Introduction

Vegetable consumption is widely acknowledged for its essential role in fostering good health, preventing disease, and promoting overall well-being (Boeing et al., 2012; Stanaway et al., 2022). In the context of the United States, dietary guidelines emphasize the importance of including a wide variety of vegetables in daily meals, as they are rich sources of vitamins, minerals, and dietary fiber (Lee et al., 2019; Taylor et al., 2024). However, despite the significant health benefits of vegetables, consumption rates remain suboptimal across various regions, including Florida (Taylor et al., 2024; Young & Steward, 2022). Understanding the factors influencing vegetable consumption in multicultural populations is crucial for developing effective nutrition interventions and policies addressing public health challenges (Stewart et al., 2021).

Florida, known for its vibrant agricultural industry, is an ideal setting for studying vegetable consumption patterns (U.S. Department of Agriculture, 2019). As the nation's leading producer of several vegetables, including tomatoes, cucumbers, and bell peppers, Florida offers a unique opportunity to explore the consumption of locally grown produce (The Florida Department of Agriculture and Consumer Services [FDACS], n.d.). However, despite its abundance of fresh vegetables, the state faces considerable challenges in promoting healthy eating habits among its residents (Feeding Florida, 2021). Florida's population encompasses multicultural, socioeconomic, and geographical backgrounds. These factors significantly shape dietary behaviors, including vegetable consumption patterns, which can vary substantially based on an individual's demographic characteristics (Schroeter et al., 2007).

In recent years, there has been a growing recognition of the need to examine dietary behaviors at the state and regional levels, considering the influence of local factors such as income, education, ethnicity, and access to healthy food options (America's Health Ranking, 2025; Labyak et al., 2016). Research has shown that low-income populations, for example, often struggle to meet recommended vegetable intake levels due to limited access to fresh produce, high costs, and insufficient knowledge of healthy cooking practices (Hayne-Maslow et al., 2013; Kasprzak et al., 2020). Similarly, cultural preferences and traditional eating habits can influence vegetable consumption, with some communities favoring certain types of vegetables over others or utilizing different cooking methods that may not prioritize nutrient retention (Lindsey, 2024).

One of the key challenges in studying vegetable consumption patterns is the variability in dietary behaviors across different regions, as local food environments, access to transportation, and cultural influences can all shape eating habits (Caspi et al., 2012; Food and Agriculture Organization, 2004; Morton et al., 2007). For instance, urban areas in Florida, which are often better connected to food distribution networks, may have more consistent access to fresh produce. In contrast, rural or underserved communities might experience food insecurity or face logistical barriers to acquiring fresh vegetables (Papanek et al., 2023; University of Florida IFAS Extension, 2020). Additionally, Florida's large immigrant population introduces multicultural perspectives on food and nutrition, further complicating efforts to understand and address vegetable consumption patterns (Gustavsen et al., 2021; Oladele et al., 2018). These factors suggest the need for a nuanced approach that considers the availability of vegetables and the social, economic, and cultural factors that may affect individuals' willingness or ability to consume them (Florida Office of Program Policy Analysis and Government Accountability, 2023; Schroeter et al., 2007).

While there is a wealth of national data on vegetable consumption, much of the existing research has focused on broad national trends or specific demographic groups, leaving a gap in

our understanding the factors influencing vegetable consumption unfold within Florida's unique demographic and agricultural context (Centers for Disease Control and Prevention, 2018; Court et al., 2023; Florida Department of Agriculture and Consumer Services [FDACS], n.d.; Labyak et al., 2016). This exploratory quantitative study aims to bridge this gap by comprehensively examining vegetable consumption factors among Floridians. This research aims to identify and analyze the factors that influence vegetable consumption in Florida, with particular attention to demographic variables such as age, gender, income, education, and ethnicity. By understanding the local context and the various barriers and facilitators of vegetable consumption, the study seeks to inform the development of targeted health and communication interventions, educational programs, and public policy strategies to improve dietary habits across the state.

Literature Review

Vegetable consumption in the United States has raised significant concerns, particularly in states like Florida, where the state's role in vegetable production contrasts with the decrease in local vegetable intake. According to Feeding Florida (2021), overall fruit and vegetable consumption frequency has dropped by nearly 10% since 2004, when national tracking began. Within this decline, vegetable consumption specifically has decreased by 16% over the same period. More recently, the downward trend has continued, with a 3% drop in overall consumption in just the last five years. This underconsumption issue is particularly pressing in Florida, given its prominence in vegetable production, including critical crops like tomatoes, bell peppers, and watermelons. A report by Produce for Better Health (2020) highlights a nationwide decline in vegetable consumption, with notable decreases observed in both children (ages 1-13) and adults (ages 31-70). However, certain age groups, such as 14-18-year-olds and those over 71, have shown slight increases in intake, pointing to variability in consumption trends across demographics (Produce for Better Health, 2020).

The decline in vegetable consumption can be attributed to several factors, including changing eating patterns. The rise of away-from-home eating occasions has shifted food choices, often to less vegetable-inclusive options (Feeding Florida, 2021). While efforts like the Fresh Access Bucks (FAB) program and plant-based meat substitutes have been introduced to encourage vegetable consumption, they have yet to reverse the broader trend (Produce for Better Health, 2020). Vegetables such as onions, tomatoes, and carrots have seen reduced consumption, while alternatives like potatoes, French fries, and avocados have grown in popularity (Feeding Florida, 2021). Moreover, vegetables are predominantly consumed as side dishes at dinner (58% of occasions), potentially limiting their prominence in daily meals (Produce for Better Health, 2020).

Health organizations, including the Centers for Disease Control and Prevention [CDC], stress the importance of increasing fruit and vegetable consumption to combat chronic diseases and improve public health (Florida Farm Bureau, 2021). Despite these recommendations, many Floridians still fail to meet the daily intake requirements for fruits and vegetables. Nearly 38% of Floridian adults do not consume at least one serving of fruit per day, and 23% do not meet the daily vegetable requirements (Florida Health, n.d.). These statistics underscore the ongoing challenges in improving vegetable consumption and highlight the need for systemic changes to address these barriers (Florida Health, n.d.).

Addressing the decline in vegetable consumption requires targeted intervention strategies. While programs like FAB have shown promise in encouraging the purchase of fruits and vegetables through Supplemental Nutrition Assistance Program (SNAP) benefits, further efforts

are needed in consumer education and policy changes. Increasing the accessibility, appeal, and convenience of vegetables is crucial to overcoming current barriers (Feeding Florida, 2021). Understanding the factors influencing vegetable consumption at the individual level, such as behavioral and demographic variables, is vital to developing effective interventions (Produce for Better Health, 2020).

In Florida, vegetable consumption patterns among youth and adults are shaped by various behavioral factors. Labyak et al. (2016) found that fewer than 25% of middle and high school students consumed adequate fruit, and less than 10% consumed sufficient vegetables. The study highlighted that weight loss behaviors, including exercising and dieting, were associated with increased fruit and vegetable intake, suggesting that encouraging healthier behaviors among youth could support improved vegetable consumption (Labyak et al., 2016). In adults, Schroeter et al. (2007) found that family eating rituals and meal practices, such as dining together without distractions like television, were linked to higher vegetable consumption. In contrast, more frequent dining away from home was associated with reduced vegetable intake, aligning with broader research indicating the negative impact of eating out on fruit and vegetable consumption (Schroeter et al., 2007).

Florida's agricultural sector, a central driver of the state's economy, is important in addressing the gap between vegetable availability and consumption. The Florida Department of Agriculture and Consumer Services (FDACS, n.d.) reports that the state is a national leader in producing several key vegetable crops. Despite this abundance, challenges persist in promoting the consumption of these locally grown vegetables. Addressing these challenges requires strategies that make vegetables more appealing and accessible to Floridians and bridge the gap between local production and consumption (FDACS, n.d.).

The COVID-19 pandemic further highlighted the complexities of Florida's agricultural system and underscored the need to strengthen local food supply chains. Court et al. (2023) and Campbell & McAvoy (2020) documented how disruptions to the food service industry led to a loss of perishable produce, prompting Florida growers to redirect unsold produce to food banks and initiate programs connecting farmers with local consumers. These efforts mitigated the crisis's immediate effects and raised awareness of Florida-grown produce, fostering local purchasing commitments from grocery stores (Campbell & McAvoy, 2020; Court et al., 2023).

In addition to domestic challenges, the growing importation of fresh produce, particularly from Mexico, has affected U.S. growers, including those in Florida. Huang et al. (2022) noted that increased imports have contributed to a decline in the production of key crops like tomatoes, peppers, and cucumbers over the past two decades. This trend raises concerns about the sustainability of domestic vegetable production, mainly as Florida competes with imports from Mexico. The authors argue that policy reforms and innovative approaches are necessary to ensure the long-term viability of the U.S. fresh produce industry (Huang et al., 2022).

To address these challenges and promote local vegetable consumption, UF/IFAS offers practical guidance on overcoming Florida's unique agricultural conditions. For instance, the "Heat-Tolerant Vegetables" article recommends crops that thrive in Florida's subtropical climate, such as boniato, amaranth, and tropical spinach. These heat-resistant varieties offer viable alternatives for gardeners and farmers in Florida's hot summer (UF/IFAS, n.d.). Similarly, the UF/IFAS "Selecting Vegetables for Your Garden" guide helps Floridians decide what to plant based on local growing conditions, covering warm and cool-season vegetables (UF/IFAS, n.d.).

