22 (71)
	Rural	9 (29)

Table 3.2 Hospital Nutrition Environment Scan for Cafeterias, Vending Machines, and Gift Shops (HNES) Section and Subsection Scores[a] for Surveyed South Carolina Hospitals

HNES Sections & Subsections (total possible score)	n	Mean HNES Score (SD)	Lowest Score in Sample	Highest Score in Sample	Percent of Total Possible Points
Gift Shops					
Media/Marketing (15)	28	0(1.6)	-3	6	0%
Access (6)	28	2.57(1.8)	0	6	43%
Point of Purchase (11)	28	0.32(2.5)	-3	4	3%
Total Gift Shop Score (32)	28	2.89(4.0)	-3	16	9%
Vending Machine					
Food (28)	31	5.58(5.3)	0	17	20%
Beverage (16)	31	4.81(2.3)	2	8	30%
Facilitator/Barriers (12)	31	1.45(1.5)	0	6	12%
Total Vending Score (56)	31	11.61(6.0)	4	23	21%
Cafeteria					
Facilitator/Barriers (12)	31	2.13(2.5)	-3	9	18%
Grab-and-Go (35)	31	17.94(5.2)	5	25	51%
Menu Review (26)	31	7.35(3.8)	1	13	28%
Point-of-Purchase (13)	31	3.74(3.6)	-3	11	29%
Total Cafeteria Score (86)	31	30.94(10.5)	11	49	36%
Composite Scores					
Total Composite Score for Cafeteria, Vending Machine, & Gift Shops (174)	28	46.3(14.9)	21	79	27%

[a] Higher scores indicate a healthier food environment

CHAPTER 4

IS FREE FOOD ANOTHER OCCUPATIONAL HAZARD FOR HOSPITAL NURSES?

AN EXPLORATION OF FREE FOOD AT WORK

[1]Horton Dias, C., Dawson, R. M., Wirth, M. D., Abshire, D. A., Harris, D. To be submitted to *Research in Nursing & Health*.

Abstract

About 55 to 60% of nurses in the United States are affected by overweight and obesity, which is concerning for the nursing workforce as overweight and obesity put nurses at higher risk for developing chronic diseases. Unhealthy dietary practices while at work could be contributing to nurses' health status. Hospital nurses regularly receive free food at work but objective data regarding frequency, quality, and consumption of free food is limited. Through a cross-sectional electronic survey of hospital Registered Nurses in the United States, defining characteristics of free food at work were measured. Two hundred seventeen nurses from 35 states participated in the self-report one-time survey. Free food was available at least once in the previous three shifts for 55.3% of surveyed nurses. When free food was available, 74.4% of nurses reported consuming even though 86% thought free food was "less healthy" than their regular diets. Free food was available more often in teaching hospitals compared to non-teaching hospitals (60.3% vs. 45.9%, $p<0.05$). Free food was available and nurses consumed more often in small hospitals with 100 beds or less compared to all other size hospitals (small 78% vs. medium 52.0%, large 56.3%, extra-large 48.6%, $p=0.04$). Top types of free food reported were dessert foods (e.g., cake, cookies, brownies) (25.1%), chocolate candies (16.4%), and donuts (13.6%). Nurses were given free food most often by peers (25%), nursing leadership (20%) and patients/family (17%). Free food was located on the unit in a break room (58%) or at the nurses' station (21%). This study highlighted the problem of free food for U.S. hospital nurses.

Introduction

Overweight and obesity affects about 65.9% of American adults, and about 60% have at least one chronic illness (CDC, NCCDPHP, & Division of Nutrition Physical Activity and Obesity, 2018; CDC & NCCDPHP, 2020). While reasons for the development of overweight, obesity, and chronic illnesses are multifactorial, diets low in health-promoting fruits, vegetables, and other whole foods are a well-established contributing factor (Slawson, Fitzgerald, & Morgan, 2013). Most adults in the United States (U.S.) are eating too many processed and ultra-processed foods which are high in solid fats, sodium, and refined sugars (Baraldi et al., 2018; Murray et al., 2013). The overconsumption of highly processed foods can be attributed, in part, to the overabundant availability and low cost of such foods (Baraldi et al., 2018; Stuckler et al., 2012).

In the workplace, especially, regular bringing and sharing of sweets and cake has occurred to the point that the Royal College of Surgeons Faculty of Dental Surgery (2016) have recommended a halt to what they deemed “cake culture”. Free food at work has indeed become a regular occurrence for many employees, as one national survey found 16.8% reported consuming free food at work at least once during the previous week (Onufrak et al., 2019). Typically, the free foods consumed were of low nutritional quality and averaged over 1,200 calories per person per week (Onufrak et al., 2019). Another survey of office workers in the United Kingdom found that cake and other highly processed sweet foods were available at work at least once/twice per week for 87.0% of respondents and 57.8% consumed cake while at work at least once/twice per week (Walker & Flannery, 2020). In an examination of frequent consumption of chocolate candy given by patients to hospital nurses, on average more than five pieces

per shift were eaten and had a negative effect on feelings of wellbeing (Cheung, 2003). Another hospital-based study on free chocolate candy consumption found that nurses and nursing assistants were the most frequent consumers (Gajendragadkar et al., 2013). Other than these few studies, the quality, frequency, or consumption of free food at work has not been quantified. Further, the characteristics and prevalence of free food at work may vary by setting and industry. Several qualitative studies on the dietary behaviors of nurses reported that free food at work was frequently available and often of low nutritional value (Horton Dias & Dawson, 2020; Monaghan et al., 2018; Nicholls et al., 2017). The health and workforce implications of frequently offering low-nutrient, high calorie foods to nurses need to be considered.

Approximately 55-60% of U.S. nurses are affected by overweight and obesity, similar to the general population (American Nurses Association, 2017; Han et al., 2011; Krussig et al., 2012). The majority of nurses with overweight and obesity is of concern for the nursing workforce and healthcare provision in general. Registered nurses (RN) comprise the largest healthcare professional group in the U.S. and about 1.7 million (62%) work in hospitals (U.S. Department of Health and Human Services & Health Resources and Services Administration, 2010; United States Department of Labor: Bureau of Labor Statistics, 2015). Overweight and obesity puts nurses at higher risk for the development of chronic illnesses (CDC, 2018a); and obesity may be adversely impacting job performance, work-related injury, and absenteeism (Jordan et al., 2015; Krussig et al., 2012). Hospital nurses are exposed to multiple conditions, such as stress, shiftwork, exhaustion, and a suboptimal food environment that may contribute to unhealthy dietary behaviors (Horton Dias & Dawson, 2020; Monaghan et al., 2018;

Wong et al., 2010; Zhao et al., 2011). Frequent offering of low nutrient, high calorie foods to nurses could be another exposure that adversely affects nurses' health.

Little data is available on the dietary quality of nurses, but in one national survey, only 16% reported eating the recommended five or more servings of fruits or vegetables per day (American Nurses Association, 2017). Though nurses reported that environmental barriers to healthy eating were of the most prominent in the workplace, they also were influenced by social and emotional situational contexts (Horton Dias & Dawson, 2018). Perceived self-efficacy for healthy eating has been associated with behavioral outcomes and is an important concept for consideration when attempting to understand dietary behaviors (Sallis et al., 1988; Sheeran et al., 2016). Self-efficacy is the belief in one's own ability towards certain behaviors (Bandura, 1977). Measures of self-efficacy for diet, or the belief of being able to eat healthy despite situational variations, have been associated with actual dietary behaviors (Sallis et al., 1988). Perceived environmental barriers may not impact consumption depending on levels of perceived self-efficacy and situational contexts. Therefore, measuring actual dietary intake would be an important consideration for assessing environmental impacts on dietary behaviors. Thus, measures of fruit and vegetable intake can serve as a baseline nutrition assessment of dietary behaviors (Thompson et al., 2002). Self-efficacy for healthy eating and fruit and vegetable intake were assessed in this study.

