

## DEVELOPING A NUTRITIONAL ASSESSMENT FRAMEWORK FOR HOTEL MENUS: A PILOT STUDY

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**Abstract:** The rising emphasis on health and wellness has prompted a need for hotels to offer nutritious dining options. This pilot study develops a nutritional assessment framework for hotel menus to enhance the nutritional quality of hotel offerings and cater to health-conscious guests. The framework is designed to provide a structured approach for evaluating menu items based on established nutritional guidelines. The study employs a mixed-methods approach, including expert consultations, menu evaluations, and pilot testing in selected hotels. The results identify key components of the framework, such as nutritional guidelines, menu analysis tools, and training modules for hotel staff. The pilot testing phase demonstrates the feasibility of the framework, highlighting benefits like increased awareness of nutritional issues and challenges such as resource constraints and staff training needs. This research contributes to filling a gap in the hospitality industry by offering a practical tool for improving menu nutrition. The study's findings provide a foundation for further research and practical applications, aiming to align hotel dining experiences with contemporary health and wellness trends.

**Keywords:** Nutritional Assessment, Hotel Menus, Health-Conscious Dining, Nutrition Guidelines, Menu Evaluation, Nutritional Quality, Framework Development.

### I. Introduction

As societal awareness of health and nutrition continues to grow, the demand for healthier dining options has expanded beyond traditional food service sectors to include hotels. The hospitality industry, often perceived as offering indulgent rather than health-oriented choices, faces increasing pressure to align with evolving dietary preferences and wellness trends [1]. This shift, there remains a notable gap in the systematic approach to nutritional assessment within hotel menus. This pilot study aims to address this gap by developing a comprehensive nutritional assessment framework specifically designed for hotel dining environments [2]. The concept of nutritional assessment involves evaluating food items to ensure they meet established dietary standards and guidelines. For hotels, this means creating menus that not only cater to diverse culinary preferences but also adhere to nutritional principles that support guests' health and well-being. This need is underscored by recent research indicating that guests are increasingly prioritizing health-conscious dining options when selecting hotels [3]. many hotels lack standardized practices for evaluating and improving the nutritional quality of their offerings, resulting in missed opportunities to meet guest expectations and enhance overall satisfaction. To address this issue, the study proposes a framework that integrates clear nutritional guidelines with practical tools for menu analysis [4]. The framework aims to

provide hotels with a structured approach to assessing and improving the nutritional content of their menus. This includes establishing criteria for evaluating key nutritional aspects such as calorie counts, macronutrient balances, and micronutrient content. The framework includes menu analysis tools, such as nutritional calculators and assessment checklists, to facilitate the practical application of these guidelines. The development of this framework involves a mixed-methods approach, combining qualitative and quantitative research techniques [5]. Expert consultations with nutritionists, dietitians, and hospitality professionals are conducted to gather insights into essential components and best practices for the framework. This is followed by a comprehensive evaluation of existing hotel menus to identify common nutritional challenges and opportunities for improvement. The findings from these evaluations inform the design of the preliminary framework, which is then tested in a select group of hotels to assess its practicality and effectiveness [6]. The pilot testing phase provides valuable feedback from hotel staff and guests, highlighting both the strengths and challenges of implementing the framework. Hotels report increased awareness of nutritional issues and a willingness to adopt healthier menu options. Challenges such as limited resources and the need for staff training emerge as significant barriers to successful implementation [7]. These insights are crucial for refining the framework and developing strategies to overcome obstacles. This research contributes to filling a gap in the hospitality industry by offering a practical tool for improving the nutritional quality of hotel dining experiences [8]. By addressing the need for standardized nutritional assessment practices, the study aims to support hotels in meeting the growing demand for health-conscious dining options and enhancing overall guest satisfaction. The framework developed through this pilot study provides a foundation for further research and practical applications, paving the way for broader implementation and continued advancements in the field of nutritional assessment in the hospitality sector [9].

