

Healthy Menu Innovation in Ready-to-Eat Food Security Catering for the Productive Generation

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Abstract

Food security among the productive generation has become a growing public health concern in Indonesia, where rapid urbanization and shifting dietary patterns increasingly favor convenience over nutritional quality. This study investigates the innovation of healthy menus in ready-to-eat (RTE) food catering services as a strategy to address food security for individuals aged 18–45 years. Using a mixed-methods approach combining nutritional analysis, consumer surveys, and menu development trials, this research evaluates the nutritional adequacy, affordability, palatability, and sustainability of newly developed RTE catering menus. A total of 150 participants from urban areas in West Java participated in the consumer acceptability study. Results indicate that innovated healthy menus achieved a 78.4% acceptability rate, met 80–95% of recommended daily nutritional requirements, and were priced competitively within a budget accessible to productive-age consumers. The study concludes that strategic menu innovation in RTE catering systems can serve as a viable intervention for improving food security and dietary quality among Indonesia's productive generation. Policy recommendations for catering businesses, health authorities, and community nutrition programs are discussed.

Keywords: healthy menu innovation; ready-to-eat food; food security; catering; productive generation; nutrition

Introduction

Food security remains one of the most pressing global challenges of the twenty-first century. Defined by the Food and Agriculture Organization (FAO) as a state in which all people, at all times, have physical and economic access to sufficient, safe, and nutritious food, food security encompasses four pillars: availability, access, utilization, and stability (FAO, 2009). While significant progress has been made in eliminating hunger worldwide, nutritional insecurity — particularly in the form of poor dietary quality — continues to affect large segments of the population, including the productive generation aged 18 to 45 years.

Indonesia, as the fourth most populous nation in the world, faces a dual nutritional burden: the persistence of undernutrition alongside a rising prevalence of diet-related non-communicable diseases (NCDs) such as obesity, type 2 diabetes, and cardiovascular conditions (Ministry of Health Indonesia, 2021). The productive generation, which constitutes the majority of the national workforce, is particularly vulnerable to dietary inadequacies due to time constraints, economic pressures, and the increasing reliance on ready-to-eat (RTE) food options available in urban catering services.

Ready-to-eat food catering has experienced remarkable growth in Indonesia, driven by urbanization, increased female workforce participation, and the proliferation of food delivery platforms (Badan Pusat Statistik, 2022). However, the nutritional quality of commercially available RTE meals frequently falls short of dietary guidelines, being often high in sodium, refined carbohydrates, and saturated fats while low in fiber, vitamins, and micronutrients (Santoso et al., 2020). This nutritional gap presents both a public health challenge and an opportunity for targeted menu innovation.

Menu innovation in catering services refers to the deliberate redesign of food offerings to enhance their nutritional profile without compromising palatability, affordability, or consumer acceptability. Several studies have demonstrated that well-designed healthy menus can significantly improve dietary intake among target populations (Lachat et al., 2012; Nago et al., 2010). However, research focusing specifically on RTE catering innovations tailored to the nutritional needs and lifestyle of Indonesia's productive generation remains limited.

This study aims to address this gap by developing and evaluating innovative healthy menus for RTE food catering services targeting productive-age adults in urban Indonesia. Specifically, the objectives are: (1) to design nutritionally balanced RTE menus aligned with Indonesian dietary guidelines; (2) to assess consumer acceptability and willingness to pay; (3) to evaluate the nutritional adequacy of the developed menus against recommended dietary allowances; and (4) to propose a scalable framework for healthy menu integration in catering businesses.

LITERATURE REVIEW

Food Security and the Productive Generation

The concept of food security has evolved beyond mere caloric sufficiency to encompass nutritional quality and dietary diversity (Pinstrup-Andersen, 2009). For the productive generation, nutritional adequacy is critical not only for individual health outcomes but also for economic productivity, cognitive function, and national development (Horton & Ross, 2003). Research consistently shows that poor dietary quality among working-age adults contributes to reduced work performance, increased absenteeism, and higher healthcare expenditures (Goetzal et al., 2012).

In Indonesia, national nutrition surveys indicate that adults aged 19–49 years frequently fail to meet recommendations for fruits, vegetables, whole grains, and protein diversity (Riskseddas, 2018). Urban dwellers in particular exhibit higher rates of processed food consumption and lower dietary diversity compared to rural counterparts, reflecting broader socioeconomic and environmental determinants of diet (Rachmi et al., 2017).

Ready-to-Eat Food and Catering Industry Dynamics

The global RTE food market has expanded substantially over the past two decades, driven by convenience, urbanization, and changing household structures (Euromonitor International, 2023). In Indonesia, the catering and food service sector contributes significantly to GDP, with the online food delivery segment growing at an annual rate of approximately 15% between 2018 and 2023 (GoFood & GrabFood Market Report, 2023). Despite this growth, nutritional considerations have historically taken a back seat to taste, cost, and convenience in menu planning.

Studies examining the nutritional content of commercially sold RTE meals in Southeast Asia reveal consistent patterns of excess sodium (averaging 1,200–1,800 mg per meal), insufficient vegetable content, and low dietary fiber (Nishi et al., 2020). These findings highlight the urgent need for structured menu innovation approaches that incorporate nutritional science into commercial food service operations.

