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I, Helen Gamez, hereby submit this original work as part of the requirements for the degree of Master of Science in Nutrition.

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Factors Associated with Domains of Food Literacy in Women Living in the United States

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**Factors Associated with Domains of Food Literacy in
Women Living in the United States**

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ABSTRACT

Background: Women are acknowledged as main providers of food and nutrition for themselves and their household. Identifying factors associated with domains of food literacy in women leads to a better understanding of the factors that influence women as they navigate the complex food environment.

Objective: The purpose of this systematic literature review is to identify factors associated with domains of food literacy in women living in the United States.

Methods: A literature search of studies published in PubMed, SCOPUS, and CINAHL between 1980 and 2017 studying a food outcome in women related to planning and managing, selecting, preparing, or eating food was performed. A total of 1856 studies were identified of which 18 were retained and analyzed. Factors associated with food literacy were categorized into four domains: ‘planning and managing,’ ‘selecting,’ ‘preparing,’ and ‘eating.’

Results: Factors associated with food literacy that were most frequently reported across the domains of food literacy were convenience, food cost, taste, health, and social relationships.

Conclusion: Some factors associated with domains of food literacy were associated with multiple domains of food literacy in women and were contextually dependent upon the domain with which they were associated.

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INTRODUCTION

Food literacy has emerged relatively recently as a term used to describe an individual's ability to adequately navigate the complex food environment and everyday practicalities associated with healthy eating.¹ A universal definition of food literacy has not been established although scoping studies have identified general themes or domains that appear to be shared between definitions.¹⁻⁵ Vidgen et al. incorporated the opinions and interpretations of both nutrition experts and young individuals navigating the food environment daily to build a comprehensive definition of food literacy with four domains from multiple perspectives. According to Vidgen et al. "Food literacy is the scaffolding that empowers individuals, households, communities or nations to protect diet quality through change and strengthen dietary resilience over time. It is composed of a collection of inter-related knowledge, skills and behaviours required to plan, manage, select, prepare and eat food to meet needs and determine intake."¹

All domains of food literacy are interconnected and an individual may not always display all domains of food literacy at the same time or all of the time. Each domain of food literacy contributes to the overall capacity of an individual to navigate the ever-changing food environment and a missing or weak domain leads to a weaker relationship with food literacy and less ability to respond to change.¹ According to the World Health Organization, individuals with strong food literacy skills enjoy better wellbeing and have better health than individuals with weaker skills.⁶ Beyond the skills, knowledge, and behaviors of the individual, the broader social and environmental factors impact an individual's food intake and developing strong food literacy could lessen vulnerability to negative social and environmental impacts.¹

Women have been recognized as having an integral role as providers of nutrition for themselves and their household and are described as overseeing the planning and managing of resources for food, selecting and purchasing food, preparing food, and eating food.⁷⁻¹⁵ The identification of factors associated with domains of food literacy in women leads to a better understanding of which factors women consider when navigating the complex food environment daily. Identifying the interrelated and competing factors that are associated with food literacy in women can direct future initiatives that aim to increase food literacy in women. Increasing food literacy in women can subsequently lead to an increase in food literacy and diet quality in children,^{15, 16} adolescents,¹⁷ and household members.¹³ The purpose of this systematic literature review is to identify factors associated with domains of food literacy in women living in the United States.

METHOD

Literature Search

This systematic literature review identified primary research articles that focused on a food literacy outcome in women using the search engines PubMed, SCOPUS, and CINAHL. The literature search was limited to articles published between the years 1980 and 2017. Search terms were based on the four domains of food literacy as identified by Vidgen et al. such as: ‘women planning food intervention,’ ‘women managing food intervention,’ ‘women selecting food intervention,’ ‘women preparing food intervention,’ ‘women eating food intervention.’ A complete list of key search terms used to identify relevant research articles is available under Appendix 1. A total of 1856 original articles were identified of which 18 were retained for the final review.

Inclusion and Exclusion Criteria

Research articles included for review had to target a food outcome such as planning and managing food resources, selecting foods, preparing meals, or eating food in women and be original research. Study populations with less than 10 women and women younger than 18 years of age were excluded. Women who were pregnant, lactating, post-partum or trying to conceive were excluded as previous research has identified heightened motivation to eat a healthy diet, higher levels of nutrition-related information seeking, and improved dietary intake in this population.⁹ Research articles written and conducted exclusively in a language other than English were excluded as were studies originating outside of the United States.

Analysis Approach

A total of 1856 research articles using the search terms were identified using PubMed, SCOPUS, and CINAHL and 167 duplicates among those were removed. After reviewing titles and abstracts of the remaining 1689 articles, 1669 were excluded because they did not meet inclusion criteria. Then, 20 research articles were assessed for eligibility as a full text. One research article was removed due to the information lacking direct relevance to food literacy in women. Finally, 19 research articles remained that were assessed for quality using the Quality Criteria Checklist: Primary Research, Appendix 8 of the Evidence Analysis Manual.¹⁸ One research article was removed due to low quality and 18 full text articles remained for the purpose of this systematic literature review.