The purpose of this study was to quantitatively explore the defining characteristics of free food at work for hospital nurses. This study examined frequency, consumption, sources, locations, and types of free foods provided to hospital nurses. Because associations for free food availability and consumption are not known, group differences were analyzed for a wide range of potential factors from personal, professional, and hospital demographics.

Methods

Design, Sample, and Setting

This cross-sectional exploratory electronic survey study was exempted by a university internal review board. Any U.S. RN who self-reported working at least 50% of the time in a hospital were eligible to participate. Participants completed a one-time electronic survey between January and September 2020. All questions were optional.

Recruitment

Nursing and hospital organizations (local chapter, state-wide, and national) were contacted and asked to participate by sharing an electronic link to the survey with RN members. Invitations were posted on nursing organization social media pages and online nursing community groups (e.g., Facebook groups, Jonas Scholars, Graduate Student Nurses Association). Email invitations were sent to graduate nursing programs across the U.S. to solicit participation from graduate nurses who were also practicing hospital RNs. Personal acquaintances of the research team from across the U.S. were emailed and/or contacted via Linked-In, Facebook, and Twitter and asked to participate and share the link with colleagues.

Electronic surveys produce commonly low response rates of approximately 1% (Fan & Yan, 2010); therefore, factors affecting electronic survey responses were taken into account and mitigated, such as offering an incentive and keeping the survey brief (Fan & Yan, 2010). A short description of the study, risks/benefits, and confidentiality were included in the invitation with a link to the electronic survey. Completing the survey was accepted as informed consent. A randomly selected raffle-style incentive of an Amazon.com gift card worth $100 (US) was offered for nurses who completed the survey and chose to give an email address. An optional separate electronic link was included at the end of the survey to allow participants to enter their email address on a separate survey form which was not linked in any way to their survey responses. Two randomly selected participants from those who provided email addresses were awarded a gift card.

Measures

Free Food at Work

No established tool existed to evaluate free food at work in any population or work setting. An exploratory mixed methods electronic survey was developed based on previous qualitative research on hospital nurses which identified common characteristics of free food (Horton Dias & Dawson, 2020). Participants were given a definition of free food at work: "any food that is available for consumption in the workplace at no financial cost to employees. 'Food' is anything that is eaten and includes candy". Survey questions addressed the characteristics of free food at work in six areas: a) prevalence of free food (frequency of availability); b) types of foods that were offered for free (quality); c) who provided free food to nurses (sources); d) locations where free food was available; e) consumption of free food; and f) frequency of consumption (Horton Dias & Dawson,

2018). To assess frequency of availability and consumption, participants were asked to consider the last three shifts worked instead of a given time frame (e.g., one week), because some hospital nurses work on an as needed basis and schedules vary widely. For example, a nurse could go more than one week without working and others work only a few shifts per month. Questions regarding consumption were answered only when free food was reportedly available. Answers for survey questions were dichotomous or categorical. Some categorical answers (e.g., sources of free food) were multiselect capable to capture all occurrences. An optional free text question at the end of the survey allowed nurses to add any information regarding free food at work that they felt was important or missing. The survey was entered into REDCap, a web-based survey software program, which produced a unique URL for electronic access (Harris et al., 2009). ReCaptcha was used to preserve the integrity of only human participants. Face validity was established prior to distribution by solicited feedback from panel experts which included nurse researchers, a registered dietician, and practicing hospital RNs and was pilot tested by four hospital RNs.

Self-reported demographic information about participant age, gender, height, weight, professional nursing specialty, shift (e.g., nights, days, weekends, evenings), and shift duration (e.g., 8, 10, 12 hours) were collected. BMI was calculated based on reported height and weight. Categorical answers for shift were multiselect capable to capture all work schedule types. Hospital demographics were self-reported for participants' current hospital of employment such as size of hospital (based on number of beds), hospital zip code, teaching status, and type of hospital (e.g., general acute care, community, children's). Hospital urbanization was assigned based on RUCA codes that

correspond to zip codes. Non-metropolitan RUCA codes (≥4 to 10) were assigned rural designation and metropolitan RUCA codes of one to three were designated urban (Bennett et al., 2019).

Self-efficacy

The Self-Efficacy for Diet survey addresses emotional and situational influences on perceived self-efficacy for eating a "healthy" diet. (Sallis et al., 1988). Given that free food in the hospital setting was reportedly provided within a situational context (celebrations, meetings, morale boosting) (Horton Dias & Dawson, 2020), this screener provided information on the nurses' perceived self-efficacy to eat healthy during times that free food might be available. Sixteen questions ask how confident the participant will feel during the next three months to be able to eat a healthy diet given various situations (e.g., when angry, when celebrating an event, during holidays) (Sallis et al., 1988). Answers were according to a Likert-type scale from "not at all confident" to "very confident" (Sallis et al., 1988). Scores were tallied on a continuous scale with zero being "not at all confident" in all situations up to 48 for "very confident" in all situations. Higher scores indicate stronger feelings of self-efficacy for eating a healthy diet.

Fruit and Vegetable Intake

The National Institutes of Health Eating at America's Table Study Quick Food Scan was used to measure fruit and vegetable intake (Thompson et al., 2002). This self-report dietary-recall screener has shown adequate accuracy and assesses fruit and vegetable consumption during the previous month including type and amount. The screener consists of 19 questions with ordinal answers; however, scoring the screener is on a continuous scale with weighted values given to frequency and quantity eaten for

each fruit and vegetable category. Numeric values for each fruit/vegetable frequency answer was multiplied by the quantity value and summed together, excluding one question which asks about vegetables in mixtures and accuracy in reporting mixtures has not been tested (National Institutes of Health & National Cancer Institute, 2020). A minimum value of zero, for no fruit or vegetable consumption, up to a maximum score of 82.5 for the highest frequency and quantity of consumption in every category (National Institutes of Health & National Cancer Institute, 2020) was assigned. Higher scores indicate higher frequency and quantity of fruits and vegetable intakes.

Statistical Analysis

Descriptive statistics of frequencies or medians and means with standard deviations were calculated using SPSS v.27 for each question across the entire sample (IBM Corp., 2019). Chi-square tests of independence were used to compare categorical variables on free food availability, frequency, and consumption between demographic groups. For continuous dependent variables of fruit/vegetable intake and self-efficacy score, one-way ANOVA and independent samples t-tests were used to compare between group differences of free food availability and consumption. Assumptions of normality and equal variances were assessed and met, otherwise, non-parametric Mann-Whitney U or Kruskal-Wallis H tests were used to analyze between group differences. Total frequency of reported food types were calculated and listed in order from most frequent to least. Total frequency of reported sources and locations of free food were also calculated. Logistic regression was performed with free food consumption as the outcome of interest (consumed free food=1, did not consume free food=0). In a single model, the continuous independent variables were self-efficacy for diet, fruit/vegetable intake, and

BMI. Assumptions for logistic regression were assessed and met. Significance was set at $p<0.05$.

Results

Two hundred seventeen surveys were completed by U.S. hospital nurses representing 35 different states, though most nurses worked in South Carolina (n=122, 56.2%). Because all questions were optional, small numbers of missing data occurred for most questions, altering the denominator for each frequency calculation, but no variable was missing more than 7% of the total population. See Table 4.1 for sample demographics.