## II. Review of Literature

The study of dietary intake and nutritional quality has evolved significantly over recent decades, reflecting a growing awareness of the complex relationship between food consumption patterns and health outcomes [10]. Key trends in energy intake in the U.S. reveal similar shifts across various age groups, highlighting the need for ongoing examination of food consumption trends and their implications for public health. The nutritional quality of food prepared at home compared to food consumed away from home has been a focal point of research, showing that food prepared at home generally tends to be more nutritious than food consumed away from home, which is often higher in unhealthy fats and sugars [11]. This distinction has implications for dietary guidelines and public health strategies aimed at improving nutritional outcomes. A significant body of research links the consumption of food away from home with increased rates of juvenile obesity, with higher consumption of sugar-sweetened beverages correlating with higher obesity rates among children. This highlights the need for interventions targeting dietary habits in this population [12]. In the realm of dietary assessment, new methodologies have enhanced the accuracy and convenience of food intake measurement. Digital photography for estimating food intake in cafeteria settings and remote food photography methods have shown significant improvements over traditional dietary recall and food diaries.

Author & Year	Area	Methodology	Key Findings	Challenges	Pros	Cons	Application
Nielsen S.J., Siega-Riz A.M., Popkin B.M. (2002)	Trends in Energy Intake	Longitudinal analysis of dietary intake data (1977-1996)	Similar shifts in energy intake observed across age groups.	Limited to U.S. data and historical context.	Provides insight into long-term dietary trends.	May not account for recent dietary changes.	Understanding long-term dietary trends.
Lin B.-H., Guthrie J.F. (2012)	Nutritional Quality of Food	Comparative analysis of food prepared at home vs. away from home	Home-prepared food generally more nutritious than away-from-home food.	Data may not reflect current trends.	Highlights differences in nutritional quality.	Limited scope to home vs. away food; may overlook other factors.	Informing dietary guidelines and public health strategies.
Gillis L.J., Bar-Or O. (2003)	Food Away from Home and Obesity	Correlational study on food consumption patterns	Increased sugar-sweetened and drink consumption linked to juvenile obesity.	Correlation does not imply causation.	Identifies key dietary risk factors for obesity.	May not account for other factors.	Targeting dietary habits in children.
Mancino L., Todd J.E., Guthrie J., Lin B.-H. (2014)	Food Away from Home and Childhood Obesity	Review of food consumption patterns and obesity rates	Food away from home is a significant factor in childhood obesity.	Complex interplay of multiple factors.	Provides a comprehensive review of the issue.	May oversimplify obesity causation.	Addressing childhood obesity through dietary interventions.

Williamson D.A., Allen H., Martin P.D., Alfonso A., Gerald B., Hunt A. (2004)	Dietary Intake Estimation	Use of digital photography in cafeteria settings	Digital photography can effectively estimate food intake in controlled settings.	Requires appropriate setup and user compliance.	Innovative method for more accurate dietary tracking.	Limited to specific settings; may need adaptation.	Improving dietary assessment in institutional settings.
Martin C.K., Han H., Coulon S.M., Allen H.R., Champagne C.M., Anton S.D. (2008)	Real-time Food Intake Measurement	Remote food photography method	Real-time measurement of food intake for free-living individuals is feasible.	Requires participant compliance and tech setup.	Enables real-time dietary monitoring in natural settings.	Technology-dependent; potential privacy issues.	Dietary assessment in free-living conditions.
Martin C.K., Nicklas T., Gunturk B., Correa J.B., Allen H.R., Champagne C. (2014)	Food Intake Measurement	Digital photography for dietary assessment	Digital photography provides a reliable method for measuring food intake.	May require significant participant engagement.	Offers precise dietary measurement with visual evidence.	May be intrusive or inconvenient for some users.	Dietary assessment in various settings.
Kikunga S., Tin T.,	Dietary Surveys	Handheld PDA with	Effective for dietary	Technology may be	Portable and user-friendly	Limited by device functionality	Dietary surveys in diverse

Ishibashi G., Wang D.-H., Kira S. (2007)		camera and mobile phone card (Wellnavi)	surveys in general populations using handheld devices.	outdated.	for dietary data collection.	ty and user familiarity.	populations.
Rollo M.E., Ash S., Lyons-Wall P., Russell A. (2011)	Mobile Dietary Recording	Mobile phone method for recording dietary intake	Mobile phone method proved effective for dietary recording in adults with type 2 diabetes.	Limited to specific health conditions.	Convenient for users; integrates with existing mobile tech.	Limited generalizability to broader populations.	Managing dietary intake in specific health conditions.