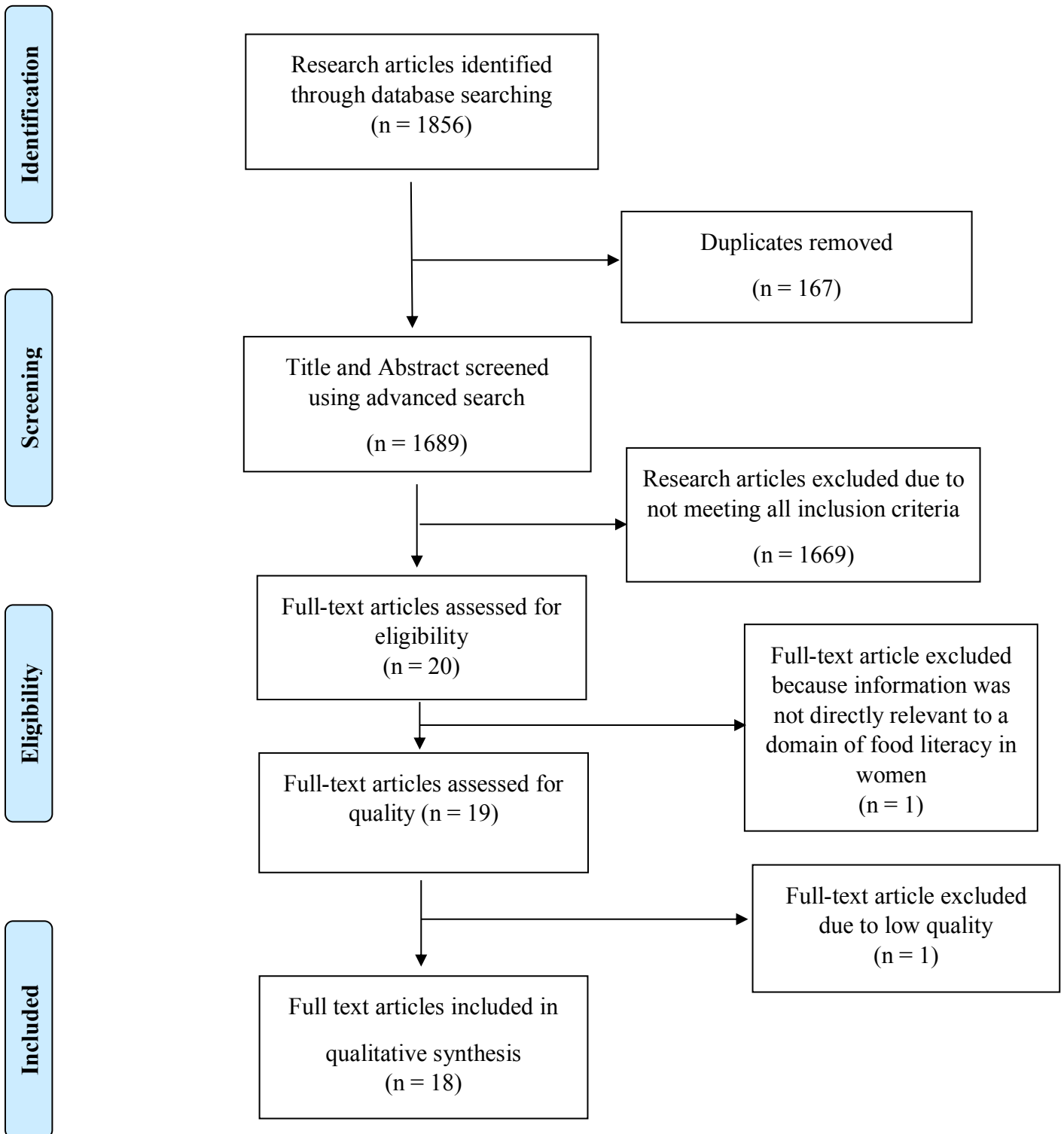


Figure 1. Identification and Final Inclusion of Relevant Research Articles

Assessment of Study Quality

The Quality Criteria Checklist: Primary Research, Appendix 8 was used as a guide to assess the quality of the primary research articles.¹⁸ Appendix 8 includes 11 evaluation components with a total of 53 questions. The evaluation components contain questions about the relevance of the study topic, clarity of the research question, selection bias of the sample, the comparability between study groups, the withdrawal handling method, method of blinding to prevent introduction of bias, explanation of intervention exposure factors, clearly defined outcomes with valid and reliable measurements, statistical analysis, discussion of conclusion with limitations and bias discussed, and questions about conflicts of interest. For qualitative research articles that did not report statistical results, the statistical analysis component of Appendix 8 was modified to reflect that analyzing and reporting qualitative results without a statistical analysis was sufficient to meet the statistical analysis component. The overall quality of each research article was based on the combined score of all 11 components, if applicable, and a final grade of positive, neutral, or negative was determined for each research article. Factors associated with food literacy in women were identified for each research article and were organized according to the four domains of food literacy: plan and manage, select, prepare, and eat.¹

RESULTS

Sample Populations

Sample populations consisted predominantly of low-income, minority women between the ages 18-85 many of whom classified as overweight or obese. The study participants were not representative of the general population in the United States because the majority of study participants were minority women such as African American, Native American, and Hispanic.

Six of the 18 studies were comprised of exclusively African American women. Recruitment took place at grocery stores, shelters, libraries, local health centers, recommended facilities, and through organizations such as SNAP, WIC and from existing research data like the Healthy Homes/Healthy Family study.

Study Designs

The research articles included in this qualitative systematic review used a qualitative study design (n= 8), a cross-sectional study design (n= 6) and an experimental study design (n=3), such as a randomized controlled trial. Additionally, a formative research study for a diagnostic tool (n= 1) was included. Interviews were the most common method used for gathering data in qualitative studies. Intervention methods varied and included online programs and focus groups.

Factors Associated with Domains of Food Literacy in Women

Some of the factors associated with food literacy in women are associated with multiple domains of food literacy but are experienced in a different context depending on the domain. The four domains of food literacy are interconnected in that planning, selecting, preparing, and eating food are all domains of food literacy that are essential components that strengthen an individual's relationship with food.¹

1. Planning and Managing

The first domain of food literacy is planning and managing and is described as behavior prioritizing money and time for food and eating, balancing food needs with available resources, and planning food intake so that food can be accessed through some source despite potential changes in circumstance or environment.¹ Convenience, food cost, food assistance programs,

food security, and family system structure have been identified as factors that are associated with how women plan and manage resources for food.

Convenience

Convenience, in the context of the planning and managing domain, is defined as the ease of accessing a store and the food available at that store and was associated with how women planned and managed their resources for food.^{8,9} The location of a woman's home in relation to available convenience stores, grocery stores, supermarkets, and corner stores as well as the distance from available food pantries, soup kitchens, shelters, and other food safety systems influenced how women planned and managed their time and money for food.⁸ Women who were able to walk to a store across the street or had reliable transportation methods planned differently than women who did not have convenient access to a store.⁸ Stores located far away from the home required women without a car to plan transportation and other logistical aspects of a trip to the grocery store.⁹ Transportation played a major role in budgeting for the overall cost of grocery shopping.⁸ Long commutes using public transportation or paying someone for a ride often resulted in incurring additional expenses to acquire food.⁹

Food Cost

Food cost is associated with planning and managing resources for food in women.^{9-10, 12,19} Women saved money on food by planning food related spending and using strategies like making food budgets, choosing sale items or generic brands, using coupons, shopping at multiple stores to get the best deals, and managing resources like their time and transportation. Women mentioned developing and following food spending budgets as a strategy to plan and manage resources for food and to ensure food availability in the household between grocery shopping trips.⁹ The cheaper cost of boxed foods like microwave meals, instant meals, and prepared meals

compared to more expensive whole foods influenced spending and was associated with how women planned to spend resources on food.^{8,9}

Food Assistance Program

In low-income women, the usage of government aid for food assistance through programs like SNAP was associated with the planning and managing of resources for food. The timing of the food stamp reception and other aid was associated with planning and budgeting behavior in women dependent upon aid to make ends meet in terms of food provisioning. Reception of food stamps and other aid at different times of the month resulted in women's need to plan and manage money and food around the reception of aid. Lack of sufficient food stamps was cited as a limiting factor to budgeting for healthful foods at the grocery store due to the higher cost of fresh foods compared to boxed and canned foods.⁸

Food Security

Food security was associated with women's ability to plan and manage money and resources for food.¹⁹ Food security, as defined by the United Nations' Committee on World Food Security, is the condition in which all people, at all times, have physical, social and economic access to sufficient safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life.²⁰ An intervention impact assessment of an online nutrition education program by Lohse et al. revealed that food-secure women may have an added benefit of being more receptive to education on food resource planning and management skills.¹⁹ Food security was associated with increased confidence to succeed at planning to include all food groups, planning and managing money for food, keeping track of food related purchases and spending, and using a written spending plan or budget for food.¹⁹ Conversely, food insecurity

negatively influenced the cognitive capacity of women to learn new concepts and practices due to stress and anxiety related to being food insecure.¹⁹

Family System Structure

Family system structure was associated with the planning and managing of food resources in women. Ahye et al. observed four dynamic family system structures that illustrate how African-American women plan and manage food to meet family needs, express family values, make use of family resources, and fit into changing family structures. The family system structures identified incorporated different combinations of five major themes: responsibility, caretaking, social connection, reward, and equal opportunity. Family system structure changed over time with changing family needs and themes used to express family values were flexible in accordance with family needs. None of the family system structures incorporated all five themes and the family system structure “My Turn” did not incorporate any themes.⁷