Nurse Characteristics

Participants were mostly 30-39 years old (n=71, 32.9%), female (n=207, 95.8%), White (n=188, 87.9%), and had obesity (n=82, 41.0%). Most nurses worked in direct patient care within the hospital (n=197, 91.6%), in a medical/surgical specialty (n=64, 29.5%), with 6-10 years nursing experience (n=56, 25.8%). Nurses with 11-20 years nursing experience were a close second place at 23.5% (n=51). Most participants worked 10-12 hour shifts (n=185, 86.0%), on day shift and/or during weekdays (n=181, 56.2%). Over half felt that their unit was adequately staffed on a typical shift (n=120, 58.5%).

Hospital Characteristics

Most of the hospitals where participants worked were general acute care hospitals (n=116, 54.2%), in an urban area (n=185, 87.3%), and designated teaching status (n=143, 65.9%). The most frequent hospital size was over 500 beds (n=65, 30.1%), closely followed by small hospitals with 1-100 beds (n=59, 27.3%), and hospitals with 101-300 beds (n=58, 26.9%) (Table 4.1).

Free Food

Availability, Frequency, and Consumption

Free food was available at least once in the last three shifts for 55.3% of hospital nurses (n=119) and consumed by, at least, 74.4% during the same time frame (n=87). Of those who reported availability of free food, most (n=71, 60.7%) reported free food was available two or three times and 42.7% (n=35) reported consuming free food two or three times in the previous three shifts. Differences in availability of free food were found where teaching hospitals had free food available more often compared to non-teaching hospitals (60.3% vs. 45.9%, $p<0.05$) (Table 4.1).

Small hospitals with ≤100 beds had significantly higher availability and consumption of free food on two or three occasions within the last three shifts. In small hospitals, free food was more often available on two or three occasions (78%) than all other size hospitals (medium 52.0%, large 56.3%, extra-large 48.6%, p=0.04). Likewise, free food was more often consumed two or three times in small hospitals compared to hospitals with more than 100 beds (small 64.3% vs. medium 35.3%, large 30.8%, extra-large 29.2%, p=0.04). No other statistically significant associations were detected.

Characteristics

Free food at work was most commonly offered during National Hospital Week (first week in May) and National Nurses' Week (May 6 to 12) (n=115, 32.8%). The holiday season (n=106, 30.2%) and year-round (n=91, 25.9%) were the second and third most common times hospital nurses reported seeing free food at work. Fourteen nurses (4.0%) reported free food was "never" available. Nine (2.6%) nurses free-texted their responses and reported free food was made available during the recent COVID-19

pandemic. Other occasions when free food was provided according to free-text responses were occasionally/monthly (n=5, 1.4%), daily (n=2, 1.0%), celebrations/parties (n=2, 1.0%), and employee recognition/unit awards (n=2, 1.0%).

Free food at work was typically of low nutritional quality; see Table 4.2 for top ten types of free food at work. The most commonly provided free food was a dessert such as cake, brownies, and cookies (n=81, 25.1%). The next most common types of free food were chocolate candies (n=53, 16.4%), and donuts (n=44, 13.6%). Notably, the first healthy options of fresh fruit (n=11, 3.4%) and fresh vegetables (n=7, 2.2%) came in at eighth and ninth place. Eighty-six percent (n=101) of nurses reported that compared to their normal diet, free food was considered to be "less healthy".

Free food at work was located most often in an on-unit break room (n=100, 58%), followed by at the nurses' station (n=37, 21%) (Figure 4.1). Staff nurses and nursing leadership together accounted for 44.5% of sources for free food at work. Patients and their families were the third highest givers of free food (n= 46, 17%). See Figure 4.2 for other sources and percentages.

Self-efficacy and Fruit & Vegetable Intake

Hospital nurses in this survey reported on their fruit and vegetable consumption over the last month and perceptions of self-efficacy for eating healthy foods during the next three months. On average, nurses reported very low fruit/vegetable consumption (n=217, mean score 2.4±2.4). Self-efficacy scores were more favorable with an average score of 19.3±9.6. In the logistic regression model, no association was detected for self-efficacy scores and free food consumption after adjusting for BMI and fruit/vegetable

intake. Though not statistically significant (p=0.11), for every one-unit increase in self-efficacy, the odds of free food consumption decreased by 4% (95% CI 0.92, 1.0).

Discussion

This study provides a baseline assessment of free food at work for hospital nurses in the U.S. These findings described characteristics of free food at work and verified what nurses reported in qualitative studies (Horton Dias & Dawson, 2020). Free food was provided frequently by peers, leadership, and patients/family, of low nutritional value, and located nearby on the unit or at the nurses' station. For 55.3% of hospital nurses, free food was available at least once during the previous three shifts. For 60.7%, free food was available on two or three occasions. The frequent availability of free food at work is troublesome due to its low nutritional quality and frequency of consumption. Free food was consumed at least once in the last three shifts for 74.4% of nurses and two or three times for 42.7%. Regular fruit and vegetable consumption was very low, but consistent with assessments of the general American adult population and RNs (American Nurses Association, 2017; Lee-Kwan et al., 2017). Still, nurses reported that free food was "less healthy" than their regular diets.

Free foods were usually located near to workstations, contributing to a less healthy food environment. For hospital nurses in direct patient care, leaving the unit can pose substantial challenges due to time restraints and the requirement to secure coverage of patient care duties by another nurse while away. Closer proximity of snacks in several workplace settings has shown increases in consumption (Baskin et al., 2016; Gorlin et al., 2014); therefore, placing free foods of low nutritional quality in close proximity to nurses may be influencing consumption.

Though not statistically significant, the 4% decrease in odds of consumption of free food per unit-increase in self-efficacy was a seemingly modest decrease in consumption of free food. If a five-unit increase in self-efficacy were considered, that would essentially equate to a 20% reduction in odds of free food consumption. Efforts to increase self-efficacy for diet in hospital nurses could be one effective method of promoting healthy eating in the workplace.

The direct effects on health from free food at work are not known; however, frequent consumption of foods high in refined sugars, solid fats, and sodium increase risk for overweight, obesity, and chronic disease development (Murray et al., 2013). Of note, most of the nurses in this sample had obesity and together with the nurses who had overweight accounted for 66.5% of the sample. No associations between BMI and consumption were detected, however, that could be in part due to the frequent consumption of free food by all nurses. Even if frequent consumption of free food at work was not contributing to weight status, the types of foods provided are of concern for general health promotion. Fruits and vegetables were rarely provided. Thus, offering healthy foods more often could improve consumption and nurses' dietary quality as workplace interventions of free fruit and free lunch have seen positive results in other settings (Lake et al., 2016; Makurat et al., 2018).

Influences on free food consumption are not known; so, it is possible that other types of foods offered for free would be less often consumed. Type of food, frequency of availability, location, social influences, situational context, and even the "free" in free food, could all be influencing nurses' consumption. Answering these questions is beyond the scope of this study, however, a few propositions should be considered. First, the types

of foods given are typically very palatable snack foods with high sugar, fat, and sodium contents, or what can be considered "comfort" foods. Stressful work conditions are a reported influencer on emotional eating and consumption of unhealthy foods for all types of workers and for hospital nurses (Sonnentag, Pundt, & Venz, 2017; Wong et al., 2010). It is possible that consumption of free foods was high because foods high in fats, sodium, and sugars were desirable when feeling stressed and other negative emotions. Furthermore, an interplay between snack foods and social modeling, or the following of peer cues on when and how much to eat, have been described where individuals are more likely to be influenced for snack foods than healthy foods (Cruwys, Bevelander, & Hermans, 2015). Social modeling may be an important factor to consider for hospital nurses and free food consumption. Nurses reported seeing free food at work most often during celebration weeks and holidays, and most recently in response to the COVID-19 pandemic. These occasions for free food suggest that nurses are receiving free food within social contexts such as celebrations, reward, and appreciation. Further, those providing free food to hospital nurses were most often peers, nursing leadership, and patients/families. The social interactions and situations created by giving and receiving free food should be considered for its potential influence on consumption. Nurses working in small hospitals with 100 beds or less were more likely than nurses working in all other hospital sizes to receive and consume free food at work two or three times within the last three shifts. Potentially, social influences are stronger in small hospitals where givers and receivers are in closer, more regular contact.