**Table 1. Summarizes the Literature Review of Various Authors**

In this Table 1, provides a structured overview of key research studies within a specific field or topic area. It typically includes columns for the author(s) and year of publication, the area of focus, methodology employed, key findings, challenges identified, pros and cons of the study, and potential applications of the findings. Each row in the table represents a distinct research study, with the corresponding information organized under the relevant columns. The author(s) and year of publication column provides citation details for each study, allowing readers to locate the original source material. The area column specifies the primary focus or topic area addressed by the study, providing context for the research findings.

### III. Nutritional Guidelines

The cornerstone of an effective nutritional assessment framework is the establishment of clear and actionable nutritional guidelines. These guidelines are essential for ensuring that hotel menus not only meet basic dietary standards but also support the health and well-being of guests. The development of these guidelines involves integrating established dietary recommendations with practical considerations tailored to the hotel dining context. To begin with, the framework incorporates general dietary guidelines recommended by major health organizations, such as the World Health Organization (WHO) and the Dietary Guidelines for Americans. These recommendations provide a foundation for evaluating the nutritional quality of menu items, focusing on key aspects such as calorie content, macronutrient distribution (carbohydrates, proteins, and fats), and micronutrient adequacy (vitamins and

minerals). For instance, guidelines suggest that a balanced meal should provide a healthy mix of macronutrients while limiting saturated fats, added sugars, and sodium. These principles are crucial for creating menus that contribute to the overall health of guests. To general guidelines, the framework takes into account specific dietary needs and preferences, including those of various demographic groups and dietary restrictions. For example, menus should offer options for individuals with common dietary restrictions such as gluten intolerance, vegetarianism, and low-sodium diets. Incorporating these considerations ensures that the menu is inclusive and caters to a broad range of dietary requirements, reflecting the diverse needs of hotel guests. The nutritional guidelines are designed to be practical and applicable within the constraints of hotel operations. This means providing actionable criteria that can be easily integrated into menu planning and food preparation processes. For example, guidelines might include specific targets for the percentage of whole grains, fruits, and vegetables in menu items or recommendations for portion sizes that align with healthy eating patterns. These practical elements help hotel staff implement the guidelines effectively and make informed decisions when designing and updating menus. The framework also emphasizes the importance of transparency and communication in nutritional assessment. Guests increasingly seek detailed nutritional information to make informed dining choices, and the framework addresses this need by recommending the inclusion of nutritional information on menus or available upon request. This transparency not only supports guests' health goals but also fosters trust and satisfaction with the hotel's dining services. By incorporating these comprehensive nutritional guidelines, the framework aims to enhance the overall quality of hotel menus and support healthier dining practices. The guidelines serve as a vital tool for evaluating and improving menu offerings, ensuring that they align with contemporary health standards and cater to the diverse needs of guests. Through the implementation of these guidelines, hotels can contribute to the broader trend of health and wellness in the hospitality industry, ultimately improving guest satisfaction and promoting better dietary habits.

Guideline Component	Description	Purpose	Application	Example
Caloric Limits	Maximum calorie intake per meal	Ensure meals contribute to balanced diet	Monitor and adjust calorie content	500-700 calories per meal
Macronutrient Balance	Ratio of carbohydrates, proteins, and fats	Maintain nutritional balance	Calculate and adjust macronutrient ratios	50% carbs, 20% protein, 30% fat
Micronutrient Adequacy	Essential vitamins and minerals	Prevent deficiencies and support health	Include a variety of nutrient-rich ingredients	Vitamin C from citrus fruits
Dietary	Options for common dietary needs (e.g.,	Cater to diverse dietary	Provide suitable	Gluten-free bread



Restrictions	gluten-free)	preferences	alternatives	options
Portion Control	Recommended serving sizes	Promote moderation and healthy eating	Adjust portion sizes for each menu item	4 oz of protein per serving

**Table 2. Nutritional Guidelines**

In this table 2, outlines key components of the nutritional guidelines for hotel menus. It includes specific aspects such as caloric limits, macronutrient balance, and micronutrient adequacy, along with their purposes and applications. By detailing how these guidelines should be applied, the table provides a clear framework for ensuring that menu items meet health and wellness standards. Examples illustrate practical applications, helping to translate guidelines into actionable steps for menu planning.