In a family system structure labeled “Mom” the mother was in charge of all nutrition related responsibilities in terms of planning and managing, selecting, and preparing food for herself and the family. This family system structure placed an emphasis on themes of responsibility, caretaking and reward. Responsibility was a theme characterized by women who felt responsible for the nutrition of a family member and who perceived it as their duty to provide food and meals. Caretaking was described as a theme by women who placed value on supervising the nutrition and health of another family member and taking care of the family member’s food needs. Older women described a theme of reward in which they would be taken care of in their old age with meals and food as a reward due to their former role as primary food providers for their family.⁷

Other family system structures such as “Exchange”, “Grandmother”, and “My Turn” reflected family system structures that divided and distributed the responsibility of providing food for the family amongst multiple family members. “Exchange” referred to the flexible management of planning food intake by multiple family members. Family members planned to make contributions to food and meal related tasks or exchanged food related responsibilities for other household work. This family system structure emphasized creating equal opportunities for family members to contribute in terms of planning and managing food responsibilities and fostering social connections through occasions surrounding food. “Grandmother” indicated a family system structure where a maternal figure other than the mother was willing to help with planning and managing food for the family upon request. In this family system structure, grandmothers provided help with emphasis on the theme of caretaking when needed and stood ready to donate efforts and resources to the family in cases where the mother was unable to fulfill all of her food related responsibilities for the family. “My Turn” referred to the woman’s desire to plan for herself independently of the rest of the family and applied to women living alone outside of an integrated family system structure. Family members were self-sufficient in this type of family system structure and took care of planning and managing their own food.⁷

2. Selecting

The second domain of food literacy pertains to selecting food and the ability to access food through multiple sources, determine what is in a food product, where it came from, the quality of the food, and how to store and use the food. The capacity to select food, at the grocery store as well as from other sources, is highly related to an individual’s experience and ability to prepare food and demonstrates the interconnected nature of the domains of food literacy.¹ Factors identified through this systematic literature review that were associated with food

selection in women were convenience, food cost, taste, income level, motherhood status, and health.

Convenience

The convenience of a food in terms of the time and skills required to prepare the food was associated with food selection at the grocery store.^{8-10, 12, 21, 22} Women's busy schedules necessitated convenient meal options that could be ready on a moment's notice and that could be prepared easily by women or other household members. Convenient foods such as Ramen Noodles, Hot Pockets, or Eggos were selected because they could be prepared with minimal effort and without a lot of kitchen appliances and utensils. Women also selected simple ingredients like bread, peanut butter, and jelly to make quick and easy sandwiches that provided a convenient snack or meal.⁹

Food Cost

Food cost was associated with the quantity and quality of foods women selected.^{8,9,12,13,19,21,22} Financially restricted women selected a larger quantity of boxed foods instead of a lower quantity of more expensive whole foods in order to maximize the amount of food purchased.^{8, 21} Boxed foods and canned foods were also selected to avoid spoilage and food waste which decreased overall spending on food. Women selected cheap foods they considered of lower quality and viewed as fillers like pasta, white potatoes, and rice to bulk up meals and provide additional satiety in conjunction with cost efficient meats like chicken, brats, sausage, ground beef, and some fish.⁸

Taste

Taste was associated with the food women select at the grocery store.^{8-11, 14} Women expressed the importance of enjoying the taste and flavor of the selected food and avoiding the

selection of disliked foods at the grocery store.⁹ Taste also drove women to select foods based on enjoyability and the desire to indulge in a special treat or snack like chocolate or chips.^{9, 23} Child and household member taste preferences also influenced women's food selection.^{9-11, 14} Women cited selecting foods at the grocery store that children and household members enjoyed eating to accommodate food preferences⁹, avoid complaints, and maintain harmony.¹⁴

Income Level

Income groups below the federal poverty level have different social influences working to help them regulate food selection as well as diverse priorities influencing their food selection compared to income groups above the federal poverty level (APL).¹³ Women below the federal poverty level (BPL) had a variety of competing factors and reported taste (29.4%), convenience (23.5%), family history (17.7%), price (11.8%), health (11.8%), and routine (5.9%) as the most frequent reasons for selecting foods on a regular basis while women above the 185% federal poverty level cited health as the driving factor of food selection. BPL women also experienced direct social control, which occurred when social network members explicitly regulated or otherwise sanctioned food choices, while APL women did not report experiencing direct social control from their social network.¹³

Motherhood

Mothers had different priorities driving their decision-making while selecting food than women without children.^{9, 12} Top priorities for mothers when selecting food at the grocery store were the nutrition and health of the child as well as the food preferences of the child. Women without children used their own taste and food preferences in addition to those of other household members to select foods. The majority of mothers in a study by Raskind et al. were

primary food shoppers with 85% of mothers compared to 65% of non-mothers in charge of selecting food at the grocery store for their household.⁹

Health

Women valued and wanted to maintain their health through food selection.^{8-10, 13, 24, 25} Women's existing nutrition knowledge, perceived norms, health status of household members, and weight considerations were associated with food selection.

Nutrition knowledge

Foods were selected based on the nutrition knowledge women had about the food and the perceived nutritional value and health benefits of the food.^{8-10, 13, 24, 25} Most women were the primary food purchases and food providers in their household and their nutrition knowledge played a key role in their overall diet quality as well as the diet quality of household members.^{8,9,12,13} Women expressed a desire to increase the selection of foods they perceived to be healthy options like low-fat beef and organic fresh fruits and vegetables in accordance with their nutrition knowledge for their benefit and the benefit of household members.^{8-10, 21}

Perceived Norms About Low-fat Diet Selection

Kristal et al. found that factors most strongly associated with the selection of low-fat diets in women already adhering to a low-fat diet were related to perceived norms in addition to nutrition knowledge about fat in foods. Women in the study had already adopted behaviors in line with low-fat diet selection and were interested in diet and health, well-educated, and willing to comply with intensive measurement protocols. Avoiding fats as a spread or flavoring, avoiding meat, substituting specially manufactured low-fat foods, modifying commonly used foods to be lower in fat, and replacing high-fat with low-fat foods were behaviors observed in women selecting a low-fat diet. Existing nutrition knowledge and perceived norms explained one

quarter of the variance in percent of energy from fat and one third of the variance in dietary behavior related to low-fat diet selection.²⁴ These results are different from other studies that have found that knowledge about low-fat diet selection and perceived norms are only weakly associated with dietary behavior.^{12, 22}

Health of Household Members

The health of household members was associated with women's food selection.^{9, 13} Women were influenced to change their own food selection for the benefit of the health of household members and to set a good example for healthy food selection for others.^{9, 13} A strong motivator for food selection was teaching household members positive dietary skills and maintaining health.^{8, 9, 13} Women with children focused on selecting food they perceived to help maintain the health of the child.⁹ Women without children selected food with the health of other household members in mind, especially ones with nutritional restrictions or special considerations.^{8, 9, 13} Women cited the poor health, illness, or death of a loved one as motivating them to select healthier food.^{9, 13, 21} Women who were influenced by a family member's negative health status were most often non-obese. Observing a family member suffering seemed to offer a protective effect in women and aid in the prevention of their own obesity.¹³

Weight Control

Women's motivation to weight control was associated with their food selection at the grocery store.⁹ Women tried to avoid selecting foods they perceived to be unhealthy and also aimed to increase the selection of healthier foods in support of the desire for weight control.⁹ Snack foods, high fat foods, and desserts were avoided in favor of an increased selection of healthier alternatives like fresh fruits, fresh vegetables, and low calorie beverages.^{9, 13} Weight loss was a stronger motivator to increase the selection of healthy foods than was addressing

cardiovascular disease (CVD) risk in women with high CVD risk. Women associated heart disease with unfavorable outcomes such as early death, stroke, and heart attacks but perceived these outcomes to be somewhat inevitable due to family history and placed more value on weight control than disease prevention.²¹

3. Preparing

The third domain, preparing food, encompasses the ability to apply basic principles of food hygiene and handling, prepare commonly available foods, efficiently use common pieces of kitchen equipment, and having a sufficient repertoire of skills to adapt recipes to experiment with ingredients and food.¹ This systematic literature review identified cooking skills, the health of household members, nutrition knowledge, and race and ethnicity as associated with the preparing domain in women.