Principles of Healthy Menu Innovation

Healthy menu innovation integrates principles from nutritional science, food technology, sensory science, and consumer behavior to redesign food offerings that are both nutritious and appealing (Harnack & French, 2008). Key strategies include ingredient substitution (e.g., replacing refined grains with whole grains), portion optimization, reduction of unhealthy additives, incorporation of functional foods, and leveraging local food biodiversity (Drewnowski & Fulgoni, 2014).

The menu engineering framework, originally developed for the restaurant industry (Kasavana & Smith, 1982), has been adapted to incorporate nutritional metrics alongside profitability indicators, enabling caterers to balance health objectives with business viability. Studies applying this framework in institutional settings such as workplaces, schools, and hospitals have demonstrated measurable improvements in consumers' nutrient intake without significant cost increases (Rao et al., 2013).

Consumer Acceptability and Behavioral Factors

Consumer acceptance is a critical determinant of the success of any menu innovation initiative. Sensory attributes — including taste, aroma, texture, and visual appeal — are the primary drivers of food choice, often outweighing health considerations (Steptoe et al., 1995). Research in the Indonesian context indicates that palatability and price are the two most influential factors in food selection among urban productive-age adults (Susanto et al., 2019).

However, evidence also suggests that health literacy, nutritional labeling, and targeted communication can shift consumer preferences toward healthier options (Grunert et al., 2010). Social norms, workplace culture, and peer influence further mediate food choices in communal

settings, suggesting that catering-level interventions may have multiplier effects on population dietary behavior (Monsivais et al., 2015).

Methods

Research Design

This study employed a mixed-methods research design combining quantitative nutritional analysis, experimental menu development, and a cross-sectional consumer survey. The research was conducted in three sequential phases: (1) menu development and nutritional assessment, (2) sensory evaluation and consumer acceptability testing, and (3) feasibility and cost analysis. Ethical approval was obtained from the Research Ethics Committee of Universitas Padjadjaran (Reference No. 1245/UN6.KEP/EC/2024).

Menu Development Process

Menu development was guided by the Indonesian Dietary Guidelines (Pedoman Gizi Seimbang, 2014) and the recommended dietary allowances for adults aged 19–45 years established by the Ministry of Health Indonesia (2019). A multidisciplinary team comprising registered dietitians, food technologists, and professional chefs collaborated to design a portfolio of 30 RTE meal options spanning breakfast, lunch, and dinner categories. Menu design principles prioritized: (1) macronutrient balance (50–60% carbohydrate, 15–20% protein, 25–30% fat); (2) micronutrient density; (3) incorporation of locally sourced ingredients; (4) minimal use of food additives and preservatives; and (5) preparation methods favoring steaming, baking, and stir-frying over deep-frying.

Nutritional Analysis

Nutritional composition of each developed menu item was calculated using the Indonesian Food Composition Table (TKPI, 2017) and supplemented with laboratory proximate analysis for key items. Parameters assessed included energy (kcal), carbohydrate (g), protein (g), fat (g), dietary fiber (g), sodium (mg), and selected micronutrients (iron, calcium, vitamin C, and vitamin A). Nutritional adequacy was expressed as a percentage of the recommended dietary allowance (RDA) per meal.

Consumer Acceptability Study

A total of 150 productive-age adults (aged 18–45 years) residing in urban areas of West Java were recruited through purposive sampling. Inclusion criteria required participants to be regular consumers of catering or RTE food services at least three times per week. A structured hedonic scale questionnaire (1–5 points) was administered to assess sensory acceptability across five attributes: appearance, aroma, taste, texture, and overall acceptability. Additionally,

participants completed a willingness-to-pay (WTP) assessment and a short dietary knowledge questionnaire.

Data Analysis

Quantitative data were analyzed using SPSS version 26. Descriptive statistics were computed for all continuous variables. The acceptability threshold was set at a mean hedonic score ≥ 3.5 out of 5.0. Pearson correlation analysis was conducted to examine associations between nutritional knowledge scores and consumer acceptability ratings. Statistical significance was set at $p < 0.05$.

Results and Discussion

Nutritional Profile of Developed Menus

The 30 developed RTE menu items demonstrated mean nutritional profiles largely aligned with dietary guidelines. Lunch menus provided an average of 540 ± 62 kcal per serving (target: 500–600 kcal), with protein content of 28.4 ± 4.1 g (representing 22.7% of total energy), fat content of 18.2 ± 3.5 g (30.3% of total energy), and carbohydrate content of 68.5 ± 8.2 g (50.7% of total energy). Dietary fiber content averaged 7.8 ± 1.4 g per meal, compared to the recommended 8–10 g per meal, representing an 85% adequacy level.

Sodium content was successfully reduced to a mean of 820 ± 145 mg per meal, compared to the national average of 1,450 mg reported in commercially available RTE meals (Santoso et al., 2020). This reduction was achieved through the use of natural flavor enhancers such as aromatics, low-sodium soy sauce alternatives, and herb-based seasoning blends. Micronutrient adequacy ranged from 72% (vitamin A) to 96% (iron) of the meal-level RDA targets, reflecting the intentional inclusion of dark leafy vegetables, legumes, and locally sourced fish in menu compositions.