The importance of this research lies in its potential to address a critical gap in the current literature surrounding vegetable consumption trends and local agricultural practices in Florida.

While existing studies have highlighted the decline in vegetable consumption and identified some factors contributing to this issue, there is a lack of comprehensive research that specifically explores the intersection of local agricultural production and consumer behavior within the state. The study aims to fill that gap by investigating the factors influencing vegetable consumption in Florida, focusing on behavioral and demographic variables. By providing insights into the influential factors and identifying effective communication strategies to promote healthier eating habits, this research will contribute valuable knowledge to agricultural communicators, Extension programming, and public health, ultimately helping to improve vegetable consumption rates and enhance the sustainability of Florida's agricultural sector.
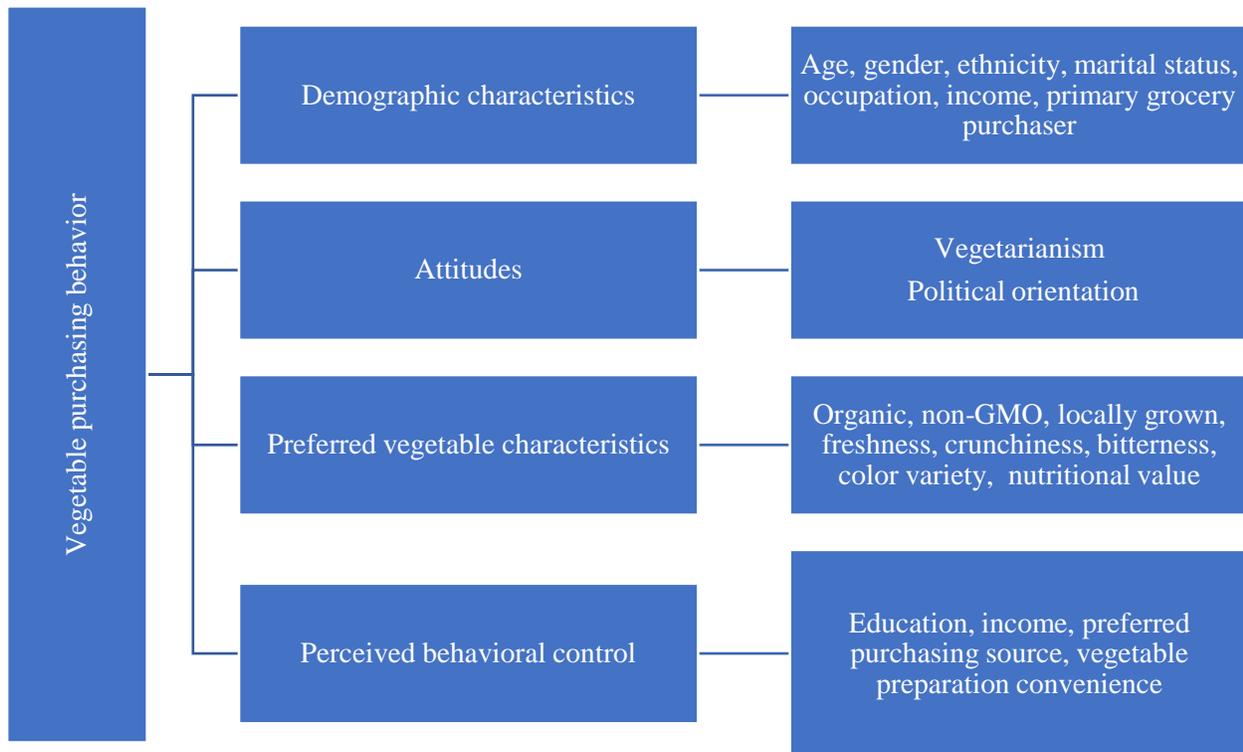
Conceptual Framework

The study presents a partial application of the Theory of Planned Behavior (TPB), focusing on attitudes and perceived behavioral control to predict behavioral intentions regarding vegetable consumption. The TPB, introduced by Icek Ajzen in 1985 (Ajzen, 2011), is a widely accepted framework for understanding human behavior across various domains (Ajzen, 2020; Armitage & Conner, 2001). According to Ajzen (2020), the TPB's versatility arises from its ability to define behavior through specific components: the target, action, context, and time frame. This adaptability makes the TPB an ideal theoretical framework for exploring vegetable consumption behaviors and preferences in the study.

The TPB suggests that attitudes, subjective norms, and perceived behavioral control guide individuals' behavioral intentions (Ajzen, 2020). One of the strengths of the TPB is its adaptability to different research needs (Armitage & Conner, 2001; Burton, 2004; Whitmarsh & O'Neill, 2010). While all three components are theoretically important, the study emphasizes attitudes and perceived behavioral control due to the theoretical focus and data constraints. Subjective norms are perceived social pressures to perform or avoid a behavior acknowledged as relevant, particularly in multicultural settings. However, the study was designed to prioritize constructs that are more directly observable and actionable in the context of public health and communication interventions (Lien et al., 2002; Sjoberg et al., 2004; Seo et al., 2019).

Given the research objectives and the nature of the data collected, the study emphasizes attitudes and perceived behavioral control as the primary factors influencing vegetable consumption. These components align more directly with the research questions, allowing for a more focused investigation of how personal beliefs and perceived control shape consumer behavior. This revision is shown in Figure 1, which highlights the modified TPB focusing on vegetable purchasing behavior.

Figure 1.
Modified Theory of Planned Behavior. Adapted from Ruangkanjanases et al. (2023).

Vegetable purchasing behavior

Demographic characteristics	Age, gender, ethnicity, marital status, occupation, income, primary grocery purchaser
Attitudes	Vegetarianism / Political orientation
Preferred vegetable characteristics	Organic, non-GMO, locally grown, freshness, crunchiness, bitterness, color variety, nutritional value
Perceived behavioral control	Education, income, preferred purchasing source, vegetable preparation convenience

The TPB builds on the premise that individuals make reasoned decisions to engage in specific behaviors by evaluating the available information (Ruangkanjanases et al., 2023). In food consumption, particularly vegetables, understanding consumer behaviors requires examining how attitudes, formed through individual beliefs about food attributes like taste, nutritional value, and health benefits, affect decision-making (Lim & An, 2021; Nocella et al., 2012). These attitudes are shaped by both individual factors (e.g., health consciousness) and broader social concerns (e.g., sustainability, local economy) (Kumar & Smith, 2018; Lim & An, 2021).

The second component of the TPB, perceived behavioral control, refers to the consumer's perception of how easy or difficult it is to perform a behavior (Mahon et al., 2006). Factors influencing perceived control include individual characteristics (e.g., income, education) and external factors (e.g., market access, preparation convenience) (Chilón-Troncos et al., 2024; Izquierdo-Yusta et al., 2022; Mahon et al., 2006). A higher perceived control often correlates with stronger intentions to engage in the behavior, as consumers who feel more informed or capable are more likely to act on their intentions (Armitage & Conner, 2001; Ruangkanjanases et al., 2023). Several studies suggest that perceived control is often the strongest predictor of dietary behaviors, particularly when identifying food access or knowledge barriers (Lien et al., 2002; Bogers et al., 2004).

In the study, behavioral intentions are seen as precursors to actual consumption, shaped by attitudes and perceived control, with subjective norms excluded from the analysis. Studies by Lien et al. (2002) and Emanuel et al. (2012) illustrate the significant role of attitudes and

perceived control in predicting vegetable consumption, with subjective norms not showing a direct impact. Similarly, McDermott et al. (2015) summarized the TPB's application in fruit and vegetable consumption, demonstrating the theory's potential to explain consumer behaviors by focusing on these key components.

Nevertheless, the exclusion of subjective norms is acknowledged, particularly given the TPB's nature and the Floridian population's multiculturality, where family and community influences may significantly affect dietary choices (Lindsey, 2024). Future studies could strengthen the TPB framework by incorporating validated subjective norm measures to capture these cultural and social pressures comprehensively.

Purpose and Objectives

Our study aims to explore and describe the factors influencing vegetable consumption among Floridian residents by examining their purchasing behaviors and preferences. Three objectives were used to explain the study:

1. Describe Floridian consumers' vegetable consumption and purchasing factors.
2. Identify the variables (age, gender, ethnicity, marital status, education level, occupation, income, political beliefs, vegetarianism, primary vegetable purchase, vegetable provider, and vegetable qualities) influencing Floridian consumers' monthly vegetable spending.
3. Identify the key vegetable attributes affecting Floridian consumers' choices.

Methods

We implemented a cross-sectional survey design for this quantitative study to meet the research objectives. Cross-sectional surveys collect data at a single time without follow-up (Rindfleisch et al., 2008). Their advantages include time efficiency, ease of generating hypotheses, and studying multiple outcomes simultaneously. However, they also have limitations, including challenges in establishing causality, susceptibility to nonresponse bias, and reliance on self-reported data (Wang & Cheng, 2020). A cross-sectional survey was our exploratory study's most appropriate data collection method. We sought to describe the factors influencing vegetable consumption and preferences among Floridian consumers without hypothesizing specific causal relationships.