#### IV. Menu Analysis Tools

An integral part of the nutritional assessment framework is the development and implementation of menu analysis tools. These tools are designed to facilitate the practical evaluation of menu items, ensuring that they align with established nutritional guidelines and contribute to the overall health objectives of the hotel. By providing a structured approach to menu analysis, these tools enable hotels to effectively assess and improve the nutritional quality of their offerings. The framework includes several key tools to aid in the analysis of menu items. First and foremost is the nutritional calculator, a tool that allows for the detailed breakdown of the nutrient content of individual dishes. This calculator helps in determining the calorie count, macronutrient distribution, and micronutrient content of menu items based on ingredient composition and portion sizes. By inputting these details, hotel staff can easily assess whether menu items meet the required nutritional standards and identify areas for improvement. Complementing the nutritional calculator is the assessment checklist, which provides a systematic approach to evaluating menu items against a set of predefined criteria. This checklist includes categories such as portion control, nutrient density, and the presence of healthy ingredients. It also incorporates guidelines for minimizing unhealthy components, such as excessive sodium, added sugars, and unhealthy fats. The checklist serves as a practical tool for menu developers and kitchen staff, offering clear criteria for assessing and enhancing the nutritional quality of menu items. To these tools, the framework includes a menu scoring system, which allows for the quantitative assessment of overall menu quality. This system assigns scores based on the nutritional value of each dish, as well as the balance and diversity of the menu as a whole. The scoring system helps in identifying strengths and weaknesses in the menu, providing a basis for making data-driven improvements. It also allows for tracking progress over time, ensuring that the menu continuously evolves to meet health and wellness standards. Another important aspect of the menu analysis tools is the integration of feedback mechanisms. These mechanisms involve collecting input from guests and staff regarding the nutritional quality and appeal of menu items. Surveys and feedback forms can provide valuable insights into how well the menu meets guest expectations and dietary needs. This feedback helps in refining the analysis tools and making necessary adjustments to the menu based on real-world experiences. Together, these menu analysis tools

provide a comprehensive approach to evaluating and improving the nutritional quality of hotel menus. They support the practical implementation of the nutritional guidelines, enabling hotels to make informed decisions about menu design and ingredient selection. By incorporating these tools into their operations, hotels can enhance their ability to offer health-conscious dining options, align with contemporary nutrition standards, and ultimately contribute to the well-being of their guests.