These findings are consistent with evidence demonstrating that systematic menu design using a food composition-based approach can effectively improve the nutritional quality of catering offerings (Lachat et al., 2012). The inclusion of whole grain rice, tempeh, tofu, and a variety of colorful vegetables as staple components reflected a deliberate effort to leverage Indonesia's rich food biodiversity while meeting modern nutritional standards.

Consumer Acceptability Findings

Among the 150 participants surveyed (mean age 31.2 ± 6.8 years; 54% female), overall acceptability of the innovated healthy menus was high, with 78.4% of participants rating the menus as acceptable or highly acceptable (hedonic score ≥ 3.5). Mean hedonic scores were as follows: appearance (3.82 ± 0.61), aroma (3.71 ± 0.58), taste (3.88 ± 0.72), texture (3.76 ± 0.64), and overall acceptability (3.85 ± 0.67). The highest-rated items included grilled chicken

with brown rice and stir-fried tempeh with mixed vegetables, both achieving overall acceptability scores above 4.0.

Notably, participants with higher nutritional knowledge scores demonstrated significantly greater acceptability of healthy menus ($r = 0.38$, $p < 0.01$), suggesting that nutrition education may serve as a complementary strategy to enhance market uptake of healthier RTE options. This finding aligns with Grunert et al. (2010), who reported that health literacy mediates the relationship between nutritional labeling and food choice behavior.

Willingness-to-pay analysis indicated that 68.7% of participants were willing to pay a price premium of up to 15% above conventional RTE meal prices for the healthy menu options, contingent on clear nutritional labeling and perceived health benefits. This figure is somewhat lower than that reported in studies from higher-income settings (Lusk & Shogren, 2007) but higher than findings from comparable urban Indonesian populations (Widodo et al., 2021), potentially reflecting growing health consciousness among younger urban adults.

Feasibility and Cost Analysis

Cost analysis revealed that the developed healthy menus were producible at an average raw ingredient cost of IDR 18,500–22,000 per meal serving, representing a 12–18% increase over equivalent conventional meals. However, when accounting for the potential reduction in long-term healthcare costs associated with improved dietary quality — estimated at IDR 45,000–65,000 per person per month through reduced NCD-related medical expenditures (calculated based on national health expenditure data) — the net societal benefit clearly favored investment in healthy menu catering.

Operational feasibility assessments conducted with five participating catering SMEs in Bandung indicated that transitioning to healthy menus required modest investments in staff training (approximately 8 hours), minor adjustments to procurement channels to source whole grain products and fresh vegetables, and the adoption of standardized recipes with precise portion controls. None of the participating enterprises reported the need for major capital equipment investments, suggesting that healthy menu innovation is accessible to small and medium-scale catering operators.

Implications for Food Security Policy

The findings of this study have important implications for food security policy at both the institutional and national levels. First, the demonstrated feasibility of producing nutritionally adequate RTE meals at competitive price points challenges the prevailing assumption that healthy eating is inherently expensive or inaccessible to lower-income urban populations. Strategic sourcing of local ingredients, menu standardization, and economies of scale in procurement offer viable pathways to cost-effective healthy catering.

Second, the positive consumer acceptability findings support the argument that taste and health are not inherently in conflict; innovative menu design can successfully marry culinary appeal with nutritional quality. This counters a common barrier cited by catering operators, namely the fear that health-focused menu changes will reduce customer satisfaction and sales (Sliwa et al., 2016).

Third, the correlation between nutritional knowledge and menu acceptability underscores the importance of integrating nutrition education into food security interventions. Government programs targeting the productive generation should complement healthy food access initiatives with targeted communication campaigns promoting the health benefits of balanced dietary choices.

Conclusion

This study demonstrates that healthy menu innovation in ready-to-eat food catering represents a practical and effective strategy for strengthening food security among Indonesia's productive generation. The developed menus achieved strong consumer acceptability (78.4%), met 80–95% of key nutritional targets, and proved financially viable for small and medium catering enterprises. The significant positive correlation between nutritional literacy and consumer acceptance further highlights the complementary role of nutrition education in sustaining demand for healthy RTE options.

Several practical recommendations emerge from this research. Catering businesses are encouraged to adopt structured menu innovation frameworks that prioritize nutritional quality alongside sensory and economic considerations. Health authorities should develop accessible guidelines and certification systems to support and incentivize healthy catering practices. Workplace nutrition programs and food procurement policies for public institutions represent high-leverage channels for scaling up healthy RTE catering adoption.

Future research should explore the longitudinal impact of regular healthy RTE catering consumption on dietary patterns and health outcomes, examine optimal nutritional labeling strategies for urban Indonesian consumers, and investigate the scalability of healthy menu innovation approaches in diverse catering contexts including corporate, educational, and community settings. Multi-city studies with larger sample sizes would also strengthen the generalizability of findings presented here.

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