Study Context

Florida, characterized by its multicultural demographic population and substantial agricultural sector, was selected for the study due to its unique combination of factors influencing consumer behavior and vegetable consumption (Thompson et al., 2021; Lee et al., 2021; Ramírez et al., 2018). As the third most populous state in the U.S., Florida is home to many ethnic groups, economic backgrounds, and political ideologies, making it an ideal context to explore regional differences in food purchasing behaviors and preferences (U.S. Census Bureau, 2021). Furthermore, Florida's significant agricultural output, particularly in vegetables such as tomatoes, bell peppers, and cucumbers, provides a unique opportunity to examine the relationship between local food production and consumer choices (Florida Department of Agriculture and Consumer Services, 2023). The state's economy is also heavily influenced by tourism, with transient populations affecting demand and consumption, particularly for locally produced vegetables.

Instrumentation

We developed the survey instrument in Qualtrics, drawing on insights from previous literature and the expertise of our research team in food systems, agricultural extension, program evaluation, agricultural communication, and leadership. To enhance clarity and comprehension, the instrument was pilot-tested with 40 undergraduates from Florida, and a panel of experts confirmed its face validity. Based on their recommendations, several questions were clarified, and the options for open-ended questions were refined.

Upon accessing the survey link, respondents were first presented with a consent form detailing the study, allowing them to choose whether to participate. The survey was divided into three sections, beginning with demographic questions covering age, gender, ethnicity, marital status, education, occupation, income, and political ideology. The next section included questions regarding respondents' vegetable consumption and expenditures, including vegetarian status, whether they were the primary vegetable purchaser in their household, and the percentage of their monthly income allocated to vegetables. Respondents were also prompted to identify the three vegetables they consumed most frequently, with follow-up questions on the sources from which they acquired these vegetables, preferred attributes, and satisfaction with the quality available in their area.

While we did not use fully validated TPB-specific instruments due to the exploratory nature of the study, several questions were informed by existing TPB scales (Ajzen, 2002; Francis et al., 2004). For example, attitudes were assessed through participants' beliefs regarding vegetables' taste, nutritional value, and health benefits. Perceived behavioral control was approximated through questions assessing vegetable access, affordability preferences, and preparation convenience (e.g., ease of preparing, versatile for cooking). Although behavioral intentions were not directly measured, questions focused on current consumption practices and purchasing behaviors, providing insight into actual behavior rather than future intent. This focus aligns with the descriptive aims of the study. Response options for these questions are shown in the results section, and the survey questions are in the appendix section of the paper.

Sample

Following approval from the Human Research Protection Program (IRB2023-692), we utilized Centiment's recruitment services to gather responses from general consumers in Florida. After a soft launch to refine the demographic questions, we collected data from 756 Floridian consumers. The sampling approach was non-probabilistic, employing quotas based on key demographic parameters, particularly ethnicity and education, to better represent the average Floridian consumer (U.S. Census Bureau, 2021). It is important to note that this sampling method does not aim to generalize the results to the entire population of Floridians.

The sample composition was as follows: 52.4% identified as female and 46.6% as male. Regarding age distribution, the largest groups were aged 45–54 (19%) and 65–74 (17.1%). In addition, most respondents identified as white (69.8%), Black or African American (15.7%), and Hispanic or Latino (9.7%). Marital status varied, with 41% of respondents married and 34.8% single. Education levels were also varied, with the most substantial portions of respondents having completed some college or holding an associate degree (23.4% and 12.7%, respectively). Occupation-wise, the sample mostly included full-time employed (35.1%) or retired (30.4%). Moreover, 41.7% of respondents identified as moderate, 33.1% as conservative, and 21.6% as liberal. The monthly income distribution showed a range of economic backgrounds, with the

largest proportion earning between $2,001 and $3,000 (20.1%). Respondents' socio-demographic characteristics are presented in Table 1.

Table 1

Respondents' Socio-demographic Characteristics

Characteristics	*f*	%
Gender		
Female	396	52.4
Male	352	46.6
Prefer not to say	4	0.5
Other	4	0.5
Age		
18-24 years	65	8.6
25-34 years	108	14.3
35-44 years	118	15.6
45-54 years	144	19.0
55-64 years	94	12.4
65-74 years	129	17.1
75+ years	97	12.9
Prefer not to say	1	0.1
Ethnicity		
White non-Hispanic	528	69.8
Black or African American	119	15.7
White-Hispanic or Latino	73	9.7
Multiracial	16	2.7
Asian or Asian American	10	1.3
Native American	1	0.1
Other	9	1.2
Marital Status		
Married	310	41.0
Single	263	34.8
Divorced	106	14.0
Widowed	60	7.9
Separated	17	2.2
Education		
Some high school or less	46	6.1
High school diploma	180	23.8
Some college, but no degree	177	23.4
Associate or technical degree	96	12.7
Bachelor's degree	176	23.3
Graduate degree	81	10.7
Occupation		
Full-time employed	265	35.1
Part-time employed	83	11.0
Full-time homemaker	42	5.6
Unemployed	110	14.6

Characteristics	f	%
Student	26	3.4
Retired	230	30.4
Political Beliefs		
Liberal	163	21.6
Moderate	315	41.7
Conservative	250	33.1
Apolitical	28	3.7
Monthly Income		
Less than $2,000		
$2,001–$3,000	152	20.1
$3,001–$4,000	94	12.4
$4,001–$5,000	76	10.1
$5,001–$6,000	42	5.6
$6,001–$7,000	40	5.3
$7,001–$8,000	43	5.7
More than $8,000	76	10.1
Prefer not to say	48	6.3

Data Analysis

Data collected were downloaded and reviewed in Excel and later analyzed using Statistical Package for Social Sciences (SPSS) v. 27 and R v.4.2. For objective one, we used descriptive statistics (i.e., frequencies and percentages) to describe the factors influencing vegetable consumption among Floridians.

For objective two, we created dummy variables for each categorical variable, using the category with the highest representation as the reference. For example, in the Ethnicity category, we created dummies for Black (n=119), Hispanic or Latino (n=73), Multiracial (n=16), Asian or Asian American (n=10), and Other (n=9), with White (n=528) as the reference category. Categories with fewer than five observations, such as Native American (n=1) and 'Prefer not to say' in age (n=1), were excluded from inferential analysis.

We conducted Pearson correlations to assess the relationships between key variables and to check for multicollinearity. Then, we conducted a multiple linear regression to identify the predictors of consumers' monthly vegetable spending. The model included age, gender, ethnicity, marital status, education level, occupation, income, political beliefs, vegetarianism, primary vegetable purchaser, vegetable source, and preferred vegetable attributes as predictors.

The dependent variable was originally measured by asking participants to indicate the percentage of their monthly income allocated to vegetables, using the following response options: 1 = none, 2 = very small portion (1–20%), 3 = small portion (21–40%), 4 = moderate portion (41–60%), 5 = large portion (61–80%), and 6 = almost all (81–100%). Prior research supports treating Likert-type scales or ordinal variables with five or more categories as continuous without negatively affecting the analysis (Johnson & Creech, 1983; Norman, 2010; Sullivan & Artino, 2013; Zumbo & Zimmerman, 1993). Therefore, we used an ordinal approximation of a continuous variable as the dependent variable for the regression. Based on prior knowledge, we included only one pair of closely related variables in the regression model to address multicollinearity concerns.

Assumption testing revealed independence of residuals, indicated by a Durbin-Watson value of 2.07. Homoscedasticity was verified by visually examining a plot of standardized residuals against unstandardized predicted values. There was no multicollinearity, as all tolerance values exceeded 0.1. One observation was removed because the studentized deleted residuals exceeded ±3 standard deviations. Influential values were analyzed using Cook's distance, evaluating values greater than .20. No values violated this assumption.

For objective three, we conducted a principal component analysis to assess consumers' preferred vegetable qualities. We used an eigenvalue cutoff value of 1.0 to retain factors in a varimax rotation for the interpretability of the factor loadings. We confirmed sampling adequacy with a Kaiser-Meyer-Olkin value of 0.65. In addition, Bartlett's test of sphericity was significant ($X^2 = 504.33$, df $= 55$, $p < .001$), indicating the data were suitable for factor analysis.

Results
Floridian Consumers' Vegetable Consumption and Purchasing Factors
A substantial portion of respondents indicated joint decision-making by adults in the household (34.9%) when purchasing vegetables. Single adults (33.2%) and female heads of household (22.6%) were also significant categories. In terms of monthly spending on vegetables, most respondents reported allocating a small portion (33.7%), a very small portion (27.5%), or a moderate portion (25.8%) of their monthly income. Table 2 presents a summary of vegetable consumption factors.