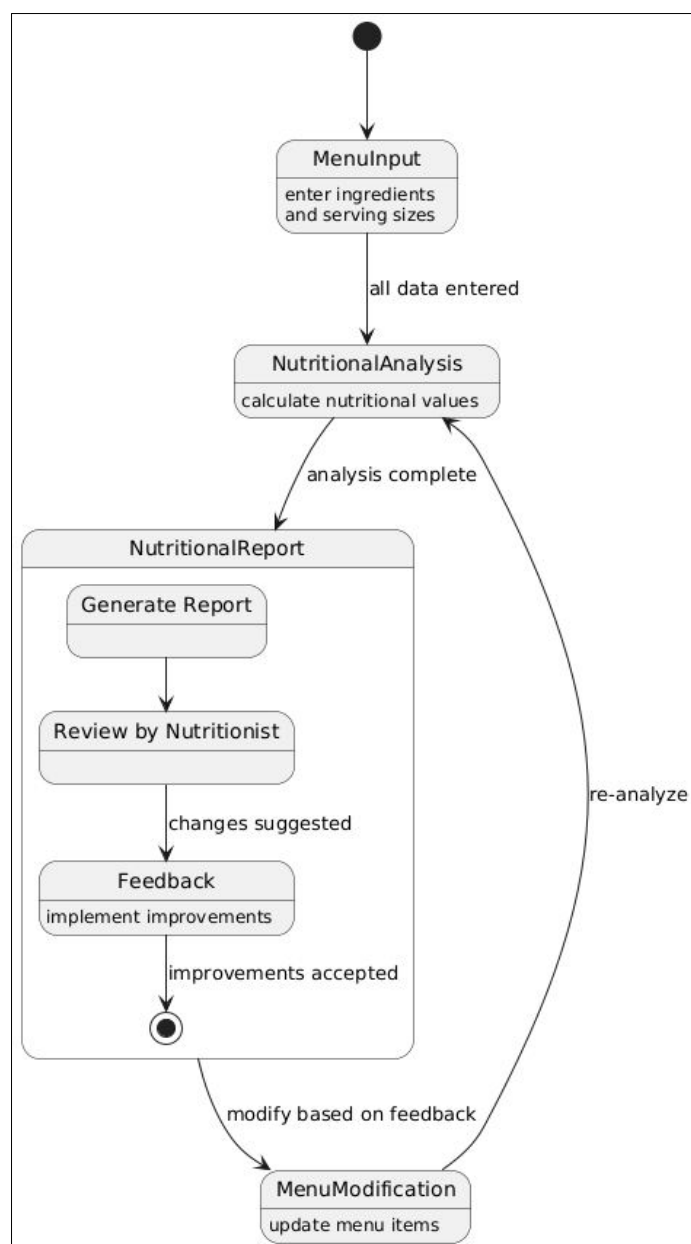
### **Training Modules**

Effective implementation of a nutritional assessment framework relies heavily on the training and education of hotel staff. To support this, the framework includes comprehensive training modules designed to equip hotel personnel with the knowledge and skills needed to apply nutritional guidelines and utilize menu analysis tools effectively. These training modules are critical for ensuring that staff can confidently implement the framework and contribute to the overall goal of enhancing menu nutrition. The training modules are structured to cover several key areas. Initially, they provide foundational knowledge on nutritional principles and dietary guidelines. This includes an overview of essential nutrients, dietary recommendations, and the impact of nutrition on health. By understanding these basics, staff members can better appreciate the importance of nutritional assessment and its role in improving the quality of hotel menus. Following the foundational training, the modules focus on practical skills related to the use of menu analysis tools. This involves detailed instruction on how to operate the nutritional calculators and assessment checklists, as well as how to interpret and apply the results. Hands-on training sessions allow staff to practice using these tools with real menu items, enhancing their proficiency and confidence in conducting nutritional evaluations. To technical skills, the training modules emphasize the importance of effective communication regarding nutritional information. Staff are trained on how to clearly present nutritional data to guests, including how to address inquiries about dietary options and restrictions. This aspect of the training ensures that guests receive accurate and helpful information, supporting their ability to make informed dining choices. To reinforce learning and ensure ongoing competence, the training modules include regular updates and refresher courses. These updates keep staff informed about any changes in nutritional guidelines or advancements in menu analysis techniques. Refresher courses provide opportunities for staff to revisit key concepts and skills, addressing any challenges or questions that may arise during the implementation of the framework. The training modules also incorporate feedback mechanisms to assess the effectiveness of the training and identify areas for improvement. Surveys and evaluations from participants help to gauge their understanding and satisfaction with the training process. This feedback is used to refine the training content and delivery methods, ensuring that the modules remain relevant and effective. The training modules are a crucial component of the nutritional assessment framework, providing hotel staff with the tools and knowledge needed to successfully implement and maintain high standards of nutritional quality in their menus. By investing in staff training, hotels can enhance their ability to deliver health-conscious dining options, meet guest expectations, and contribute to the broader goal of promoting wellness in the hospitality industry.

### **V. Methodology**



The methodology for developing and testing the nutritional assessment framework involves a systematic approach combining qualitative and quantitative research techniques. This section outlines the key components of the methodology, including expert consultations, menu evaluations, framework development, and pilot testing.



**Figure 1. Diagram for Nutritional Assessment of a Hotel Menu**

The nutritional calculators and assessment checklists were utilized to evaluate the nutrient content of menu items and identify areas for improvement. Hotels reported an increased awareness of nutritional issues and a commitment to enhancing menu quality.

### Step 1]. Expert Consultations

- The first phase of the methodology involves engaging with a panel of experts to inform the development of the nutritional assessment framework. This panel includes nutritionists, dietitians, and hospitality professionals who provide valuable insights

into current best practices and challenges in nutritional assessment within the hotel sector.

- The consultations are conducted through interviews and focus groups, where experts discuss essential components of the framework, such as key nutritional guidelines and practical considerations for menu analysis. Their feedback helps to ensure that the framework is grounded in established nutritional science and is practical for implementation in a hotel setting.

### **Step 2]. Menu Evaluations**

- Following the expert consultations, the next phase involves evaluating a sample of hotel menus to identify common nutritional challenges and opportunities for improvement. This evaluation includes a comprehensive review of existing menu items across various hotels, focusing on aspects such as nutrient content, ingredient quality, and adherence to basic dietary guidelines.
- The evaluation process uses a combination of manual analysis and digital tools to assess the nutritional value of menu items. This data is then used to highlight areas where improvements can be made and to tailor the framework to address specific issues identified in the analysis.