Gender differences in influences on eating behaviors have been observed in adults (Chao et al., 2017; Cruwys et al., 2015). RNs in the U.S. are 93.4% female, which carries

additional implications for consideration on free food availability and consumption. Onufrak et al.'s (2019) analysis of national data found that women were more likely than men to acquire free food at work. Further, the influence of social modeling on eating behaviors has been shown to be stronger for women (Cruwys et al., 2015). Walker & Flannery's (2020) study on office cake also found that women office workers were more often persuaded by peers to consume free food when they had initially refused. Women also had more difficulty in resisting free food when it was available and co-workers were partaking, even when not feeling hungry and recognizing the food as unhealthy (Walker & Flannery, 2020). Women may be inclined to eat more high-fat and sweet foods when stressed (Habhab, Sheldon, & Loeb, 2009; Sproesser et al., 2011). Also, seeing free food at work may elicit a greater response to eat in women than men due to greater neural activation in women to visualizations of food (Chao et al., 2017).

Altogether, free food at work probably involves multiple levels of influence on consumption including the types of foods offered, where foods are located, how often foods are offered, and the social influences of who is giving and receiving the free food. For hospital nurses, free food needs to be of healthier quality, offered less often, or both. Hospital leadership can do more to set priorities and implement policies for a healthy organizational eating climate, which has been associated with improved employee dietary choices (Sonnentag et al., 2017). Likewise, nursing leadership and nurses themselves can request and bring healthier free foods. Guidelines for offering healthy foods at meetings are available and reportedly adopted by 57.2% of hospitals with workplace health promoting programs (Mulder et al., 2020; U.S. Department of Health and Human Services et al., n. d.). More attention to and wider adoption of such guidelines are needed.

Strengths and Limitations

This study focused on nurses in the hospital setting which provided an in-depth description of free food's defining characteristics for this population and setting. The sample represented a wide range of nursing professional and hospital demographics, which adds to the generalizability of the findings to U.S. hospital nurses. The survey was not tested for validity or reliability which could introduce bias or inaccuracy. However, the survey questions regarding free food characteristics were based on qualitative research findings and given face validity by panel experts. Target sample size was not reached which underpowered our analyses. Recruitment started just prior to many changes to hospital environments due to the COVID-19 pandemic. As a result, in-person recruiting was not an option at hospitals, local chapter meetings, or conferences. Relying completely on electronic recruitment hindered our ability to achieve optimal statistical sample size. Furthermore, hospital nurses may have felt less inclined to take the time to participate in an electronic survey given the current pandemic working conditions. Our findings are also limited by the unreliable nature of self-report data and especially dietary recall.

Conclusion

Free food at work is an unhealthy and common occurrence for hospital nurses with high levels of consumption. This study provides a baseline quantitative assessment of the defining characteristics of free food at work for U.S. hospital nurses. Nurses,

nursing leadership, and occupational health practitioners need to be aware of the contribution of free food to the hospital food environment and nurses' dietary health. Healthy foods should be the primary types of foods offered to nurses for free. If highly processed foods are going to be provided, the frequency at which they are made available needs to be assessed and addressed.

Table 4.1 Free Food Availability and Consumption Frequencies by Selected Sample Characteristics

Sample Characteristics		Free Food Available at Least Once[a]		Free Food Consumed at Least Once[ab]		Free Food Available 2 or 3 Times[a]		Free Food Consumed 2 or 3 Times[ab]	
		Yes	No	Yes	No	Yes	No	Yes	No
		n(%)							
	Overall	(n=215)[c]		(n=117)[c]		(n=117)[c]		(n=82)[c]	
		119(55.3)	96(44.7)	87(74.4)	30(25.6)	71(60.7)	46(39.3)	35(42.7)	47(57.3)
Gender									
Male	9(4.2)	6(2.8)	3(1.4)	5(4.3)	1(1.0)	6(5.2)	0(0)	3(3.7)	2(2.4)
Female	207(95.8)	112(52.3)	93(43.5)	82(70.7)	28(24.1)	64(55.2)	46(39.7)	32(39.0)	45(54.9)
Age									
20-29	50(23.1)	24(11.2)	24(11.2)	18(15.5)	6(5.1)	15(12.9)	9(7.7)	7(8.5)	10(12.1)
30-39	71(32.9)	39(18.2)	32(15)	30(25.8)	9(7.7)	21(18.1)	18(15.5)	13(15.8)	16(19.5)
40-49	47(21.8)	27(12.6)	20(9.3)	23(19.8)	3(2.5)	15(12.9)	11(9.4)	9(11)	13(15.9)
50-59	37(17.1)	23(10.7)	14(6.5)	14(12.0)	8(6.8)	16(13.7)	6(5.1)	6(7.3)	6(7.3)
≥60	11(5.1)	5(2.3)	6(2.8)	3(2.5)	2(1.7)	3(2.5)	2(1.7)	0(0)	2(2.4)
Race/ethnicity									
White	188(87.9)	103(48.4)	84(39.4)	75(65.2)	26(22.6)	62(53.9)	39(33.9)	31(38.3)	40(49.4)
Black	12(5.6)	4(1.9)	8(3.8)	4(3.5)	0(0)	2(1.7)	2(1.7)	2(2.5)	1(1.2)
Hispanic	6(2.8)	5(2.3)	1(0.5)	3(2.6)	2(1.7)	4(3.4)	1(0.7)	1(1.2)	2(2.5)
Other	8(3.7)	5(2.3)	3(1.4)	4(3.5)	1(0.9)	2(1.7)	3(2.6)	1(1.2)	3(3.7)
BMI									
18.5-24.9 (healthy)	67(33.5)	67(33.5)	37(18.5)	30(15)	28(25.5)	9(8.2)	21(19.1)	16(14.5)	9(11.8)
25-29.9(overweight)	51(25.5)	51(25.5)	34(17.0)	17(8.5%)	24(21.8)	9(8.2)	22(20)	12(10.9)	10(13.2)
>30 (obesity)	82(41)	82(41)	41(20.5)	41(20.5)	29(26.4)	11(10)	23(20.9)	16(14.5)	12(15.8)
Nursing Specialty									
Medical/Surgical	70(32.3)	43(20.0)	27(12.6)	32(27.4)	10(8.5)	28(23.9)	15(12.8)	16(19.5)	15(18.3)
Intensive Care	28(12.9)	15(7.0)	13(6.0)	11(9.4)	4(3.4)	11(9.4)	4(3.4)	7(8.5)	3(3.7)
Emergency	44(20.3)	23(10.7)	20(9.3)	16(13.7)	6(5.1)	10(8.5)	12(10.3)	3(3.7)	11(13.4)
Pediatrics	13(6.0)	9(4.2)	4(1.9)	6(5.1)	3(2.6)	5(4.3)	4(3.4)	2(2.4)	4(4.9)