Table 2
Respondents' Vegetable Purchasing Factors (N = 756)

Characteristics	*f*	%
Vegetarianism		
No	690	91.3
Yes	66	8.7
Primary vegetable purchaser		
Both adults jointly	264	34.9
Single adult	251	33.2
Female head of household	171	22.6
Male head of household	60	7.9
Other	10	1.3
Monthly income toward vegetables		
Very small portion	255	33.7
Small portion	208	27.5
Moderate portion	195	25.8
Large portion	58	7.7
None	23	3.0
Almost all	17	2.2

Preferred Vegetable Attributes
Among the 756 Floridian consumers, freshness emerged as the vegetable attribute valued by most respondents (79.6%). Crunchiness (42.5%), easy-to-prepare options (34.8%), nutritional value (31.1%), color variety (26.5%), and versatility for cooking (25.7%) were also valued by

substantial portions. Attributes such as bitterness (3.7%), non-GMO (11.5%), and locally grown (19.0%) were valued by fewer respondents. Table 3 summarizes preferred vegetable attributes.

Table 3
Respondents' Preferred Vegetable Attributes (N = 756)

Attribute	*f*	%
Freshness	602	79.6
Crunchiness	321	42.5
Easy to prepare	263	34.8
Nutritional value	235	31.1
Color variety	200	26.5
Versatile for cooking	194	25.7
Sweetness	171	22.6
Organic	160	21.2
Locally grown	144	19.0
Non-GMO	87	11.5
Bitterness	28	3.7

Preferred Vegetable Source

Among the 756 Floridian consumers, the most preferred source for purchasing vegetables was the supermarket (89.4%). Local farmers markets (23.5%) and online grocery delivery (10.7%) were also popular options. Other sources included My Farm or Garden and Ethnic Grocery Stores, each with 6.7%, followed by roadside stands (6.5%) and family or friends (5.7%). Community-shared agriculture was the least favored option, with only 1.6% of respondents selecting it. Table 4 summarizes the preferred vegetable-purchasing sources.

Table 4
Respondents' Preferred Vegetable Source (N = 756)

Attribute	*f*	%
Supermarket	677	89.4
Local Farmers Market	178	23.5
Online Grocery Delivery	81	10.7
My Farm or Garden	51	6.7
Ethnic Grocery Stores	51	6.7
Roadside Stands	49	6.5
Family or Friends	43	5.7
Community Shared Agriculture	12	1.6

Frequently Consume Vegetables

Broccoli and lettuce were the most frequently consumed vegetables by respondents, with 19.0% and 18.8% of respondents listing them (see Table 5). Potatoes followed at 12.8%, carrots at 9.4% and onions at 6.6%. Less frequently mentioned vegetables included corn and green beans, each noted by 25 (3.3%) and 31 (4.1%) respondents. Other vegetables, such as cabbage, asparagus, sweet potatoes, zucchini, Brussels sprouts, peppers, okra, avocados, and pickles, were reported much less frequently, each representing less than 1% of responses.

Table 5

Respondents' Most Frequently Consumed Vegetables (N = 756)

Vegetable	f	%
Broccoli	144	19.0
Lettuce	142	18.8
Potato	97	12.8
Carrots	71	9.4
Onion	50	6.6
Corn	25	3.3
Green Beans	31	4.1
Tomato	31	4.1
Spinach	19	2.5
Cauliflower	14	1.9
Celery	13	1.7
Peas	10	1.3
Cucumber	10	1.3
Cabbage	9	1.2
Asparagus	8	1.1
Sweet Potatoes	7	0.9
Zucchini	6	0.8
Brussels Sprouts	5	0.7
Pepper	5	0.7
Okra	2	0.3
Avocados	1	0.1
Pickles	1	0.1
Prefer not to answer	55	7.3

Identify the Variables Influencing Floridian Consumers' Monthly Spending on Vegetables

For objective two, a multiple regression analysis was conducted to identify factors influencing Floridians' monthly vegetable spending. The regression model included predictors such as gender, ethnicity, marital status, education level, occupation, income, political beliefs, vegetarian status, primary vegetable purchaser, vegetable source, and preferred vegetable attributes. This model accounted for 18% of the variation in monthly vegetable spending (*adjusted R^2* = .17), explaining a statistically significant portion of the variation in the outcome variable ($F(9, 741) = 17.63$, $p < .001$).

Significant predictors of monthly income spent on vegetables included female gender ($B = .27$, $SE = .07$, $\beta = .13$, $p < .001$), Black or African American ethnicity ($B = .31$, $SE = .10$, $\beta = .10$, $p = .003$), and non-vegetarian status ($B = -.41$, $SE = .14$, $\beta = .11$, $p < .05$). Respondents aged 35–44 years spent marginally more ($B = .21$, $SE = .11$, $\beta = .07$, $p < .05$), as did full-time homemakers ($B = .33$, $SE = .16$, $\beta = .07$, $p < .05$).

Preferences for specific vegetable attributes also influenced spending. Valuing freshness ($B = .23$, $SE = .09$, $\beta = .08$, $p < .05$), organic qualities ($B = .25$, $SE = .09$, $\beta = .10$, $p < .05$), nutritional value ($B = .25$, $SE = .08$, $\beta = .11$, $p < .05$), and bitterness ($B = .44$, $SE = .19$, $\beta = .07$, $p < .05$) were all associated with higher monthly spending on vegetables. Furthermore, respondents with incomes exceeding \$8,000 per month allocated more to vegetable spending ($B = .38$, $SE = $

.13, $\beta = .10$, $p < .05$). At the same time, those with graduate education levels spent slightly less than those with lower education levels ($B = -.27$, $SE = .12$, $\beta = -.07$, $p < .05$).

Finally, respondents who sourced vegetables from family or friends spent more on vegetables ($B = .35$, $SE = .16$, $\beta = .03$, $p < .05$), while those who shopped at local farmers' markets spent an additional .41 compared to other sources ($B = .41$, $SE = .09$, $\beta = .16$, $p < .001$) On average, female respondents spent .27 more of their monthly income on vegetables than non-females, while Black or African American respondents allocated .31 more than their non-Black counterparts. Non-vegetarians spent .41 less of their monthly income on vegetables than vegetarians. Additionally, those aged 35–44 years spent .21 more on vegetables compared to other age groups, and respondents who were full-time homemakers spent .33 more than those in other occupations.

Respondents who valued freshness, nutritional value, and organic attributes in vegetables spent an additional .23, .25, and .25 of their monthly income, respectively, compared to those who valued other attributes. Those who preferred a bitter taste in vegetables spent .44 more than those who did not. Higher-income respondents, with monthly earnings over $8,000, spent .38 more on vegetables than those in lower income brackets. In contrast, respondents with a graduate education spent .27 less than those with lower education levels. Finally, those who source vegetables from family or friends spend .35 more of their monthly income on vegetables, and those who buy from local farmers' markets spend .41 more than those who use other sources.

Table 5
Results from the Multiple Linear Regression with Monthly Income Toward Vegetables as the Dependent Variable (N = 755)

Predictors	*B*	SE	B
Constant	2.80**	.17	
Gender: Female	.27	.07	.13**
Ethnicity: Black or African American	.31	.10	.10*
No Vegetarian	-.41	.14	.11*
Age: 35–44 years	.21	.11	.07*
Occupation: Full-time homemaker	.33	.16	.07
Attribute: Freshness	.23	.09	.08*
Attribute: Organic	.25	.09	.10*
Attribute: Nutritional value	.25	.08	.11*
Attribute: Bitterness	.44	.19	.07*
Income = More than $ 8.000.00	.38	.13	.10*
Educational Level: Graduate	-.27	.12	-.07*
Vegetable source: Family or Friends	.35	.16	.03*
Vegetable source: Local farmers' market	.41	.09	.16**

Note. ** indicates $p < .001$; * indicates $p < .05$

Identify the Key Attributes Underlying Floridian Consumers' Vegetable Choices
For objective three, a principal component analysis was conducted to investigate the factors influencing vegetable consumption among Floridians. We assessed the factors that underlie their decisions to purchase vegetables. The principal component analysis identified five components that explained 59.92% of the total variance in the data (see Table 6). We defined the themes of these components based on the attributes with the highest factor loadings.

Table 6

Total Variance Explained by the Five Extracted Factors

Factor	Initial Eigenvalues			Extracted Rotated Sums of Squared Loadings		
	Total	% Variance	Cumulative %	Total	% Variance	Cumulative %
1	2.040	18.546	18.546	2.040	18.546	18.546
2	1.316	11.962	30.508	1.316	11.962	30.508
3	1.156	10.511	41.019	1.156	10.511	41.019
4	1.067	9.702	50.720	1.067	9.702	50.720
5	1.012	9.200	59.920	1.012	9.200	59.920

Following the PCA, we used a varimax rotation to help interpret the factor loadings. We named the factors based on the nature of the items associated with the extracted factors, which are Factor 1: Organic and Non-GMO Preferences; Factor 2: Convenience in Cooking; Factor 3: Freshness and Texture; Factor 4: Taste Attributes; and Factor 5: Appearance and Nutritional Value (see Table 7).

Table 7

Principal Component Analysis of Vegetable Attributes

	Factors				
Scale Items	Organic and Non-GMO Preferences	Convenience in Cooking	Freshness and Texture	Taste Attributes	Appearance and Nutritional Value
Organic	.732				
Non-GMO	.720				
Locally Grown	.601				
Versatile for cooking		.775			
Easy to prepare		.773			
Freshness			.792		
Crunchiness			.729		
Sweeteners				.791	
Bitterness				.659	
Color variety					.802
Nutritional Value					-.459

Note. Principal Component Analysis. Varimax rotation.