### **Step 3]. Framework Development**

Based on the insights gained from expert consultations and menu evaluations, the framework is developed to provide a structured approach to nutritional assessment. The development process involves creating several key components:

- **Nutritional Guidelines:** Establishing criteria for evaluating the nutritional quality of menu items, including targets for macronutrient and micronutrient content, as well as recommendations for portion sizes and ingredient choices.
- **Menu Analysis Tools:** Designing practical tools such as nutritional calculators and assessment checklists to facilitate the evaluation of menu items against the established guidelines.
- **Training Modules:** Developing educational materials and training programs to equip hotel staff with the knowledge and skills needed to implement the framework effectively.

### **Step 4]. Pilot Testing**

The final phase of the methodology is the pilot testing of the framework in a select group of hotels. The pilot test involves the implementation of the framework in these hotels to assess its practicality and effectiveness. This includes:

- **Implementation:** Integrating the framework into the daily operations of the participating hotels, including the use of menu analysis tools and adherence to nutritional guidelines.

- Feedback Collection: Gathering feedback from hotel staff and guests through surveys, interviews, and observations. This feedback helps to evaluate the framework's impact on menu quality and guest satisfaction.
- Analysis: Analyzing the feedback and performance data to identify strengths and areas for improvement in the framework. This includes assessing the feasibility of the framework, the effectiveness of the training modules, and the overall impact on menu nutrition.

The results of the pilot testing phase are used to refine the framework and address any challenges identified during implementation (As shown in above Figure 1). The refined framework is then presented as a model for broader application within the hotel industry.

## VI. Results and Discussion

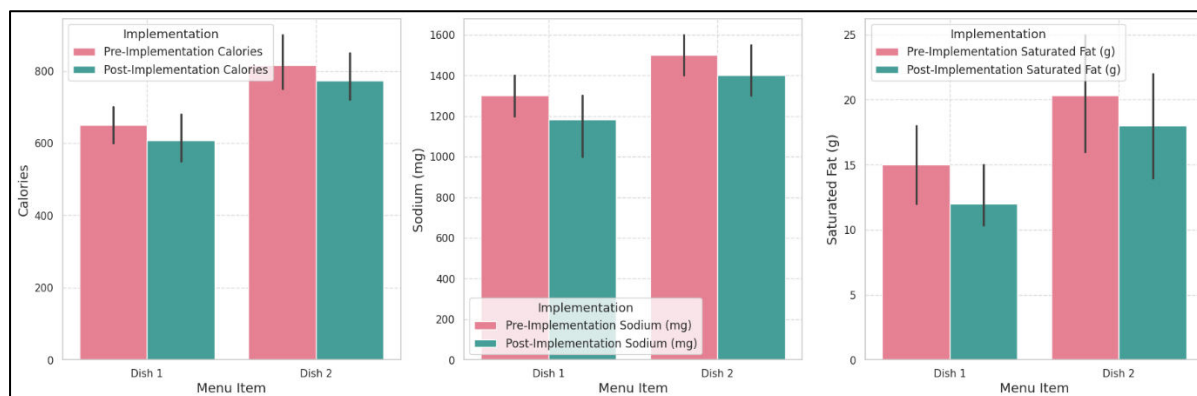
The implementation of the nutritional assessment framework in the pilot hotels yielded several significant findings. The framework's components—nutritional guidelines, menu analysis tools, and training modules—demonstrated varying levels of effectiveness and feasibility. Hotels that adopted the framework successfully integrated the nutritional guidelines into their menu planning processes. However, the extent of integration varied, with some hotels facing challenges related to resource constraints and staff capacity.