Cooking Skills

Women's ability to prepare a meal varied based on cooking skills and was associated with the preparation methods used.^{8, 10, 12, 22, 25} Some women used the microwave or oven to prepare meals such as frozen dinners or pizza by simply heating the meal with minimal preparation while others prepared elaborate meals from scratch.⁸ The use of fats and food flavorings to prepare foods depended on cooking skills and preparation methods. Women's preparation methods influenced energy density and subsequently diet quality so that healthier food preparation methods were associated with a lower intake of fat and a better overall diet quality.^{8, 13, 22, 25, 26} The lack of familiarity with certain foods influenced the preparation and use of those foods.^{8, 10}

Health of Household Members

Women living with household members with diet related chronic conditions like obesity, type 2 diabetes, high cholesterol, and hypertension used healthier food preparation methods and smaller portion sizes.^{8, 9, 13, 21} Even if a family member with a diet related chronic condition was not living in the household, women responded by adopting new, healthier food preparation techniques.^{8, 13} Food preparation methods like steaming, grilling, and boiling were used to reduce overall calories from fat as were strategies like trimming off excess fat from meat, decreasing the use of oils and fats as flavoring, and replacing high calorie items like desserts with fresh fruits and vegetables.^{8, 9, 13, 23} Healthy serving behaviors such as using smaller plates and serving smaller portion sizes were used to decrease overall calorie consumption and increase overall diet quality in response to diet related chronic conditions of household members. Healthy food preparation methods and healthy food serving behaviors stood out as very important strategies used to address overall diet quality.²⁶

Nutrition Knowledge

Women changed the way they prepared and offered fruits and vegetables as a result of increased nutrition knowledge. Women identified value, importance, and relevance of nutrition education that increased nutrition knowledge and subsequently influenced their fruit and vegetable preparation and offering patterns. In response to new nutrition knowledge, women started gardens, replaced a variety of snacks with fruits and vegetables, made freshly squeezed lemonade, froze seasonal fruits, and expanded the variety of fruits and vegetables prepared and offered at meals.¹⁰

Race and Ethnicity

Race and ethnicity was associated with women's preparation methods.^{21, 23} Black women tended to fry foods in oil more often, leave excess fat on chicken, and modify meals through substitution less frequently than white women. White women added more fat as a flavoring agent than black women and were more likely to substitute fruits and vegetables than black women. Hispanic women fried foods more often and used substitution less often as a dietary modification than white women. Hispanic women avoided fat as flavoring more often than white women and modified meat to reduce excess fat more than white women.²³

4. Eating

The last domain of food literacy is food consumption and is related to the act of eating. This domain is characterized by the ability to understand that food has an impact on personal wellbeing and health. Eating together in a social context is associated with the eating domain.¹ This systematic literature review identified convenience, food cost, taste, health, intention, self-efficacy, stage of change, needs surrounding an eating occasion, motherhood status, family traditions, culture, race and ethnicity, social environment, and household environment as being associated with the domain eating in women.

Convenience

The convenience of a non-home food source influenced women's decision to eat a meal prepared outside of the home.^{9, 21} Restaurants, fast food chains, convenience stores, gas stations, and vending machines were places outside of the home that offered easily accessible and quick meal options. Non-home food sources were used to obtain a convenient meal during a busy day filled with work, school, and childcare obligations. Women with children or women running errands longer than expected cited the convenience of a non-home food source as a benefit when

they were already tired and did not feel like cooking.⁹ Women valued the aspect of instant gratification that a convenient meal provided.²¹

Food Cost

Food cost was associated with how frequently women consumed meals from a non-home food source.^{9,21} Cost limited how frequently women consumed food outside of their home, such as from a vending machine, convenience store, ordering take out or delivery, or dining at a restaurant. Women with children cited cost as a reason to avoid the use of non-home food sources and ate food prepared outside of the home once a week compared to twice a week for women without children.⁹

Taste

Taste was associated with women's use of non-home food sources. Women mentioned craving a specific restaurant meal that compelled them to eat outside of the home if they could not prepare the meal at home or did not know how to recreate a desired taste. Women mentioned being hesitant to try new foods out of concern that food won't be consumed if it does not satisfy their taste preferences or the taste preferences of household members.⁹

Nutrition Knowledge

Nutrition knowledge regarding the health benefits of fruits and vegetables and the positive impact of including fresh foods in a regular diet was associated with women offering and eating more fruits and vegetables.^{9, 10, 27} A nutrition education intervention to promote healthy eating was effective in promoting fruit and vegetable intake and reducing fried food intake at 12 and 24-month follow-up.²⁷ Women cited health benefits of fruits and vegetables like avoiding constipation, being full from a meal, and snacking less due to a higher intake of fruits and vegetables as reasons they increased their offerings and consumption of fruits and

vegetables. Based on nutrition knowledge women also used offering methods such as replacing snacks with fruit and squeezing lemon juice on foods to increase consumption of fruits and vegetables.¹⁰

Intention

The Reasoned Action Approach constructs consist of attitude, perceived norms, and self-efficacy and were associated with intention to buy and eat dark green leafy vegetables (DGLV) and the consumption of DGLV in African American women. Attitude toward buying DGLV was strongly associated with attitude toward eating. High self-efficacy toward buying DGLV was associated with high self-efficacy toward eating DGLV. A positive attitude and high self-efficacy about performing a certain behavior was indicative of strong intentions to perform the behavior. Women who strongly intended to buy and eat DGLV actually purchased and consumed on average more than women with weak intentions to buy and eat DGLV. Reasoned Action Approach constructs explained 71.2% of the variance in intention to buy and 60.9% of the variance in intention to eat DGLV.¹¹

Self-efficacy

Self-efficacy is the confidence in one's ability to succeed in specific situations or one's belief in the ability to accomplish a certain task and applies to many different contextual situations in which a woman has to make decisions about food.²⁸ Self-efficacy was associated with women's motivation and willpower to eat healthy foods.^{11, 19, 21} Women with high self-efficacy maintained a healthful food intake even in stressful circumstances when they were in a rush, tired, or time restrained.²⁸ High self-efficacy was associated with increased motivation to change eating behavior and increased willpower to succeed with a change in behavior. Knowledge of health-promoting effects of fruits and vegetables and high self-efficacy related to

increasing fruit and vegetable consumption were positively associated with readiness to increase fruit and vegetable intake. Readiness to increase fruit and vegetable consumption was an indicator of statistically significant improvements in consumption.¹¹