Discussion

The study provides an exploratory yet comprehensive examination of the factors influencing vegetable consumption among Floridians guided by the partial use of the TPB, focusing on attitudes and perceived behavioral control. Our findings revealed that gender, ethnicity, vegetarian status, and preferences for attributes like freshness and organic qualities significantly predict vegetable purchasing behaviors. These insights align with the work of Ajzen (2020) and Armitage and Conner (2001), who highlighted the importance of attitudes, subjective norms, and perceived behavioral control in shaping consumer behavior. Specifically, women and

Black or African American respondents reported higher monthly spending on vegetables, indicating the substantial influence of demographic factors on dietary choices, as observed by Kumar and Smith (2018). This research extends prior work by offering a more nuanced understanding of how demographic characteristics shape food purchasing in a multicultural population.

Perceived behavioral control refers to consumers' perceptions of the resources and opportunities that enable or hinder their ability to purchase and consume vegetables. In our study, this construct was reflected in both economic and practical dimensions. Specifically, we used self-reported barriers to vegetable access (e.g., affordability, availability), as well as indicators of preparation convenience. Preferences for freshness and nutritional content also align with perceptions of control, since these attributes are tied to consumers' belief in their ability to access and select higher-quality options. These findings support Li et al. (2022) and Nocella et al. (2012), who identified health consciousness and perceived access as key drivers of consumer choices. Our study expands this understanding by demonstrating how socio-economic and demographic factors—such as income, education, occupation, and household structure—shape perceptions of control over food consumption (Ham et al., 2015; Kumar & Smith, 2018).

While subjective norms and behavioral intentions were not directly measured, given the study's cross-sectional and descriptive nature, our findings still contribute to understanding the role of demographic and perceptual factors in shaping dietary practices. We acknowledge that the exclusion of standardized TPB measures limits comparability with other TPB-based studies; however, our intent was to ground the analysis in real-world consumption factors, rather than to formally test the full TPB model. Previous studies have indicated that individuals or entities within a consumer's immediate social network significantly influence their subjective norms (Ham et al., 2015). Ruangkanjanases et al. (2023) found that when consumers receive positive reinforcement from their social circles regarding a food product, they are more likely to develop a stronger motivation to engage in that behavior (Armitage & Conner, 2001). Investigating the influence of subjective norms on vegetable consumption in multicultural contexts would provide valuable insights into the social dimensions of dietary behaviors. Future studies may benefit from integrating validated scales and structural modeling to deepen this theoretical lens.

Our principal component analysis identified five key factors shaping Floridian vegetable preferences: freshness, convenience in cooking, organic and non-GMO preferences, taste attributes, and appearance and nutritional value. This finding aligns with Mahon et al. (2006), who emphasized the significance of freshness and health attributes as primary drivers of consumer food choices. Our study, however, extends this understanding by offering a more localized perspective, reflecting the unique needs and preferences of Florida. The emphasis on organic and non-GMO products aligns with broader trends toward environmentally sustainable and health-conscious eating, as documented by Ham et al. (2015) and Chilón-Troncos et al. (2024). Nevertheless, our findings also reveal that economic constraints can limit the adoption of organic and sustainable produce, particularly among lower-income populations, highlighting the need for strategies that balance health promotion with affordability considerations (Izquierdo-Yusta et al., 2022).

In our study, "appearance" and "nutritional value" were grouped together in the PCA, forming a single component. Interestingly, this factor showed a positive loading for "color variety" but a negative loading for "nutritional value." This contrast likely reflects perceptual—rather than objective—associations, where visual appeal, such as vibrant color, is interpreted as an indicator of healthfulness. Prior research in consumer psychology supports this interpretation,

15

demonstrating that visual cues like color, shape, and overall aesthetic can significantly influence consumers' perceptions of nutritional quality (Nocella et al., 2012; e.g., Schifferstein & Ophuis, 1998).

The opposing loadings within this factor may indicate the presence of distinct consumer subgroups: one that closely associates visual appeal with nutritional value (Vermeir & Roose, 2020), and another that is more skeptical of aesthetic cues (Hagen, 2020; Janjić et al., 2023), instead prioritizing objective or evidence-based indicators of nutrition. Despite this divergence, it remains appropriate to group these items under a single factor because they collectively represent a shared evaluative dimension—how consumers use visible characteristics to make inferences about food quality (Grunert, 2005; Vermeir & Roose, 2020). The contrasting loadings are not indicative of measurement error but rather reflect a meaningful continuum along which consumer perceptions vary.

From a psychometric standpoint, this factor offers valuable insight into the different perceptual strategies consumers employ when selecting vegetables. Grouping these items together provides a nuanced understanding of the interplay between aesthetic judgments and perceived nutrition, even when those judgments diverge (Grunert, 2005; Vermeir & Roose, 2020). This also highlights the potential value of future qualitative research to explore how consumers interpret visual cues and how these interpretations ultimately shape their purchasing behavior.

Socio-economic factors, such as income and education level, also play a critical role in shaping vegetable consumption. Higher-income respondents tended to allocate more of their budget to vegetables, reflecting financial flexibility and an elevated awareness of health benefits. This aligns with Chilón-Troncos et al. (2024) and Ham et al. (2015), who highlighted the role of economic resources in shaping food choices. Conversely, individuals with graduate-level education spent slightly less on vegetables, a finding that may be influenced by alternative dietary choices, such as home gardening or community-supported agriculture (CSA), that do not appear in direct consumer spending (Izquierdo-Yusta et al., 2022). This complexity illustrates how socio-economic realities and lifestyle factors intersect to influence consumer behaviors, necessitating tailored public health and policy interventions to ensure equitable access to quality produce (Li et al., 2022; Ruangkanjanases et al., 2023).

By situating our findings within the broader body of literature, the study fills a critical gap by providing detailed insights into the factors driving vegetable consumption in a multicultural state like Florida. These findings have practical implications for public health initiatives, emphasizing the importance of designing interventions that reflect various demographic groups' needs, preferences, and barriers. Tailored strategies incorporating socio-economic considerations can promote healthier eating more effectively and support equitable health outcomes across populations.

The insights derived from the study have direct implications for the practice of strategic communication in agricultural and public health contexts. Understanding how consumers perceive and prioritize vegetable attributes such as freshness, organic qualities, and non-GMO status offers communicators valuable leverage for developing more targeted and persuasive messaging. Public information campaigns, for instance, can tailor content to resonate with distinct demographic groups by using socioeconomically relevant narratives, emphasizing values such as sustainability, tradition, and health. In particular, Extension professionals and food system communicators can apply these findings to refine educational programs that not only inform but also emotionally engage consumers based on their lived experiences and value

systems. This targeted approach reflects the principles of audience segmentation and message framing emphasized in applied communication research (Orton et al., 2024; Telg & Irani, 2011).

Conclusions

Overall, our study offers a strong foundation for developing targeted public health interventions that promote healthier dietary behaviors. Addressing various demographic groups' unique needs and motivations can foster greater equity in health outcomes and build a more inclusive and effective approach to improving nutrition and public health.

It's important to highlight that while our analysis offers insights into how certain demographic and perceptual variables influence spending on vegetables, we did not formally examine interaction effects or model complex relationships between these variables. Therefore, any conclusions regarding the interplay of socio-economic and lifestyle factors should be interpreted cautiously and seen as exploratory

Future research should consider using moderation analysis or structural equation modeling (SEM) to explore how these factors interact and collectively impact consumer behavior (Shen et al., 2022). These modeling techniques could uncover conditional effects that are not apparent in linear regression frameworks. Additionally, alternative factor extraction methods, such as oblique rotations like Promax—which allow for factor correlations—might yield a more intuitive factor structure and reveal cross-loadings among the vegetable attribute factors (Hair et al., 2021). However, since our study aimed to identify the key influences on vegetable consumption and minimize cross-loadings, we opted for varimax rotation, which emphasizes orthogonality and interpretability.

Future investigations should build upon the insights provided by our study through longitudinal studies that track changes in vegetable consumption patterns over time. Such research would offer a deeper understanding of the causal relationships that drive consumer behaviors and provide a more robust basis for targeted interventions (Rindfleisch et al., 2008). Expanding this research to other regions would offer comparative insights, enhancing the generalizability of findings and enabling cross-regional strategies. Moreover, there is a need to delve deeper into vegetable consumption's psychological drivers and barriers, using qualitative or mixed-methods approaches to explore consumer motivations, cultural influences, and perceived obstacles in greater detail (Lien et al., 2002; Nocella et al., 2012).

Additionally, while the current survey identified key predictors of vegetable spending behavior, it did not investigate the deeper beliefs or meanings attached to vegetable consumption. Future research could benefit from qualitative or mixed methods—such as focus groups or in-depth interviews—to explore how consumers perceive social expectations, cultural values, and internal beliefs related to vegetables. Such work would offer a richer understanding of perceived behavioral control, including barriers such as preparation time, affordability, or taste preferences, which may not be fully captured in a closed-response format. Qualitative insights could also help uncover overlooked constructs and refine theory-driven models of food choice behavior.