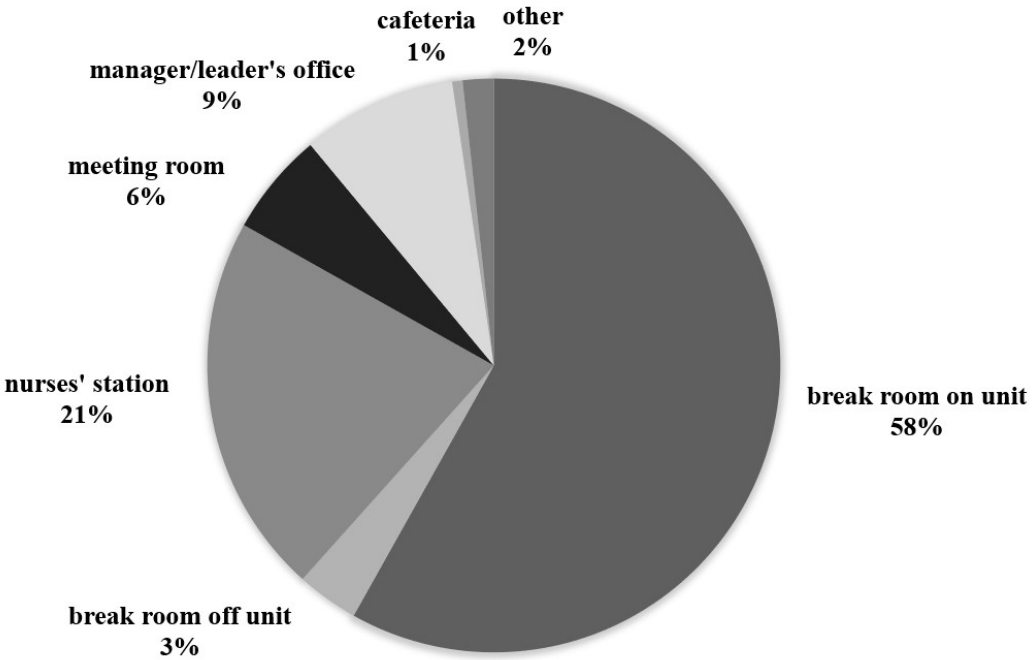
Perioperative/ Procedural	18(8.3)	11(5.1)	7(3.3)	11(9.4)	0(0)	7(6.0)	4(3.4)	4(4.9)	7(8.5)
Other	44(20.3)	18(8.4)	25(11.6)	11(9.4)	7(6.0)	10(8.5)	7(6.0)	3(3.7)	7(8.5)
Shift									
Day	136(62.7)	80(39.2)	56(27.5)	59(52.7)	20(17.9)	48(42.9)	31(27.7)	25(32.5)	31(40.3)
Other[d]	70(32.3)	33(16.2)	35(17.2)	23(20.5)	10(8.9)	20(17.9)	13(11.6)	8(10.4)	13(16.9)
Hospital Size									
1-100 beds	59(27.3)	59(27.3)	41(19.2)	18(8.4)	30(25.6)	11(9.4) [e]	32(27.4) [e]	9(7.7) [e]	18(22)[e]
101-300 beds	58(26.9)	58(26.9)	26(12.1)	30(14)	18(15.4)	8(6.8) [e]	13(11.1) [e]	12(10.3) [e]	6(7.3) [e]
301-500 beds	34(15.7)	34(15.7)	17(7.9)	17(7.9)	13(11.1)	3(2.6) [e]	9(7.7) [e]	7(6) [e]	4(4.9) [e]
>500 beds	65(30.1)	65(30.1)	35(16.4)	30(14)	26(22.2)	8(6.8) [e]	17(14.5) [e]	18(15.4) [e]	7(8.5) [e]
Hospital Urbanization									
Urban	185(87.3)	102(48.6)	82(39)	75(65.2)	26(22.6)	61(53)	41(42.6)	30(37.5)	41(51.3)
Rural	27(12.7)	14(6.7)	12(5.7)	10(8.7)	4(3.5)	8(7)	5(4.3)	5(6.2)	4(5)
Teaching Hospital									
Yes	143(65.9)	85(39.5)[e]	56(2)[e]	60(51.3)	24(20.5)	52(44.4)	32(27.3)	27(32.9)	29(35.4)
No	74(34.1)	34(15.8)[e]	40(18.6)[e]	27(23)	6(5.1)	19(16.2)	14(12)	8(9.8)	18(22)
continuous measures presented as medians(interquartile range)[f] or means±standard deviations[g]									
Fruit/Vegetable Intake[f]	1.7 (0.9,3.0)	1.9 (1.0,3.1)	1.6 (0.7,3.0)	1.8 (1.0,2.9)	2.1 (1.0,3.8)	2.1 (1.0,3.8)	1.6 (0.9,2.6)	1.8 (0.9,2.8)	1.8 (0.9,2.9)
Self-Efficacy Score[g]	19.3±9.6	19.0±9.3	19.7±10	18.5±8.9	21.4±10	19.6±9.6	18.0±8.7	16.5±8.5	19.7±9.3

[a] during the last three shifts worked
[b] sample for consumption includes only those that indicated free food was available
[c] column total may not equal population total due to missing data. However, no variable was missing more than 7% of the total population.
[d] other shift category includes night shift, evenings, and rotating shifts; excluded weekend that did not specify day or night shift
[e] $p<0.05$ for χ^2 test of independence
[f] Mann-Whitney U results shown as medians and interquartile range
[g] Independent samples t-test or one-way ANOVA results shown as means and standard deviations

Table 4.2 Top 10 Free Foods given to Hospital Nurses (n=323[a])

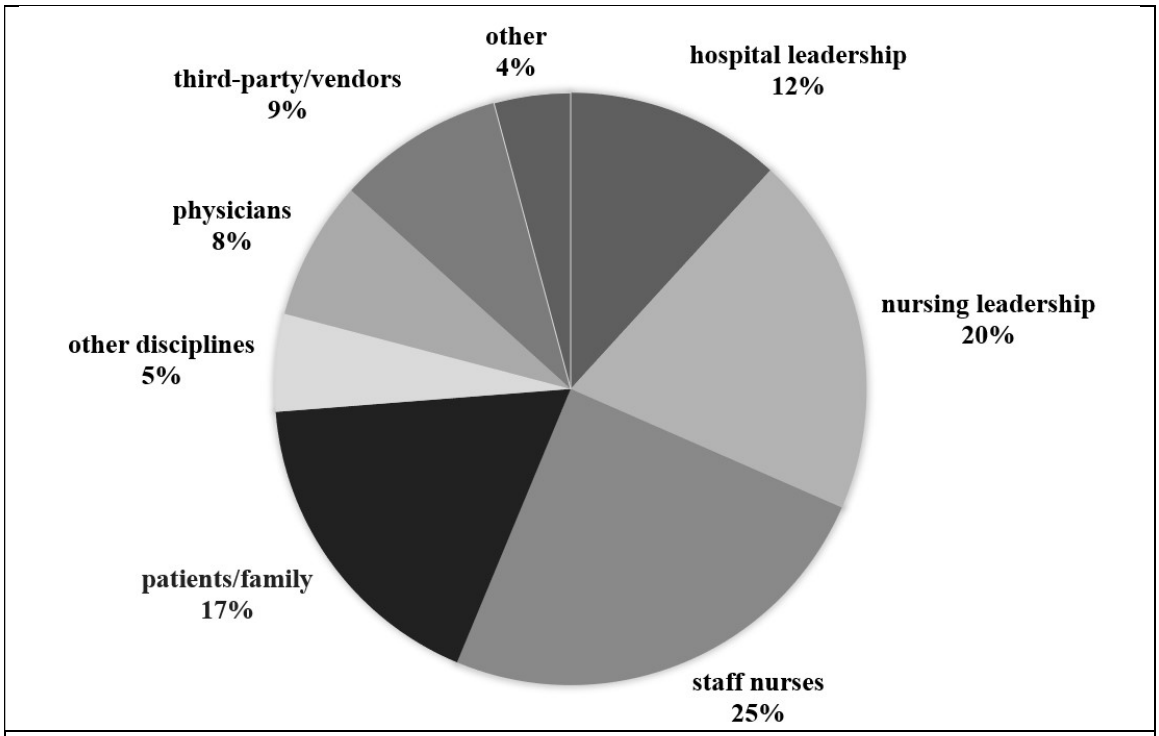
Rank	Food category	# occurrences reported n(%)
1	Dessert (cakes, cookies, brownies, etc.)	81(25.1)
2	Chocolate Candy	53(16.4)
3	Donuts	44(13.6)
4	Non-chocolate Candy	35(10.8)
5	Salty snacks (chips, crackers, etc.)	34(10.5)
6	Pizza	28(8.7)
7	Deli Sandwiches/subs/wraps	15(4.6)
8	Fresh fruit	11(3.4)
9	Fresh vegetables	7(2.2)
10	Burgers and fries/chips	2(0.6)
10	Chicken nuggets	2(0.6)