Stage of Change

The five stages of change were associated with women's fat consumption in terms of adherence to a low fat diet²⁹ and were indicative of women's fruit, juice, and vegetable consumption.²⁸ The five stages of change are precontemplation, contemplation, preparation, action, and maintenance. Women in early stages of change such as precontemplation and contemplation consumed significantly more calories, had a greater percent of calories from fat, and ate fewer fruits and vegetables and less fiber than those in action and maintenance stages.²⁹ Women in later stages of change such as action and maintenance consumed about 10 servings of fruit, juice, and vegetables a day compared to women in early stages of change who consumed about three servings of fruit, juice, and vegetables a day. They also perceived the benefits of eating an increased amount of fruits and vegetables to address weight issues as well as health concerns.²⁸ Women in later stages seemed more aware of diet related diseases and had an increased desire for disease prevention as well as weight control²¹ which may explain why women in later stages of change had greater self-efficacy to adhere to eating more fruits and vegetables regularly, even in difficult situations, compared to women in earlier stages of change.²⁸

Need State Surrounding an Eating Occasion

A need state is defined as "all internal and external drivers interpreted by the individual as perceived needs surrounding an eating occasion" and influenced the kind of benefit women sought from a particular eating occasion. The need state a woman was trying to satisfy through

an eating occasion was associated with food consumption and meal composition in terms of food group, nutrient, and energy intake. Six general need states were identified as influencing the type and quality of food women consumed during an eating occasion: “Routine Family Meals,” “Healthy Regimen,” “Comforting Personal Time,” “Fast Fueling,” “Family Ritual,” and “Indulgent Escape.”¹⁴

“Routine Family Meals” served as occasions for women to fulfill their perceived role as meal providers for the household. Energy, total fat, and cholesterol consumption per eating occasion were highest for ‘Routine Family Meals’ of which more than 60% were eaten as dinner and were consumed in the home with children. “Routine Family Meals” had the highest percentage of fruit and vegetable consumption per eating occasion.¹⁴

The “Healthy Regimen” need state was defined by women actively trying to balance their food intake within and across meals, eat foods with positive nutrient benefits, and avoid food with ingredients perceived as unhealthy. Fast food, soft drinks, or convenience food were limited in favor of fruits and vegetables giving women a sense of wellbeing due to the focus on healthy food consumption. The use of supplements and meal replacements was highest for this eating occasion.¹⁴

“Comforting Personal Time” were eating occasions in which women prioritized needing quality personal time and often included the consumption of personal food favorites. The foods consumed had to adhere to practical constraints in regard to health, convenience, and cost.¹⁴

The “Fast Fueling” need state was associated with foods that required little to no preparation and were easy to grab and consume without hassle while running errands.¹⁴ Women wanted to avoid disruption of their activity and minimize the time spent on the eating occasion

and opted for convenient fast food even though it compromised dimensions of taste and comfort.^{14, 22}

Eating occasions categorized as “Family Ritual” focused on strengthening a sense of family identity and were perceived as an occasion to spend time together. Family rituals and traditions were often a central part of this eating occasion that were passed down from generation to generation and valued as a way of connecting the family to cultural heritage.¹⁴

More than half of the eating occasions categorized as “Indulgent Escape” occurred outside of the home and one-third were considered snacks. Women sought a brief diversion from their day’s activity and turned to food for a break and an indulgence that took their mind away from their current activity. Saturated fat as well as consumption of sweets were highest for this eating occasion while consumption of fruits and vegetables was low compared to other eating occasions.¹⁴

Motherhood

Motherhood was associated with food consumption in women. Mothers discussed eating healthier foods than they usually would because they wanted to change unhealthy eating behaviors they had established earlier in life and model healthy eating behavior for their children.⁹ Mothers wanted their children to learn healthy cooking methods and healthy eating habits and wanted to avoid their children making negative associations to food such as eating for emotional comfort.²¹ However, financially restricted mothers of “picky eaters⁹” purchased foods to accommodate the preferences of the child and subsequently ate food that children wanted.⁹

Family Traditions and Culture

Family traditions established during women’s childhood and culture was associated with their attitudes about eating and influenced mealtime routines. Women placed value on passing

down family traditions to their children and adopted similar practices to the ones they were accustomed to from childhood such as eating at a dinner table instead of in front of the TV or finishing all food on the plate instead of discarding waste.^{8, 14, 21} Cultural heritage was associated with foods women ate and changing existing traditions or routines such as eating for comfort was seen as difficult despite women's awareness of unhealthy eating.⁸ Women in West Virginia along the rural Appalachian trail strongly believed that cultural heritage and upbringing hindered their ability to adapt and make changes to established routines.²¹ The attitudes, upbringing, nutrition knowledge, and cooking skills of the head of the household directly influenced the family's dietary intake and meal patterns.⁸ Changes in the roles of women from stay-at-home mothers who tend gardens that provide wholesome foods for their family and raise children to women who have their own career along with homemaking has resulted in food traditions being used as a guide to food consumption despite changing dietary requirements.²¹

Race and Ethnicity

Differences between blacks, whites, and Hispanics were observed in terms of fat consumption.^{21, 23} Black women consumed less fat from dairy foods, baked goods, mixed dishes, vegetables, and salads when compared to white women, and more fat from fish, red meat, and poultry than white women. Hispanics consumed more fat from dairy foods, red meat, vegetables and salads compared to white women, and less fat from fish and other foods like eggs, snacks, chips, and nuts than white women. Compared to black and Hispanic women, white women consumed the most fat from added fats like oils and flavorings. Added fat was the largest source of fat in all races and ethnicities.²³

Social Environment

Women's social environment was associated with eating behavior and the use of non-home food sources.^{7-10, 13, 14, 21} Women perceived eating at family gatherings, special occasions, and non-home food sources as opportunities to socialize around food and enjoy the company of family, friends, and peers. The social environment was associated with social events like potlucks, barbecues, and church gatherings centered around food and facilitated women's social connections within the community and exposure to new foods.^{7-10 13, 14, 21}

Direct Social Control and Indirect Social Control

Direct social control is associated with women's food consumption.¹³ Direct social control is experienced when a social network member such as a close friend, boyfriend, spouse, or family member explicitly persuades, sanctions, or physically intervenes to control a woman's dietary behavior and describes how social networks may be linked to health.^{8, 13} A woman persuaded by her sister to eat a serving of vegetables at dinner or a spouse physically taking away candy from a woman who is trying to control calories are examples of direct social control. Women at or below the 185% federal poverty level (BPL) experienced direct social control from their social network members while women above the 185% federal poverty level (APL) did not. Women who were obese experienced direct social control more frequently than overweight or normal weight women who also used indirect social control to assist in healthy eating.¹³

Indirect social control is also associated with women's food consumption. Indirect social control manifests through self-regulation in which the woman imposes restrictions on herself based on perceived norms in order to avoid unwanted eating behavior. Indirect social control is characterized by avoiding locations, certain foods, and situations that could result in unwanted behavior such as unhealthy eating and overeating. Women are influenced by indirect social

control through the relationships with members of their social network, the desire to exemplify healthy eating for others, and perceived social norms of healthy eating to use avoidance as a strategy to healthier food consumption. Avoiding a location that contributes to unhealthy eating or overeating like a fast food restaurant or an all you can eat buffet decreased the likelihood of consuming unwanted food. Avoiding foods by physically keeping unhealthy items out of the house and skipping a meal entirely eliminated the need to make active decisions for healthy eating at the home.¹³ Women avoided situations that could lead to unwanted eating in order to set a good example for children and household members.^{10, 13}