In addition, our study supports the role of communication in shaping behavioral intentions and facilitating planned change within different groups. Through the use of the TPB, communicators can craft interventions that enhance perceived behavioral control and positively influence attitudes toward vegetable consumption (Ajzen, 2020; Armitage & Conner, 2001). For example, by addressing affordability and access through informational messaging and storytelling that reflects consumers' realities, communicators can empower underrepresented groups to make healthier dietary choices (Li et al., 2022; Orton et al., 2024). Integrating

17

storytelling methods and visual communication strategies into campaigns—particularly those distributed via social media or community-based platforms—can increase message salience and trust (Telg & Irani, 2011).

Policymakers should also consider the socioeconomic disparities that influence dietary behaviors. Interventions that improve access to high-quality, preferred vegetable types—particularly in economically disadvantaged communities—can play a critical role in reducing health inequities (Feeding Florida, 2021; Florida Health, n.d.). Policies that support farmers' markets, community-supported agriculture (CSA) programs, and subsidies for fresh produce could help bridge gaps in access and ensure that all population segments benefit from improved dietary choices (Court et al., 2023; Huang et al., 2022).

From a practical standpoint, public health communication strategies should emphasize nutrition education campaigns designed to engage and reflect the unique socio-economic realities of various demographic groups. Such interventions must go beyond generic messaging and be sensitive to socioeconomic and practical considerations that shape dietary behaviors (Ramírez et al., 2018; Thompson et al., 2021). Furthermore, local agricultural markets and farmers can play a vital role by aligning their produce offerings with consumer preferences for freshness and organic or non-GMO qualities, as supported by consumer behavior research (Mahon et al., 2006; Lim & An, 2021). This alignment promotes greater vegetable consumption, supports community health, and boosts local economies.

The results of our study underscore the complex interplay of demographic, personal, and socio-economic factors that influence vegetable consumption among Floridians. Key predictors—including gender, ethnicity, income levels, and preferences for freshness, organic qualities, and convenience—demonstrate how diverse population segments prioritize their food choices based on socioeconomic and lifestyle considerations (Kumar & Smith, 2018; Chilón-Troncos et al., 2024). These findings highlight the need for tailored public health and agricultural interventions that address different demographic groups' specific needs and values (Ham et al., 2015; Izquierdo-Yusta et al., 2022).

References

Ajzen, I. (2011). The theory of planned behavior: Reactions and reflections. *Psychology & Health*, *26*(9), 1113–1127. https://doi.org/10.1080/08870446.2011.613995

Ajzen, I. (2020). The theory of planned behavior: Frequently asked questions. *Human Behavior and Emerging Technologies*, *2*(4), 314–324. https://doi.org/10.1002/hbe2.195

America's Health Rankings. (2025). *Fruit and vegetable consumption in Florida*. United Health Foundation. Retrieved from https://www.americashealthrankings.org/explore/measures/fvcombo/FL

Armitage, C. J., & Conner, M. (2001). Efficacy of the theory of planned behaviour: A meta-analytic review. *British Journal of Social Psychology*, *40*(4), 471–499. https://doi.org/10.1348/014466601164939

Boeing, H., Bechthold, A., Bub, A., Ellinger, S., Haller, D., Kroke, A., Leschik-Bonnet, E., Müller, M. J., Oberritter, H., Schulze, M., Stehle, P., & Watzl, B. (2012). Critical review: vegetables and fruit in the prevention of chronic diseases. *European Journal of Nutrition*, *51*(6), 637–663. https://doi.org/10.1007/s00394-012-0380-y

Bogers, R. P., Brug, J., Van Assema, P., & Dagnelie, P. C. (2004). Explaining fruit and vegetable consumption: The theory of planned behaviour and misconception of personal intake levels. *Appetite*, *42*(2), 157–166. https://doi.org/10.1016/j.appet.2003.08.015

Burton, R. J. (2004). Reconceptualizing the 'behavioral approach' in agricultural studies: A socio-psychological perspective. *Journal of Rural Studies*, *20*(3), 359–371. http://dx.doi.org/10.1016/j.jrurstud.2003.12.001

Campbell, C., & McAvoy, G. (2020). Florida fruit and vegetable growers' adaptation and response to COVID-19. *Journal of Agriculture, Food Systems, and Community Development,* 1–5. https://doi.org/10.5304/jafscd.2020.094.032

Caspi, C. E., Sorensen, G., Subramanian, S. V., & Kawachi, I. (2012). The local food environment and diet: a systematic review. *Health & Place*, *18*(5), 1172–1187. https://doi.org/10.1016/j.healthplace.2012.05.006

Chilón-Troncos, R. F., García-Salirrosas, E. E., Escobar-Farfán, M., Millones-Liza, D. Y., & Villar-Guevara, M. (2024). Predicting willingness to consume healthy brand foods using the theory of planned behavior: The role of nutritional literacy. *Frontiers in Nutrition*, *11*, 1353569. https://doi.org/10.3389/fnut.2024.1353569

Centers for Disease Control and Prevention. (2018). *State action guide: Florida* (p. 508). CDC. https://www.cdc.gov/nutrition/data-statistics/pdfs/florida_stateactionguide_sept2018_508.pdf

Court, C.D., Outerbridge, D., Baker, L., Birou, L., Campbell, C., DiGiacomo, G., Galindo, S., Lai, J., Magnier, A., Miller, M., Oliveira, G. de L.T., Orlando, E., Peterson, H.H., Xiaohui, Q., Roka, F., Ropicki, A., Saha B. B., Stevens, A. W., & Li, Z. (2023). Pandemic produce: Impacts of COVID-19 on Florida's fruit and vegetable industries. *Journal of Agricultural & Food Industrial Organization*, *21*(1), 69–88. https://doi.org/10.1515/jafio-2022-0025.

Cowan-Pyle, A. E., Bailey, R. L., Gao, J., Hess, J. M., Ademu, L. O., Lankes Smith, J., Mitchell, D. C., Racine, E. F. (2024). Dietary quality and diet-related factors among emerging adults (18–23y) in the United States are a cause for concern: National health and nutrition examination survey 2015–2018. *Journal of Nutrition*, *154*(8), 2524–2533. 10.1016/j.tjnut.2024.06.015.

Emanuel, A. S., McCully, S. N., Gallagher, K. M., & Updegraff, J. A. (2012). The theory of Planned Behavior explains gender differences in fruit and vegetable consumption. *Appetite*, *59*(3), 693–697. https://doi.org/10.1016/j.appet.2012.08.007

Feeding Florida. (2021). *Can grocers fight veggie consumption decline?* https://www.feedingflorida.org/staying-informed/news/2021-02-24-can-grocers-fight-veggie-consumption-decline

Fish, C. A., Brown, J. R., & Quandt, S. A. (2015). African American and Latino low-income families' food shopping behaviors: Promoting fruit and vegetable consumption and use of alternative healthy food options. *Journal of Immigrant and Minority Health, 17*, 498–505. https://doi.org/10.1007/s10903-013-9956-8

Food and Agriculture Organization of the United Nations. (2004). *Human nutrition in the developing world*. FAO. https://www.fao.org/4/ac911e/ac911e05.htm

Florida Department of Agriculture and Consumer Services. (n.d.). *Florida agriculture overview and statistics.* https://www.fdacs.gov/Agriculture-Industry/Florida-Agriculture-Overview-and-Statistics

Florida Farm Bureau. (2021). *Floridians should eat more fruits and vegetables for good health.* https://floridafarmbureau.org/news/report-floridians-should-eat-more-fruits-and-vegetables-for-good-health/

Florida Health. (n.d.). *Adults who consumed five or more servings of fruits or vegetables per day (BRFSS).* https://www.flhealthcharts.gov/ChartsReports/rdPage.aspx?rdReport=BrfssCounty.Dataviewer

Florida Office of Program Policy Analysis and Government Accountability (OPPAGA). (2023). *Food insecurity in Florida: Prevalence, programs, and policy options* (Report No. 23-09). https://oppaga.fl.gov/Documents/Reports/23-09.pdf

Gustavsen, G. W., Dong, D., Nayga, R. M., & Rickertsen, K. (2020). Ethnic variation in Immigrants' diets and food acculturation – United States 1999–2012. *Agricultural and Resource Economics Review*, *50*(1), 43–62. https://doi.org/10.1017/age.2020.17

Grunert, K. G. (2005). Food quality and safety: consumer perception and demand. *European Review of Agricultural Economics*, *32*(3), 369–391. https://doi.org/10.1093/eurrag/jbi011

Hair, J. F., Hult, G. T. M., Ringle, C. M., Sarstedt, M., Danks, N. P., & Ray, S. (2021). Moderation analysis. In *Classroom companion: business* (pp. 155–172). https://doi.org/10.1007/978-3-030-80519-7_8

Hagen, L. (2020). Pretty healthy food: How and when aesthetics enhance perceived healthiness. *Journal of Marketing*, *85*(2), 129–145. https://doi.org/10.1177/0022242920944384

Ham, M., Jeger, M., & Frajman Ivković, A. (2015). The role of subjective norms in forming the intention to purchase green food. *Economic Research-Ekonomska Istraživanja*, *28*(1), 738–748. https://doi.org/10.1080/1331677X.2015.1083875