[a] total number of occurrences from a multi-select categorical question



[a] total number of occurrences from a multi-select categorical question

Figure 4.1 Workplace Locations Where Free Food was Most Frequently Available to Nurses (n=172[a])



[a] total number of occurrences from a multi-select categorical question

Figure 4.2 Groups Most Frequently Providing Free Food at Work to Nurses (n=263[a])

CHAPTER 5

CONCLUSIONS AND RECOMMENDATIONS

This study was rooted in the experiences of hospital shift nurses, who regularly faced many workplace barriers to healthy eating. Because of nurses' unique role and responsibilities in hospitals, environmental barriers had substantial influence over dietary behaviors while at work. The findings from this study add to our understanding of hospital food environments from the nurses' perspective. This study on the hospital food environment assessed two sources of workplace food acquisition: 1.) the consumer food environment, which includes hospital cafeteria, vending machines, and gift shops, and 2.) free food at work.

Hospital Consumer Food Environment

This cross-sectional observation study measured the use of recommended environmental practices that promote healthy food choices for hospital consumer food environments in South Carolina. The findings supported nurses' claims that too many unhealthy foods were available at all hours, while few ready-to-eat fruits or vegetables could be purchased, especially on nights and weekends (Horton Dias & Dawson, 2020). Vending machines were typically filled with less healthy options and located closer to nursing units than cafeterias where healthy foods were available. The findings also called attention to specific practices that need intervention to improve the health profile of hospital consumer food environments.

Primarily, the ratio of healthy to unhealthy options need to be improved in the direction of more healthy options in all venue types. Access or hours of operation also need to be adjusted considering that nurses work around the clock. Finally, product placement needs to be optimized to increase exposure of healthy foods for purchase.

Free Food at Work

Free food at work as a concept and phenomenon has been little researched and not previously measured for hospital nurses. This study analyzed potential contributing factors for the influence of free food at work on consumption. Characteristics of free food at work were delineated and a conceptual model was developed to guide future research and theoretical advancement. This study also served to quantify the extent of the free food at work problem for hospital nurses, while measuring and describing fundamental free food characteristics.

Free food at work was found to be frequently offered to hospital nurses, usually by peers, nursing leadership, and patients/family, and easily accessible in on-unit break rooms and nurse stations. The free food that was provided was typically of low nutritional value such as dessert foods, chocolate candies, and donuts. Consumption of free food when available was high even though nurses rated free foods as “less healthy” than their typical diets. Nurses’ regular diets did not consist of enough fruits and vegetables and most of the sample had overweight or obesity. The odds of consumption of free food was not found to be significantly associated with self-efficacy for diet, BMI, or fruit and vegetable intake; however, the lack of statistical significance is likely due to inadequate sample size. Significant differences were noted with increased availability and consumption of free food in small hospitals with 100 beds or less compared to larger

hospitals. Availability of free food in teaching hospitals was also significantly greater than for non-teaching hospitals.

Implications

To promote nurses' health through diet, barriers in the hospital food environment need to be addressed. Though individual level factors, such as self-efficacy for diet, were important in dietary decision-making, environmental barriers due the nurses' unique role and responsibilities were difficult to overcome. Bringing healthy foods from home requires planning and preparation, a luxury of time that many shift nurses with family responsibilities were unable to accomplish (Horton Dias & Dawson, 2020). Hospital shift nurses struggled to acquire healthy foods from the workplace but were frequently presented with free unhealthy foods.

Though links between poor diet and nursing turnover are not known, it can be understood that dietary quality affects physical and mental performance. One study tested the effects of healthy meals and adequate hydration on hospital shift workers and found reductions in fatigue and mood disturbances (Leedo, Beck, Astrup, & Lassen, 2017). Possibly, long and tiresome shifts may be intolerable to nurses who are fueled by low quality foods. Further, overweight and obesity in the nursing workforce could be contributing to work-related injury and absenteeism (Krussig et al., 2012). Nurses need hospital food environments to support, not hinder, healthy workplace dietary behaviors.

Recommendations

Recommendations for Practice

Hospital leadership should consider the potential benefits of implementing health-promoting practices in hospital consumer food environments. Since nurses are the most

numerous employees in hospitals, decreasing nursing specific environmental barriers could have a considerable impact on nurses' dietary behaviors. In addition to influencing behavior, creating a healthy consumer food environment could be educational for all consumers.

Hospital leadership should employ tools, such as the HNES, to assess the consumer food environments in their hospitals. Using tools like the HNES and A Toolkit for Creating Healthy Hospital Environments: Making Healthier Food, Beverage, and Physical Activity Choices from the CDC (2020) would help hospitals identify the specific recommended practices that need to be implemented (Winston et al., 2013b). Findings from this study suggest that increasing the quantity of healthy food options, especially fruits and vegetables, and making them available in more venues at all hours, would decrease some environmental barriers for shift nurses. Likewise, incentivizing purchases through promotional prices or employer-subsidized healthy foods could decrease cost-related barriers for purchasing fruits, vegetables, and other healthy options.

Free food at work also needs to be addressed by hospital and nursing leadership. Guidelines for foods offered at meetings are available from the CDC, but leadership need to consider the other occasions that free food is being provided (U.S. Department of Health and Human Services et al., n. d.). Leadership needs to consider offering non-food rewards and incentives, in addition to altering the types of free foods given. Less healthy, highly processed foods should be rarely, if ever, provided from leadership. Setting workplace policies to address what types of foods can be provided by leadership and peers could begin to institutionalize change.

Hospital and nursing leadership could also partner with occupational health practitioners to incorporate free food sharing guidelines into workplace health promoting programs. Educating employees on the importance of diet and adopting guidelines for types of free foods that can be brought and shared could begin to address the problem of frequent availability of unhealthy free foods at work. Potentially, public-facing campaigns to encourage the sharing of healthy foods with nurses could be instituted and studied for their acceptability and efficacy in changing the types of free foods provided. Hospital and nursing leadership could also work to change the food culture, by setting priorities and allocating resources for supporting healthy habits.

Recommendations for Nursing Education

Self-care for nurses should be incorporated into nursing education both pre- and post- degree. Student nurses should be made aware of the many challenges to healthy eating they may encounter if they choose to work in the hospital setting. Students and RNs should be taught strategies for increasing consumption of healthy foods. Practicing nurses should receive additional education on the role of diet in health promotion and the ways in which they can advocate for changes in the workplace.