Household Environment

The household environment is associated with foods women consume and how women consume foods.^{8, 13, 22, 25, 26} Household environment considers physical and social characteristics of the home and is broadly defined to include features such as availability and placement of foods inside the home, facilities for food storage, preparation, cooking, eating, and mealtime routines.²² Fruit and vegetable availability in the home was predictive of fruit and vegetable consumption^{22, 25} and diet quality.²⁶ Women with a high variety of fruits and vegetables available in the home indicated higher consumption compared to women in a household with a low variety of fruits and vegetables. Energy density was highest in women eating a low variety of vegetables a day compared with women who consumed a medium or high variety of vegetables each day.²⁵ High vegetable variety positively affected dietary fiber and potassium intake in women and was associated with diet quality.^{25, 26}

High frequency of grocery shopping per week for fresh foods like fruits and vegetables was associated with increased availability of fruits and vegetables in the home and higher intake.^{22, 26} The number and availability of high-fat snacks and unhealthy food items like soda

and candy in the home was positively associated with fat intake. Food placement such as keeping snacks clearly visible or keeping snacks out of sight in a cupboard did not influence overall consumption.²²

Household environment such as living in a shelter versus having a home base was associated with what women ate and how they consumed food. Lack of storage space necessitated women with no fridge or cabinet space to restrict the amount of perishable dairy products, meat products, fresh fruits, and vegetables kept in the household while increasing the use of boxed and packaged foods. Women who were not able to prepare a meal due to lack of countertop space were limited to different foods than women who had enough countertop space to prepare an elaborate meal. Women living in shelters did not always have access to amenities like a stove or oven which influenced the food they could prepare and consume. Women with a home-base reported eating their meals in the living room, bedroom, in front of the TV, or at a dining table and regularly consumed meals as a family. Women in shelters were at the mercy of the facility and often had communal dining areas without designated amenities like a dining room table. Dining in shelters led women to be dependent upon shelter meal times and shelter meal options for their mealtime routines. Women resorted to making other arrangements if the food served at a shelter was not a preferred food or time constraints limited the ability to be present for a meal.⁸

DISCUSSION

This systematic literature review identified factors associated with domains of food literacy in women. Studies examined in this systematic literature review are notable for their focus on low-income, ethnically and culturally diverse women who were often the head of the household and in charge of food planning, selecting, preparing, and eating. Some of the factors

associated with domains of food literacy were reported for multiple domains of food literacy but were contextually dependent on the domain with which they were associated and were often interrelated with all domains of food literacy to some extent due to the interconnected nature of the domains of food literacy. Factors associated with domains of food literacy are influenced by women's situational context, socio-cultural influences, and environmental structure.³⁰ This systematic literature review identifies factors that are associated with domains of food literacy in women and relates them to the Social Ecological Model (SEM) on the intrapersonal, interpersonal, and environmental level.³¹

Intrapersonal Level

Convenience, food cost, taste, nutrition knowledge, self-efficacy, and stage of change were factors associated with domains of food literacy in women on the intrapersonal level of the SEM³¹ and were dependent upon situational context, socio-cultural relationships, and environmental structure.³⁰

Convenience has been previously discussed as being associated with domains of food literacy in populations from the United States³² as well as the UK³³ and this systematic literature review confirms that convenience is associated with domains of food literacy in women living in the United States.^{9, 10, 21, 33} Convenience was contextually dependent on the domain of food literacy with which it was associated with. Women planned and managed their time and resources according to the convenience of the grocery store which was understood as the ease of access to a location and the availability of food items at that location.^{8, 9} Stores that were easily accessible, such as being within walking distance from women's homes, were considered convenient even if the food from that location was more expensive.⁸ Women selected food items for the household that were convenient to prepare in order to save time and ensure household

members could also prepare food items easily.^{9, 10, 21} A non-home food source is defined as a location such as a restaurant, fast food chain, a ready-to-eat meal from a convenience store, gas station, or vending machine that provides a convenient food option prepared outside of the home.^{9, 21} The convenience of a meal obtained from a non-home food source influenced women to consume food in cases where they were in a hurry and were looking for a quick meal while running errands or after a long day at work.^{8, 9}

Low-income women perceived a diet rich in fresh foods to be unaffordable despite the awareness that fresh foods are desirable and conducive to good health.^{8, 21, 33, 34} Cost was associated with how women planned and managed resources for food, what type of foods women selected, and how frequently women chose to eat outside of the home.^{8- 10, 12, 19, 21, 32, 34} Managing coupons, selecting sale items and generic brands, and shopping at multiple locations for the best deals were strategies women used to manage money.^{8, 9} Women also planned food budgets and menus with meals for the week that guided spending at the grocery store.^{8, 9, 34} The cheaper cost of boxed and packaged foods influenced financially restrained women to select a larger quantity of those types of foods rather than a smaller quantity of more expensive whole foods to increase overall food availability.^{8, 10, 13, 21, 34, 33} The cost of eating at a restaurant or obtaining a meal from a non-home food source was also associated with how frequently women obtained meals from non-home food sources.⁸

Taste has been repeatedly noted as one of the most common and prioritized factors considered during food selection in adolescents³⁰ and adults.³² Taste was associated with food selection at the grocery store and influenced women's preparation of food and food consumption from a non-home food source.^{8-11, 14, 23} Women wanted to enjoy the taste of a meal and selected food items to satisfy their taste preferences while avoiding disliked foods.⁸ Women chose items

that tasted good even if they were less healthy or more expensive.⁸ Women prepared meals using fats as flavoring such as olive oil and butter in order to enhance the taste and flavor of the meal.²³ Lack of cooking skills or the inability to recreate a specific flavor contributed to women obtaining a meal from non-home food sources to satisfy a craving.⁹

Women's nutrition knowledge was associated with food selection, preparation methods, and food consumption.^{8-10, 13, 24, 25, 32} Women selected foods in line with a low-fat diet based on their nutrition knowledge about fat in food and modified preparation methods accordingly in order to decrease calorie consumption from fat and increase diet quality.^{21, 24} Women avoided selecting fats as a flavoring, avoided selecting high fat cuts of meats, substituted specifically manufactured low-fat food for high-fat food, modified commonly used foods to be lower in fat like trimming excess fat from meat, and replaced high-fat foods with low-fat alternatives like offering fruit instead of dessert. Food preparation influenced the nutritional value of foods and women tried to utilize healthy preparation methods like boiling, steaming, baking, broiling, and grilling in accordance with nutrition knowledge.²³ Women who increased their nutrition knowledge about the health benefits of fruits and vegetables as a result of a learner centered nutrition education class consumed more fruits and vegetables which positively affected their diet quality.¹⁰ A similar relationship has been observed in adolescents in that nutrition knowledge is associated with diet quality. Adolescents considered food and nutrition knowledge more important than other factors associated with domains of food literacy like making time for shopping or learning how to prepare foods. Adolescents lacked opportunities to develop nutrition knowledge due to lack of food literacy education in the home and high school setting which exemplifies the need to increase nutrition knowledge in women.¹⁶