Haynes-Maslow, L., Parsons, S. E., Wheeler, S. B., & Leone, L. A. (2013). A qualitative study of perceived barriers to fruit and vegetable consumption among Low-Income populations, North Carolina, 2011. *Preventing Chronic Disease*, *10*. https://doi.org/10.5888/pcd10.120206

Huang, K.-M., Guan, Z., & Hammami, A. (2022). The U.S. fresh fruit and vegetable industry: An overview of production and trade. *Agriculture, 12*(10), 1719. https://doi.org/10.3390/agriculture12101719

Izquierdo-Yusta, A., Martínez–Ruiz, M. P., & Pérez–Villarreal, H. H. (2022). Studying the impact of food values, subjective norms, and brand love on behavioral loyalty. *Journal of Retailing and Consumer Services*, *65*, 102885. https://doi.org/10.1016/j.jretconser.2021.102885

Janjić, L., Vujović, S., Zdravković, I., & Ilić, D. (2023). The impact of food visual aesthetics on consumer perception of a healthy and tasty meal in the hospitality and tourism industry. *Ekonomika Poljoprivrede*, *70*(3), 689–710. https://doi.org/10.59267/ekopolj2303689j

Jaworsky, K., DeVillez, P., Alexander, J. M., & Basu, A. (2023). Effects of an eating pattern including colorful fruits and vegetables on management of gestational diabetes: A randomized controlled trial. *Nutrients*, *15*(16), 3624. https://doi.org/10.3390/nu15163624

Johnson, D. R., & Creech, J. C. (1983). Ordinal measures in multiple indicator models: A simulation study of categorization error. *American Sociological Review*, *48*, 398–407.

Kasprzak, C. M., Sauer, H. A., Schoonover, J. J., Lapp, M. M., & Leone, L. A. (2020). Barriers and facilitators to fruit and vegetable consumption among lower-income families: Matching preferences with stakeholder resources. *Journal of Hunger & Environmental Nutrition*, *16*(4), 490–508. https://doi.org/10.1080/19320248.2020.1802383

Kumar, A., & Smith, S. (2018). Understanding local food consumers: Theory of planned behavior and segmentation approach. *Journal of Food Products Marketing*, *24*(2), 196–215. https://doi.org/10.1080/10454446.2017.1266553

Labyak, C. A., Johnson, T. M., Sealey-Potts, C., & Perkin, J. E. (2016). Fruit and vegetable consumption, body mass index, and dieting behaviors among Florida middle and high school youth. *Florida Public Health Review, 13*, 41–48.

Lee, S. D., Kellow, N. J., Choi, T. ST., & Huggins, C. E. (2021). Assessment of dietary acculturation in East Asian populations: A scoping review. *Advances in Nutrition*, *12*(3), 865–886. https://doi.org/10.1093/advances/nmaa127

Lee, S. H., Moore, L. V., Park, S., Harris, D. M., Blanck, H. M. (2019). Adults meeting fruit and vegetable intake recommendations — United States, MMWR Morb Mortal Wkly Rep 2022(71), 1–9. http://dx.doi.org/10.15585/mmwr.mm7101a1

Li, J., Guo, F., Xu, J., & Yu, Z. (2022). What influences consumers' intention to purchase innovative products: Evidence from China. *Frontiers in Psychology*, *13*, 838244. https://doi.org/10.3389/fpsyg.2022.838244

Lien, N., Lytle, L. A., & Komro, K. A. (2002). Applying theory of planned behavior to fruit and vegetable consumption of young adolescents. *American Journal of Health Promotion*, *16*(4), 189–197. https://doi.org/10.4278/0890-1171-16.4.189

Lim, H. R., & An, S. (2021). Intention to purchase wellbeing food among Korean consumers: An application of the Theory of Planned Behavior. *Food Quality and Preference*, *88*, 104101. https://doi.org/10.1016/j.foodqual.2020.104101

Lindsey, M. (2024). Cross-cultural differences in food preferences and consumption patterns. *Journal of Food Sciences*, *5*(1), 30–42. https://doi.org/10.47941/jfs.1841

Mahon, D., Cowan, C., & McCarthy, M. (2006). The role of attitudes, subjective norm, perceived control and habit in the consumption of ready meals and takeaways in Great Britain. *Food Quality and Preference*, *17*(6), 474–481. https://doi.org/10.1016/j.foodqual.2005.06.001

Miller, V., Mente, A., Dehghan, M. Rangarajan, S., Zhang, X., Swaminathan, S., Dagenais, G., Gupta, R., Mohan, V., Lear, S., Bangdiwala, S. I., Schutte, A.E., Wentzel-Viljoen, E., Avezum, A., Altuntas, Y., Yusoff, K., Ismail, N., Peer, N., Chifamba, J…Yusuf, S. (2017). Fruit, vegetable, and legume intake, and cardiovascular disease and deaths in 18 countries (PURE): A prospective cohort study. *Lancet*, *390*, 2037–2049. http://dx.doi.org/10.1016/S0140-6736(17)32253-5.

Morton, L. W., & Blanchard, T. C. (2007). Starved for access: Life in rural America's food deserts. *Rural Realities, 1*(4), 1–10. Mississippi State University. https://scholarsjunction.msstate.edu/cgi/viewcontent.cgi?article=6631&context=td

Nocella, G., Boecker, A., Hubbard, L., & Scarpa, R. (2012). Eliciting consumer preferences for certified animal-friendly foods: Can elements of the theory of planned behavior improve choice experiment analysis? *Psychology & Marketing*, *29*(11), 850–868. https://doi.org/10.1002/mar.20569

Norman, G. (2010). Likert scales, levels of measurement and the "laws" of statistics. *Advances in Health Sciences Education*, *15*(5), 625–632. https://link.springer.com/article/10.1007%2Fs10459-010-9222-y#citeas

Oladele, C. R., Sharma, S., Yang, J., Pathak, E. B., Himmelgreen, D., Dagne, G., Nembhard, W., & Mason, T. (2018). Food and nutrient intakes of Jamaican immigrants in Florida. *Journal of Immigrant and Minority Health*, *21*(3), 570–577. https://doi.org/10.1007/s10903-018-0770-1

Orton, G., Fischer, L., & Kitten, K. (2024). Using audience segmentation to identify target audiences for climate-smart beef production communication. *Journal of Agricultural Education*, *65*(3), 166–190. https://doi.org/10.5032/jae.v65i3.2741

Papanek, A., Campbell, C. G., & Wooten, H. (2023). Social and community benefits and limitations of urban agriculture. *EDIS*, *2023*(1). https://doi.org/10.32473/edis-fy1517-2023

Produce for Better Health. (2020). *State of the plate: 2020 executive summary.* https://fruitsandveggies.org/wp-content/uploads/2021/04/2020-PBH-State-Of-The-Plate-Executive-Summary-1.pdf

Ramírez, A.S., Golash-Boza, T., Unger, J.B., & Baezconde-Garbanati, L. (2018). Questioning the dietary acculturation paradox: A mixed-methods study of the relationship between food and ethnic identity in a group of Mexican-American women. *Journal of the Academy of Nutrition and Dietetics*, *118*(3), 431–439. https://doi.org/10.1016/j.jand.2017.10.008.

Ramírez, A.S., Wilson, M.D., & Soederberg Miller, L.M. (2022). Segmented assimilation as a mechanism to explain the dietary acculturation paradox. *Appetite*, *169*(2022), 105820. https://doi.org/10.1016/j.appet.2021.105820.

Rindfleisch, A., Malter, A. J., Ganesan, S., & Moorman, C. (2008). Cross-sectional versus longitudinal survey research: Concepts, findings, and guidelines. *Journal of Marketing Research*, *45*(3), 261–279. https://doi.org/10.1509/jmkr.45.3.261

Ruangkanjanases, A., You, J. J., Chien, S. W., Ma, Y., Chen, S. C., & Chao, L. C. (2020). Elucidating the effect of antecedents on consumers' green purchase intention: An extension of the theory of planned behavior. *Frontiers in Psychology*, *11*, 1433. https://doi.org/10.3389/fpsyg.2020.01433

Schroeter, C., House, L., & Lorence, A. (2007). Fruit and vegetable consumption among college students in Arkansas and Florida: Food culture vs. health knowledge. *The International Food and Agribusiness Management Review*, *10*(3), 63–89. https://doi.org/10.22004/ag.econ.8165

Seo, M., Kim, I., & Seo, G. (2019). Relationship between theory of planned behavior factors and optimistic bias and vegetable and fruit intake in college students. *Counseling Faculty Publications*, *41*. https://digitalcommons.unomaha.edu/counselfacpub/41

Shen, X., Xu, Q., & Liu, Q. (2022). Predicting sustainable food consumption across borders based on the theory of planned behavior: A meta-analytic structural equation model. *PLoS ONE*, *17*(11), e0275312. https://doi.org/10.1371/journal.pone.0275312

Sjoberg, S., Kim, K., & Reicks, M. (2004). Applying the theory of planned behavior to fruit and vegetable consumption by older adults. *Journal of Nutrition for the Elderly*, *23*(4), 35–46. https://doi.org/10.1300/j052v23n04_03

Soto, S. H., Arredondo, E. M., Marcus, B., Shakya, H. B., Roesch, S., & Ayala, G. X. (2017). Effects of Latino children in their mothers' dietary intake and dietary behaviors: The role of children's acculturation and the mother-child acculturation gap. *Social Science & Medicine*, *191*(2017), 125–133. http://dx.doi.org/10.1016/j.socscimed.2017.09.004.