Recommendations for Future Research

Future research should include environmental interventions that address the barriers to healthy eating specific to nurses' role and responsibilities within the hospital. Behavioral outcomes, health outcomes, and effects on workforce productivity from environmental interventions need further testing.

More research is needed to expand scientific knowledge on free food at work, theoretically and practically. Further investigation is needed into free food prevalence,

consumption, and characteristics in various industries and settings. Studying factors for the levels of influence of free food on consumption would help build the science of free food in the workplace and would contribute to theory development and testing.

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APPENDIX A

FREE FOOD SURVEY

Screeners for inclusion/exclusion

Are you an RN in the United States?	Yes	No
Do you work more than 50% of the time in a hospital?	Yes	No
If both "yes": Invitation letter/consent		
If one "no": Thank you for your interest, however, you do not qualify for this survey. Please feel free to share the survey link with RN colleagues that work in a U.S. hospital.		

Invitation letter/Consent

Dear Colleague,

I am a hospital staff nurse and a PhD Candidate at the University of South Carolina and I am contacting you for potential participation in a research study. I am interested in getting a better understanding of the experiences of hospital nurses with free food in the workplace. **If you are an RN, working at least 50% of the time inside a U.S. hospital, I would greatly appreciate your participation in this one time, survey-based study.**

Participation in this study will involve filling out one survey about your experiences at work. This survey should take you no more than 15 minutes. If you choose to participate, you can be entered into a raffle for one of two US$100 Amazon gift cards. Once we draw for each of the raffles, your email address will no longer be retained. No other personally identifiable information will be collected in this study, although we will be collecting demographic measures. **BE ADVISED**: In order to be eligible for our raffles, you will need to click the link (or copy and paste it to your browser) at the end of the initial survey. This link will take you to a separate page to include your email address for the raffle. If you do not do this, we will have no way of entering your email into the raffles as we will not be collecting unique and identifiable information. If you complete the survey and forget to click the follow-up link, feel free to email me hortondc@email.sc.edu and I would be happy to send you a direct link.

To further assist with this research, please pass along the link to this study **https://is.gd/RNfreefood** to colleagues who fit inclusion criteria: **RN, working at least 50% of the time inside a U.S. hospital.**

The box below highlights key information for you to consider when deciding if you want to participate. More detailed information is provided below the box. Please feel free to contact the researcher (contact info below) with any questions.

Key Information for You to Consider

- **Voluntary Consent**. You are being asked to complete a survey for nursing research. It is up to you whether you choose to participate or not. There will be no penalty or loss of benefits to which you are otherwise entitled if you choose not to participate or discontinue participation. If you choose to participate, you do not have to answer any questions you do not want to.
- **Purpose**. The purpose of this research is to better understand the experiences of hospital nurses and free food in the workplace. Our goal is to gain a better understanding of the hospital food environment and nurses' dietary behaviors/perceptions. Results will help inform recommendations and interventions for healthy hospital food environments.
- **Duration.** It is expected that your participation will last about 10-15 minutes.
- **Procedures and Activities.** You will be asked to complete a single time point online survey about your feelings concerning your day to day workplace experience and dietary behaviors. No personally identifiable information will be linked to your responses.
- **Risks.** Since participants in this study will only be asked to fill out a brief, confidential, one-time survey there are no foreseeable risks to the individuals from participation in this survey.
- **Benefits**. This research is not likely to benefit you personally, but results will benefit hospital nurses by providing a better understanding of free food characteristics and nurses' dietary behaviors/perceptions.
- **Cost/Compensation**. There are no costs for participation. Participants will have the voluntary option to provide an email address at the end of the survey if they would like to be entered into a raffle for a $100 Amazon gift card. Two randomly selected participants from those who provide email addresses will be awarded a gift card. Winners will be contacted via email. Email addresses will not be linked to survey responses and will be kept confidential and deleted once the drawing takes place.

Who is conducting this research?

Cynthia Horton Dias BSN, RN, CMSRN and PhD Candidate at the University of South Carolina, College of Nursing is in charge of this study. The faculty advisor is Robin M. Dawson, Ph.D. of the University of South Carolina, College of Nursing. This study has been approved by the University of South Carolina Internal Review Board for protection of human subjects.

Who can answer my questions about this research?

Before you decide whether or not to volunteer for this study, please send any questions that might come to mind to the primary researcher email address hortondc@email.sc.edu . Later, if you have questions, suggestions, concerns, or complaints about the study, you can contact the faculty advisor via email at Robin.Dawson@sc.edu . If you have any questions about your rights as a volunteer in this research, contact Lisa Johnson, Assistant Director, Office of Research Compliance, University of South Carolina by phone:(803) 777-6670 or email: LisaJ@mailbox.sc.edu.

I have been given a chance to ask questions about this research study. These questions have been answered to my satisfaction. Please click "yes" if you agree to participate in this survey.	Yes No
If “yes” continue on with survey questions	
If “no” end of survey	

Demographics

What state do you work in?	
Please provide your hospital's zip code?	
What size is the hospital you work in?	1-100 beds 101-300 beds 301-500 beds >500 beds
What kind of hospital do you work in?	Tertiary General Children's Geriatric Surgical Psychiatric Women's Health OB/GYN Community Federal Other:
Is your hospital a teaching hospital?	Yes No
What is your work status?	Full time Part time PRN Agency/contract

How many years experience do you have as an RN?	0-1 2-5 6-10 11-20 21-30 >30
Do you work more than 50% of the time in direct patient care?	Yes No
What specialty are you currently working in?	Medical/Surgical ICU Emergency Pediatrics OB Oncology Behavioral Health Dialysis Other: _____
If you work in a patient care area, how many beds are in your unit/department?	1-20 21-45 >45 N/A
How many hours is your typical shift?	8 10 12 Other: _____
What shift do you work most often? (can choose more than one)	Weekday Day Night Evening Weekend Varies
What is your age? (fill in)	
What is your gender?	Male Female Other: _____
What is your race/ethnicity?	American Indian Asian Black Pacific Islander White Hispanic Other: _____
What is your current height in feet/inches? (fill in)	
What is your current weight in pounds (fill in)	

Self Efficacy for Diet

Instructions: Many people report that it is more difficult to eat a diet high in fruits, vegetables and whole grains under some conditions than others. By using the scale below, please rate how CONFIDENT you are that you could eat a healthy diet under each of the following conditions over the NEXT THREE MONTHS.

Over the next 3 months I am _____ that I could eat a healthy diet...	Not at all confident	Somewhat confident	Confident	Very confident
1. when nervous.				
2. when angry.				
3. when upset or stressed by events in my life.				
4. when celebrating an event.				
5. when at a party.				
6. when eating out at a restaurant.				
7. when a lot of unhealthy food is available.				
8. when someone offers me unhealthy foods.				
9. during the holidays.				
10. when travelling or on vacation.				
11. when at a church event with food.				
12. when tired.				
13. when rushed.				
14. when eating with children.				
15. when eating with a spouse/partner.				
16. when eating with friends.				

NIH Eating at America's Table Study Quick Food Scan

INSTRUCTIONS:

- Think about what you usually ate last month.
- Please think about <u>all</u> the fruits and vegetables that you ate <u>last month</u>. Include those that were:
    - raw and cooked,
    - eaten as snacks and at meals,
    - eaten at home and away from home (restaurants, friends, take-out), and
    - eaten alone and mixed with other foods.
- Report how many times per month, week, or day you ate each food, and if you ate it, how much you usually had.