Self-efficacy is predictive of adolescents fruit and vegetable consumption³⁶ and diet quality^{16, 37} and evidence from this review supports self-efficacy as being associated with domains of food literacy in women.^{8, 11, 19, 21, 28} Self-efficacy is the confidence in one's ability to succeed in a specific situation and influences how a challenge is approached and is associated with diet quality.^{16, 21, 28, 37, 39} Self-efficacy increased women's motivation and willpower to eat healthy foods,²¹ even in difficult situations.²⁸ Women who were in a rush, tired, or time restrained were more likely to consume fruits and vegetables under these circumstances if they had high self-efficacy.²⁸ Self-efficacy of food secure women was higher than that of food insecure women and played a major role in their motivation to learn new concepts in regards to planning and managing food responsibilities as well as their overall success in learning new concepts.¹⁹

A fundamental aspect of modifying behavior is having the personal motivation to do so.⁴⁰ The Transtheoretical Model, or Stage of Change Model, is a flexible model with five stages, which are precontemplation, contemplation, preparation, action, and maintenance, and describes the process an individual may use in order to make lasting behavior changes.²⁹ The stage of change women identified with was associated with their food consumption.^{28, 29} One study found that women in the precontemplation and contemplation stage of change consumed more calories from fat and ate fewer fruits and vegetables²⁹ while another study reported that women in the action and maintenance stage of change ate more fruits and vegetables, and drank more fruit and vegetable juices.²⁸ Women in later stages of change perceived the benefits of eating an increased amount of fruits and vegetables to address weight issues as well as health concerns.²⁸

Interpersonal level

The influence of the interpersonal factors on food literacy and diet quality has been previously observed³³ and this systematic literature review identifies factors associated with domains of food literacy in women on the interpersonal level. Women's interpersonal relationships and social environment were associated with how women planned and managed, selected, prepared, and ate food. Family system structure, family traditions, household members, and motherhood status were associated with domains of food literacy in women on the interpersonal level of the SEM.³¹

Family system structure influenced the distribution of food related responsibilities between members of a household and was associated with how women planned and managed resources for food.^{7, 41} Ahye et al. observed four distinct family system structures that illustrated some of the dynamic and intergenerational strategies that women use to manage food and nutrition knowledge to meet family needs, express family values, fit into changing family structures, and make use of family resources. Each family system structure was built around different combinations of themes that influenced how food related responsibilities were distributed and managed between household members.⁷ Family systems were modified and adjusted over time in accordance with family needs.^{7, 41}

Family traditions are a component of women's social environment and were associated with women's food preparation and consumption.²¹ Family traditions encompass attitudes, upbringing, nutrition knowledge, and cooking skills and directly influenced food selection, preparation, and consumption in women.^{8, 9, 21, 42, 43} Traditional meal preparation methods were considered an ingrained component of behavior by women who valued family history and traditions.²¹ Women in West Virginia along the rural Appalachian trail strongly believed that

family traditions and upbringing hindered their ability to adapt and make changes to established routines.²¹ Women who were raised eating a meal at the dinner table were more likely to enforce mealtime routines and rules they had grown up with themselves than women who did not have a structured mealtime routine.¹³ Family rituals and traditions were often a central part of eating occasions that were passed down from generation to generation and valued as a way of connecting the family to cultural heritage.¹⁴ Research has concluded that a shared home food environment plays a strong role in shaping children's intake of healthy food⁴⁴ and may be due to the influence of family traditions and values. Social support was an important facilitator and barrier to dietary change in women and initiating and maintaining dietary change was perceived as difficult without support and encouragement from social network members.¹³

Household members with special nutritional considerations or diet related chronic conditions were considered during food selection.^{7, 9, 13} Diet related health conditions like high cholesterol, type 2 diabetes, and hypertension observed in family members motivated women to increase the selection of healthful foods in order to avoid diet related disease outcomes.²¹ Observing a family member suffering health consequences due to diet seemed to offer a protective effect against obesity.^{13, 21} Taste preferences and cooking abilities of household members were also considered by women when selecting foods for the household.⁸ Women wanted to accommodate the food preferences of household members in order to maintain harmony and avoid complaints.¹⁴

Vespäläinen et al. established that children's diet most closely resembles that of the person responsible for teaching them food behavior, which was often the mother.^{45, 46} The food habits of mothers were the most dominant determinants of a child's future healthy eating behavior⁴² and had long term implications on diet quality in children according to studies in the

UK,⁴⁷ Australia,⁴⁸ and other countries.¹⁷ Increasing food literacy in mothers can lead to a healthy relationship with food for children¹⁶ and increased food literacy in adolescents¹⁷ and household members.¹³ Motherhood status was associated with how women selected foods and the type of foods consumed.^{8,9} A top priority for mothers was keeping children healthy and mothers focused on selecting foods that contributed to proper nutrition and health maintenance.⁸ Additionally, mothers selected foods at the grocery store based on the child's taste preferences and the convenience of the food in terms of the ease of preparation.^{8,9} Financially restricted mothers of "picky eaters"⁹ placed special value on selecting foods to accommodate the child's preferences and subsequently consumed foods that their children preferred in order to avoid food waste.⁹ By comparison, women without children discussed the importance of nutrition and selected food to satisfy their own taste preferences and avoided selecting disliked foods.^{8,9}

Household Food Environment

The household environment was associated with how women planned and managed resources for food and what kind of foods were selected, prepared and how they were offered and consumed.^{8, 13, 22, 25} Household environment is characterized by features such as food availability and accessibility, storage facilities, countertop space, and cooking equipment.²² Fruit and vegetable availability in the home was predictive of fruit and vegetable consumption.^{22, 25, 26} High frequency of grocery shopping per week for fresh foods like fruits and vegetables was associated with higher intake of those foods due to increased availability in the home.^{22, 26} Lack of access to food stores in neighborhoods limited availability of healthy foods and required women to plan according to their environmental surroundings despite the desire to prioritize health above other factors associated with domains of food literacy.⁸ The accessibility, or placement, of healthy and unhealthy foods in the home was not associated with consumption.²²

Lack of storage space like cabinets or lack of cooking facilities like a stove resulted in the need to adjust the food selected, prepared, and consumed to the household environment.⁸ The mealtime routine was affected by the availability of a dining table or dining space and was part of a mealtime routine in households that had a dining table. The structure of mealtime routines in households without a dining table or dining area differed.⁸ An increase in food literacy can lead to resilience against negative environmental changes.¹

The qualitative nature of this systematic literature review provides insightful data for future research and is useful for the design of future interventions. The Quality Criteria Checklist, Appendix 8 was used to score study quality to ensure the inclusion of strong research in this literature review. Study samples consisted predominantly of minority women who were recruited through shelters, WIC, SNAP and other government aid programs and qualified as low income living in the United States. This indicates that the factors associated with domains of food literacy identified through this systematic literature review are specific to populations of low income, minority women benefiting to some extent from government support to meet dietary requirements.

CONCLUSION

Several factors including convenience, food cost, taste, health, and social relationships, are associated with multiple domains of food literacy in women living in the United States and are contextually dependent upon the domain with which they are associated. Women prioritize factors associated with domains of food literacy based on their situational context, socio-cultural influences, and environmental structure, which may change over time and requires women to adapt accordingly. The identification of factors associated with domains of food literacy in women, who are often in charge of providing nutrition for the rest of the household, can lead to a

better understanding of how women navigate the complex food environment and can be used to increase their food literacy which also increases their resilience against negative environmental changes.