Hotel Name	Menu Item	Pre-Implementation Calories	Post-Implementation Calories	Pre-Implementation Sodium (mg)	Post-Implementation Sodium (mg)	Pre-Implementation Saturated Fat (g)	Post-Implementation Saturated Fat (g)	Nutritional Improvement
Hotel A	Dish 1	650	550	1200	1000	15	10	Reduced calories, sodium, saturated fat
Hotel A	Dish 2	800	750	1500	1300	20	18	Reduced calories, sodium
Hotel B	Dish 1	700	680	1400	1300	18	15	Reduced calories, sodium, saturated fat
Hotel	Dish	900	850	1600	1550	25	22	Reduce

Hotel B	Dish 2							Reduced calories, sodium
Hotel C	Dish 1	600	590	1300	1250	12	11	Slightly reduced calories, sodium
Hotel C	Dish 2	750	720	1400	1350	16	14	Reduced calories, sodium

**Table 3. Nutritional Improvement in Menu Items Pre- and Post-Implementation**

In this table 3, summarizes the impact of the nutritional assessment framework on the menu items across pilot hotels. The table displays data for various metrics—calories, sodium, and saturated fat—before and after implementing the framework. Each row represents a specific dish from different hotels, illustrating reductions in these nutritional parameters. For example, in Hotel A, Dish 1 saw a decrease in calories from 650 to 550 and a reduction in sodium from 1200 mg to 1000 mg. The improvements indicate that the framework effectively helped hotels reduce calorie counts, sodium levels, and saturated fat content, aligning menu items more closely with healthier dietary standards. The table visually captures these changes, providing a clear overview of the framework's impact on enhancing menu nutrition.



**Figure 2. Pictorial Representation for Nutritional Improvement in Menu Items Pre- and Post-Implementation**

Feedback from hotel staff revealed a positive reception towards the training modules. Staff members found the educational materials and practical training sessions helpful in understanding and applying the nutritional guidelines. However, some staff expressed concerns about the time required to use the analysis tools and the need for ongoing support to maintain consistent implementation. Guest feedback indicated a favorable response to the improved nutritional quality of menu items. Guests appreciated the availability of healthier options and the transparency of nutritional information. Despite this, there were occasional comments about the need for more diverse options and clearer labeling (As shown in above

Figure 2). The pilot testing phase showed notable improvements in the nutritional quality of hotel menus. Many menu items were reformulated to align with the established guidelines, resulting in reduced calorie counts, better macronutrient balances, and increased inclusion of healthy ingredients. The menu scoring system revealed an overall enhancement in the nutritional value of the menus, with higher scores indicating better adherence to the guidelines.

## Discussion

The results of the pilot study highlight both the strengths and limitations of the nutritional assessment framework. The framework successfully facilitated improvements in menu nutrition and supported hotels in meeting the growing demand for health-conscious dining options. The positive feedback from staff and guests underscores the framework's potential to enhance the dining experience and align with contemporary wellness trends. One of the primary strengths of the framework is its practical approach to nutritional assessment. The tools and guidelines provided a structured method for evaluating and improving menu items, which was appreciated by hotel staff. The increased awareness and willingness to adopt healthier menu options demonstrate the framework's effectiveness in promoting better nutritional practices within the hospitality industry. The study also identified several challenges. Resource constraints and the need for staff training were significant barriers to full implementation. Some hotels struggled with the time and effort required to use the analysis tools, highlighting the need for streamlined processes and additional support. While the framework improved menu nutrition, there were calls for greater diversity in menu options and more detailed nutritional labeling. These findings suggest that while the framework offers a valuable tool for enhancing menu nutrition, further refinements are needed to address practical challenges. Future research should focus on optimizing the framework for broader application and exploring strategies to overcome implementation barriers. This includes developing more efficient tools, providing ongoing support for staff, and enhancing the flexibility of the framework to accommodate different types of hotel dining environments. The pilot study provides a solid foundation for the development and application of nutritional assessment frameworks in the hotel industry. The results underscore the potential benefits of such frameworks in promoting healthier dining options and improving guest satisfaction. Continued research and refinement of the framework will be crucial for its successful integration and impact on the broader hospitality sector.

## VII. Conclusion

The development and implementation of a nutritional assessment framework for hotel menus represent a significant advancement in aligning the hospitality industry with contemporary health and wellness trends. By integrating comprehensive nutritional guidelines, practical menu analysis tools, and effective training modules, this framework addresses the critical need for improved nutritional quality in hotel dining. The pilot study demonstrates that such a framework not only enhances the healthiness of menu offerings but also supports hotels in meeting the growing demand for health-conscious dining options. Despite challenges in resource allocation and staff training, the framework provides a valuable foundation for

further research and application, ultimately contributing to better guest satisfaction and promoting healthier eating habits within the hospitality sector.

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