- If you mark "Never" for a question, follow the "Go to" instruction.
- Choose the best answer for each question. Mark only one response for each question.

1. over the last month, how many times per month, week, or day did you drink **100% juice** such as orange, apple, grape, or grapefruit juice? **Do not count** fruit drinks like Kool-Aid, lemonade, Hi-C, cranberry juice drink, Tang, and Twister. Include juice you drank at all mealtimes and between meals.	Never **(Go to Question 2)** 1-3 times last **month** 1-2 times per **week** 3-4 times per **week** 5-6 times per **week** 1 time per **day** 2 times per **day** 3 times per **day** 4 times per **day** 5 or more times per **day**
1a. Each time you drank **100% juice**, how much did you usually drink?	Less than ¾ cup (less than 6 ounces) ¾ to 1 ¼ cup (6 to 10 ounces) 1 ¼ to 2 cups (10 to 16 ounces) More than 2 cups (more than 16 ounces)
2. Over the last month, how many times per month, week, or day did you eat **fruit**? Count any kind of fruit- fresh, canned, and frozen. **Do not count** juices. Include fruit you ate at all mealtimes and for snacks.	Never **(Go to Question 3)** 1-3 times last **month** 1-2 times per **week** 3-4 times per **week** 5-6 times per **week** 1 time per **day** 2 times per **day** 3 times per **day** 4 times per **day** 5 or more times per **day**
2a. Each time you ate fruit, how much did you usually eat?	Less than 1 medium fruit/ less than ½ cup 1 medium fruit/ about ½ cup 2 medium fruits/ about 1 cup More than 2 medium fruits/ more than 1 cup
3. Over the last month, how often did you eat **lettuce salad (with or without other vegetables)**?	Never **(Go to Question 4)** 1-3 times last **month** 1-2 times per **week** 3-4 times per **week** 5-6 times per **week** 1 time per **day** 2 times per **day** 3 times per **day** 4 times per **day** 5 or more times per **day**
3a. Each time you ate **lettuce salad**, how much did you usually eat?	About ½ cup About 1 cup About 2 cups

	More than 2 cups
4. Over the last month, how often did you eat **French fries** or **fried potatoes**?	Never **(Go to Question 5)** 1-3 times last **month** 1-2 times per **week** 3-4 times per **week** 5-6 times per **week** 1 time per **day** 2 times per **day** 3 times per **day** 4 times per **day** 5 or more times per **day**
4a. Each time you ate **French fries** or **fried potatoes**, how much did you usually eat?	Small order or less (About 1 cup or less) Medium order (About 1 ½ cups) Large order (About 2 cups) Super Size order or more (About 3 cups or more)
5. Over the last month, how often did you eat **other white potatoes**? Count **baked, boiled,** and **mashed potatoes, potato salad,** and **white potatoes that were not fried**.	Never **(Go to Question 6)** 1-3 times last **month** 1-2 times per **week** 3-4 times per **week** 5-6 times per **week** 1 time per **day** 2 times per **day** 3 times per **day** 4 times per **day** 5 or more times per **day**
5a. Each time you ate **these potatoes**, how much did you usually eat?	Small order or less (About 1 cup or less) Medium order (About 1 ½ cups) Large order (About 2 cups) Super Size order or more (About 3 cups or more)
6. Over the last month, how often did you eat **cooked dried beans**? Count **baked beans, bean soup, refried beans, pork and beans** and **other bean dishes**.	Never **(Go to Question 7)** 1-3 times last **month** 1-2 times per **week** 3-4 times per **week** 5-6 times per **week** 1 time per **day** 2 times per **day** 3 times per **day** 4 times per **day** 5 or more times per **day**
6a. Each time you ate **these beans**, how much did you usually eat?	Less than ½ cup ½ to 1 cup 1 to 1 ½ cups More than 1 ½ cups

7. Over the last month, how often did you eat **other vegetables**? **DO NOT COUNT:** • lettuce salads • white potatoes • cooked dried beans • vegetables in mixtures, such as in sandwiches, omelets, casseroles, Mexican dishes, stews, stir-fry, soups, etc. • rice **COUNT:** • All other vegetables-raw, cooked, canned, and frozen	Never **(Go to Question 8)** 1-3 times last **month** 1-2 times per **week** 3-4 times per **week** 5-6 times per **week** 1 time per **day** 2 times per **day** 3 times per **day** 4 times per **day** 5 or more times per **day**
7a. Each of these times that you ate **other vegetables**, how much did you usually eat?	Less than ½ cup ½ to 1 cup 1 to 2 cups More than 2 cups
8. Over the last month, how often did you eat **tomato sauce**? Include tomato sauce on pasta or macaroni, rice, pizza and other dishes.	Never **(Go to Question 9)** 1-3 times last **month** 1-2 times per **week** 3-4 times per **week** 5-6 times per **week** 1 time per **day** 2 times per **day** 3 times per **day** 4 times per **day** 5 or more times per **day**
8a. Each time you ate **tomato sauce**, how much did you usually eat?	About ¼ cup About ½ cup About 1 cup More than 1 cup
9. Over the last month, how often did you eat **vegetable soups**? Include tomato soup, gazpacho, beef with vegetable soup, minestrone soup, and other soups made with vegetables.	Never **(Go to Question 10)** 1-3 times last **month** 1-2 times per **week** 3-4 times per **week** 5-6 times per **week** 1 time per **day** 2 times per **day** 3 times per **day** 4 times per **day** 5 or more times per **day**
9a. Each time you ate **vegetable soup**, how much did you usually eat?	Less than 1 cup 1 to 2 cups 2 to 3 cups More than 3 cups

10. Over the last month, how often did you eat **mixtures that include vegetables**? Count such foods as sandwiches, casseroles, stews, stir-fry, omelets, and tacos.	Never 1-3 times last **month** 1-2 times per **week** 3-4 times per **week** 5-6 times per **week** 1 time per **day** 2 times per **day** 3 times per **day** 4 times per **day** 5 or more times per **day**

Free Food

The following questions are about your experience with free food in the workplace which is: food that is available for consumption in the workplace at no financial cost to employees. "Food" is anything that is eaten and includes candy.		
In your work area, when is it common for free food to be available? (can choose more than one)		Never Year-round Holiday season Nurses' week/Hospital Week Other: _____
During your last 3 shifts, was any food available to you for free?		Yes No
"no": jump to next screener		
"yes"		
	How many of the 3 shifts was the free food available?	1 2 3
	Did you consume any of the free food?	Yes No
If "no": jump to next question		
"yes"		
	Of the shifts that free food was available, on how many shifts did you consume the free food?	1 2 3
	What food was available for free? (can choose multiple)	Dessert (cakes, cookies, brownies, etc.) Donuts Chocolate Candy Non-chocolate Candy Pizza Salty snacks (chips, crackers, etc.)

		Nuts Deli Sandwiches/subs/wraps Fresh fruit Fresh vegetables other: _____
	Compared to your normal diet, how would you grade the healthfulness of free food?	Less healthy than my normal diet About the same More healthy than my normal diet
	Who provided the free food?	hospital leadership nursing leadership staff nurses patients/family other disciplines physicians third-party/vendors other: _____
	Where was the free food located? (can choose multiple)	break room on unit break room off unit nurses' station meeting room manager/leader's office cafeteria other: _____

Open ended comments

Is there any additional information you would like to provide regarding your experience with free food?	Free text box (300 word limit)

Optional Contact information/Incentive

Thank you for participating in this survey! If you would like to be entered into a drawing for an Amazon.com gift card worth $100, please click the link to enter your email address	Free text box for email address