The factors associated with domains of food literacy in women and the highly contextual nature of navigating the food environment implies simply identifying associated factors is not enough to establish why women prioritize certain factors over others. Quantitative study designs can be used to confirm hypothesis generated about the associations of factors identified as being associated with domains of food literacy or food literacy as a whole. Alternatively, the confirmed association can be used to prioritize factors, particularly modifiable factors, in interventions that aim to improve food literacy of women based on situational context, social relationships and environment is needed.

Appendix 1. Complete List of Key Search Terms

Women managing food, women managing food intervention, women planning food, women planning food intervention, women nutrition intervention, women nutrition planning intervention; Women selecting food, women selecting food intervention, women selecting nutrition; Women storing food, women storing food intervention, women preparing food, women preparing food intervention, women cooking , women food cooking intervention; Women food eating, women food eating intervention, women food consuming, women food consuming intervention

Appendix 2. Articles Included in This Systematic Literature Review

Author's Name	Study Objective	Study Design	Study Population	Major Findings Related to Food Literacy
Ahye et al, 2006	Understand intergenerational family roles and the food management strategies from a social-ecological perspective	Qualitative	n=30 Low/moderate income, African American, age 19-85	Family system structure depended on family needs and resources and was built on foundation of five values for responsibility, caretaking, social connections, reward for service and equal opportunity. Women modified their family role and food management strategies based on the needs of the family.
DiClemente et al 2015	Examined self-reported motivational stage of change to goal of eating diet low in fat	Cross-sectional, Quantitative	n=2057 Low-income, predominantly African American, age 18+	Readiness to change and self-efficacy influenced stage of change. Women evaluate their motivation about eating low-fat diets based on perceived efforts and specific activities related to dietary consumption.
Gerstein et al 2010	Assess women's reported changes in behaviors in regard to offering fruits and vegetables to their families	Qualitative	n=60 Predominantly Latina mothers, age 19-55	Women identified value, importance and relevance of fruit and vegetable nutrition education information and adopted new fruit and vegetable practices due to increased nutrition knowledge.
Hartman et al 2015	Assess roles of demographic and home food environment characteristics on diet quality	Cross-sectional, Quantitative	n=198 Low income, overweight or obese, African American	Home food environment factors are associated with diet quality. Healthy grocery shopping practices, healthy food preparation and food serving behavior, and selecting healthy beverages were associated with higher diet quality.

Author's Name	Study Objective	Study Design	Study Population	Major Findings Related to Food Literacy
Henry et al 2006	Determine relationship between Stage of change and decisional balance, processes of change, and self-efficacy variables of the Transtheoretical Model to increase fruit and vegetable consumption	Cross-sectional, Quantitative	n=420 Low income, African American mothers, age 18-45	Perceptions of benefits for health through fruit and vegetable consumption were stronger for women in later stages compared with earlier stages. Self-efficacy based on eating fruits and vegetables for various eating occasions and in difficult situations was greater for women in later stages compared to earlier stages of change.
Huye et al 2014	Identification of prominent themes to be considered when planning a nutrition intervention	Qualitative	n=37 White (n=5) African American (n=32), age 23-75	Cultural relevance and social support influence women's food behavior. Support from women's social network is important for initiating and maintaining change.
Kegler et al 2014	Describe home food environments and examine which aspects are associated with fruit and vegetable intake and percent calories from fat	Cross-sectional, Quantitative	n=319 Low income, overweight and obese, African American (83.7%), age 35-65	Frequent fruit and vegetable purchase results in increased home availability and higher consumption. Availability of high fat snacks is associated with fat intake. Ease of food accessibility or visibility in the home is not associated with consumption and neither is eating in front of the TV.
Keim et al 2014	Determine whether vegetable variety is associated with vegetable consumption and diet quality	Qualitative	n=112, Low income, ethnically diverse, age 20-55	Vegetable variety is associated with diet quality. High vegetable variety group ate greater quantity of vegetables per day, had better diet quality, and healthier attitudes about food and eating compared to low variety group.

Author's Name	Study Objective	Study Design	Study Population	Major Findings Related to Food Literacy
Kristal et al 1990	Examine differences in fat-related dietary patterns between black, Hispanic, and white women	Randomized Controlled Trial	n=1702 Hispanic, black, and white, age 50-79	Sources of fat, food preferences, and preparation methods differ based on race. Overall reduction in fat consumption is possible through one intervention by providing different strategies for fat reduction.
Kristal et al 1990	Assess nutrition knowledge, attitudes about diet, and perceived norms associated with selecting low-fat diets	Diagnostic Tool	n=97 Age 45-59	Factors most strongly associated with low-fat diet selection were related to perceived norms and knowledge about fat in foods. Norms and knowledge contributed significantly and independently to both measures of diet behavior while variance explained by attitudes was small.
Lohse et al 2015	Produce and evaluate About Eating (AE), an online nutrition education program for low-income women	Randomized Controlled Trial	n=284 Low-income, mixed race, age 18-45	Food secure women had more confidence in managing money for food, keeping track of food related purchases, and creating a food budget than food insecure.
Raskind et al 2017	Explore the factors that influence food choices while grocery shopping and use of non-home food sources - and whether there are differences by motherhood status	Qualitative	n=40 65% Overweight or obese, 65% African American, 30% white, age 20-29	Decision making at the grocery store and the use of non-home food sources was affected by numerous factors that differed based on motherhood status.
Scarinci et al 2014	Efficacy of community based, culturally relevant intervention to promote healthy eating and physical activity	Randomized Controlled Trial	n=495 African American, age 45-65	Nutrition education can lead to an increase in fruit and vegetable consumption and a decrease in fried food consumption.

Author's Name	Study Objective	Study Design	Study Population	Major Findings Related to Food Literacy
Sheats et al 2013	Examine intentions to buy and eat dark green leafy vegetables (DGLV)	Cross-sectional, Quantitative	n=410 African American, age 18+	Intention, attitude and self-efficacy to buy DGLV were strongly associated with intention, attitude and self-efficacy to eat DGLV.
Sudo et al 2009	Determine relationship between type of eating occasion based on need state segments and food group, nutrient, and energy intake	Cross-sectional, Quantitative	n=200 Age 35-55	Six eating occasions driven by different need states were identified. Situational context with regard to need state may contribute to differences in food group, nutrient and energy intake across type of eating occasion
Tessaro et al 2006	Guide the development of a culturally targeted and individualized tailored nutrition intervention	Qualitative	n=48 age 40-65	Weight loss was a greater motivator for dietary change than was preventing heart disease. Social support, cultural heritage, confidence, convenience, and cost of eating healthier influenced dietary patterns
Vilaro et al 2016	Explore the main factors that influence food choices among rural women with an in-depth exploration of social influences on choice	Qualitative	n=20 85% Overweight or obese, 55% black, 45% white, age 27-73	Women in different income groups have different social influences working to help them regulate eating behaviors as well as diverse priorities influencing their food choices
Wiig & Smith 2009	Investigate factors affecting food choice and health beliefs among low-income women in the context of their weight and socioeconomic status	Qualitative	n=92 Low-income mothers, over 75% overweight or obese, diverse, age 18-65	Food choice of low income families is based on a number of interacting personal, behavioral, and environmental factors

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