Stanaway, J. D., Afshin, A., Ashbaugh, C., Bisignano, C., Brauer, M., Ferrara, G., Garcia, V., Haile, D., Hay, S. I., He, J., Iannucci, V., Lescinsky, H., Mullany, E. C., Parent, M. C., Serfes, A. L., Sorensen, R. J. D., Aravkin, A. Y., Zheng, P., & Murray, C. J. L. (2022). Health effects associated with vegetable consumption: A burden of proof study. *Nature Medicine*, *28*(10), 2066–2074. https://doi.org/10.1038/s41591-022-01970-5

Stewart, H., Hyman, J., Dong, D., & Carlson, A. (2020). The more that households prioritise healthy eating, the better they can afford to consume a sufficient quantity and variety of fruits and vegetables. *Public Health Nutrition*, *24*(7), 1841–1850. https://doi.org/10.1017/s1368980020004929

Sullivan, G. M., & Artino, A. R. (2013). Analyzing and interpreting data from Likert-Type scales. *Journal of Graduate Medical Education*, *5*(4), 541–542. https://doi.org/10.4300/jgme-5-4-18

Schifferstein, H. N., & Ophuis, P. A. O. (1998). Health-related determinants of organic food consumption in The Netherlands. *Food Quality and Preference*, *9*(3), 119–133. https://doi.org/10.1016/s0950-3293(97)00044-x

Taylor, C. A., Abrams, S. A., Booth, S. L., Byrd-Bredbenner, C., Eicher-Miller, H. A., Fung, T., Jernigan, V. B., Talegawkar, S. A., Tobias, D., Adler, M., Beckman, K., Cruz, C. M., de Jesus, J., DeSilva, D., English, L. K., Fu, S., Hiza, H., Kuczynski, K., McClain, V., Pannucci, T., Raghavan, R., Scanlon, K., & Stoody, E. (2024, February). *What are the implications for nutrient intakes when modifying the vegetables food group and subgroup quantities within the Healthy U.S.-Style Dietary Pattern? Food pattern modeling protocol*. U.S. Department of Agriculture, Food and Nutrition Service, Center for Nutrition Policy and Promotion, Nutrition and Economic Analysis Branch. https://www.dietaryguidelines.gov/

Telg, R., & Irani, T. A. (2011). *Agricultural communications in action: A hands-on approach*. Cengage Learning.

Thompson, D.; Callender, C.; Velazquez, D.; Adera, M.; Dave, J.M.; Olvera, N.; Chen, T.-A.; Goldsworthy, N. (2021). Perspectives of Black/African American and Hispanic parents and children living in under-resourced communities regarding factors that influence food choices and decisions: A qualitative investigation. *Children*, *8*, 236. https://doi.org/10.3390/children8030236

United States Census Bureau. (2021). *Florida: 2020 census*. https://www.census.gov/library/stories/state-by-state/florida-population-change-between-census-decade.html

United States Department of Agriculture. (2020). Dietary guidelines for Americans, 2020 – 2025. https://www.dietaryguidelines.gov/sites/default/files/2020-12/Dietary_Guidelines_for_Americans_2020-2025.pdf

U.S. Department of Agriculture. (2019, October 15). *Agriculture in the Sunshine State*. U.S. Department of Agriculture. https://www.usda.gov/about-usda/news/blog/agriculture-sunshine-state

University of Florida IFAS Extension. (2020, April 11). *Increasing accessibility to fresh produce in urban food deserts in Volusia County, Florida.* UF/IFAS Blogs.

UF/IFAS Extension. (n.d.). *Heat-tolerant vegetables.* https://gardeningsolutions.ifas.ufl.edu/plants/edibles/vegetables/heat-tolerant-vegetables/#:~:text=Truth%20be%20told%2C%20carrots%2C%20potatoes,potato%2C%20boniato%2C%20and%20cassava

UF/IFAS. (n.d.). *Selecting vegetables for your garden.* https://gardeningsolutions.ifas.ufl.edu/plants/edibles/vegetables/selecting-vegetables/

Vermeir, I., & Roose, G. (2020). Visual design cues impacting food choice: A review and future research agenda. *Foods*, *9*(10), 1495. https://doi.org/10.3390/foods9101495

Wang, X., & Cheng, Z. (2020). Cross-sectional studies: Strengths, weaknesses, and recommendations. *Chest*, *158*, S65–71. https://doi.org/10.1016/j. chest.2020.03.012

Whitmarsh, L., & O'Neill, S. (2010). Green identity, green living? The role of pro-environmental self-identity in determining consistency across diverse pro-environmental behaviours. *Journal of Environmental Psychology*, *30*(3), 305–314. https://doi.org/10.1016/j.jenvp.2010.01.003

Young, S. K., & Stewart, H. (2022). U.S. fruit and vegetable affordability on the thrifty food plan depends on purchasing power and safety net supports. *International Journal of Environmental Research and Public Health*, *19*(5), 2772. https://doi.org/10.3390/ijerph19052772

Zumbo, B. D., & Zimmerman, D. W. (1993). Is the selection of statistical methods governed by level of measurement? *Canadian Psychology/Psychologie Canadienne*, *34*(4), 390–400. https://doi.org/10.1037/h0078865

Appendix A

Demographic Information

Please select your age category.
- ☐ 18-24 years
- ☐ 25-34 years
- ☐ 35-44 years
- ☐ 45-54 years
- ☐ 55-64 years
- ☐ 65-74 years
- ☐ 75-84 years
- ☐ 85+ years
- ☐ Prefer not to say

What is your US Zip Code?

Please select your gender identity from the options below.
- ○ Male
- ○ Female
- ○ Non-binary / third gender
- ○ Non-binary / third gender
- ○ Other (please specify)
- ○ Prefer not to say

What is your ethnicity?
- ○ Asian or Asian American
- ○ Black or African American
- ○ Hispanic or Latino, including Mexican American, Caribbean Central and South American, and others
- ○ White, Caucasian, Anglo, European American; not Hispanic
- ○ American Indian, Native, or Alaska Native
- ○ Multiracial; parents are from two or more groups
- ○ Other (please specify)

What is your marital status?
- ○ Single
- ○ Married
- ○ Widowed
- ○ Divorced
- ○ Separated

What is the highest level of education you completed?
- ○ Some high school or less
- ○ High school diploma or GED
- ○ Some college, but no degree
- ○ Associates or technical degree

○   Bachelor's degree
○   Graduate or professional degree (MA, MS, MBA, PhD, JD, MD, DDS, etc)

Which occupational status best describes you?

○ Full-time employed
○ Part-time employed
○ Full-time homemaker
○ Unemployed
○ Student
○ Retired

What is your monthly income, before taxes?

○ Less than $2,000
○ $2,001.00 – $3,000.00
○ $3,001.00 – $4,000.00
○ $4,001.00 – $5,000.00
○ $5,001.00 – $6,000.00
○ $6,001.00 – $7,000.00
○ $7,001.00 – $8,000.00
○ More than $8,000.00
○ Prefer not to say

How would you best describe your views on the political spectrum?

○ Very liberal
○ Liberal
○ Moderate
○ Conservative
○ Very conservative
○ Apolitical

Vegetables Consumption Section

In this section, you will answer a series of questions about your consumption and expenditures on non-ethnic vegetables. Please continue to start answering questions.

Are you a vegetarian?

☐ Yes
☐ No

Who is the primary vegetable purchaser of your household?

○ Single adult
○ Both adults jointly
○ Male head of household
○ Female head of household
○ Other (please specify)

What percentage of your monthly income goes toward vegetables and food in general?

	None	Very small portion (1-20%)	Small portion (21-40%)	Moderate portion (41-60%)	Large portion (61-80%)	Almost all (81-100%)
Vegetables						
Food in general						

The term vegetable refers to the edible portion of a plant, usually grouped according to the portion of the plant that is eaten, such as leaves (lettuce), stem (celery), roots (carrot), tubers (potato), bulbs (onion), and flowers (broccoli) (USDA, 2023).

Please identify three vegetables based on how frequently they are consumed in your household.

Vegetable 1 (   )
Vegetable 2 (   )
Vegetable 3 (   )

From which of the following sources do you get your ${Identified vegetable 1}? Please select all that apply.

○ My farm or garden
○ Local farmers' market
○ Community Shared Agriculture (CSA)
○ Roadside stands or on-farm market
○ Supermarket
○ Ethnic grocery store (e.g., Asian markets, Hispanic markets)
○ Online grocery delivery
○ Family or friends
○ Other (please specify)

Which of the following qualities do you prefer in your ${Identified vegetable 1} to have, if any? Please check all that apply.

○ Freshness
○ Color variety
○ Crunchiness
○ Sweetness
○ Bitterness
○ Nutritional value
○ Organic

○ Non-GMO
○ Locally grown
○ Easy to prepare
○ Versatile for cooking
○ Other (please specify)
○ I don't have any preferences

Are you satisfied with the quality of ${Identified vegetable 1} supplied in your area?
○ No
○ Yes
○ I don't know