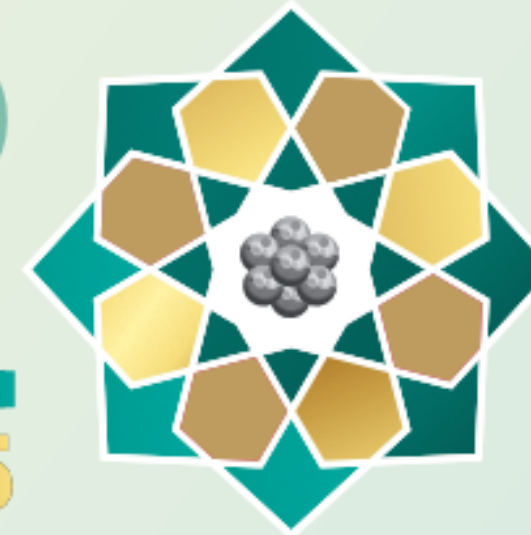




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Preliminary Survey and Profiling of Food Additives in Ultra-Processed Foods (UPFs) from Convenience Stores in Bangkok

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ABSTRACT

Ultra-Processed Foods (UPFs) undergo extensive industrial processing and incorporate various food additives. They are typically characterized by high total energy but low nutritional value. The continuous consumption of UPFs is associated with increased risks of chronic diseases and metabolic dysfunction. This study aimed to quantitatively survey and analyze the profile of food additives (INS numbers) and nutritional information displayed on commercial UPF products available in local convenience stores. A key objective was to compile a database of food additives frequently found in UPFs to support future research and analysis. A cross-sectional survey methodology was employed to collect data on 102 UPF products, including snacks (56 types) and quality-defined foods (46 types). Samples were collected from major convenience store chains for three months in 2025. Recorded data included product ingredients, INS numbers, functional classes of additives, and key nutrition facts. The survey of 102 UPFs identified the presence of 73 distinct types of food additives. In the snack category (56 types), the most frequently detected additives were INS 621 and INS 330. Nutritional analysis generally indicated that these products contained high levels of energy, sugar, and sodium. Specifically, hidden sodium was detected in 53 types of snacks and 30 types of quality-defined foods. Additionally, artificial sweeteners were present in 7 snack items and 2 bakery items. The average total energy content was found to be 159.1 ± 86.1 kcal per serving for snacks ($n=56$) and 209.0 ± 308.8 kcal per serving for quality-defined foods ($n=46$). This data serves as a crucial foundation for future in-depth research, supports efforts to promote consumer education on reading nutritional labels, and provides grounds for suggesting the development of nutritional warning labels or improved product formulations.

INTRODUCTION

Ultra-processed foods (UPFs) are defined as foods that undergo multiple industrial processes, often incorporating ingredients like synthetic colors, flavors, high-fructose corn syrup, hydrogenated oils, preservatives, and hydrolyzed proteins. In Thailand, consumption trends show that sweetened beverages, semi-prepared foods, and snacks are the most frequently consumed UPF categories, with projected increases in beverage and snack consumption over the next five years. The consumption of UPFs has been positively correlated with adverse health outcomes globally, including cardiovascular diseases (CVD) and all-cause mortality. Furthermore, high UPF intake is linked to increased risk of diabetes (24% higher risk for highest consumers; 13% increased risk for every 10% increment in UPF consumption) and metabolic disorders, such as insulin resistance and fatty liver disease in obese youth. Given that food additives are crucial components of UPFs, monitoring their usage and safety is paramount.

METHODOLOGY

A cross-sectional survey methodology was employed to randomly collect data on 102 UPF products, including snacks (56 types) and quality-defined foods (46 types). Samples were collected from major convenience store chains, specifically 7-Eleven Suan Luang Square and Donki MBK center, for three months in 2025. Data were systematically collected from product labeling covering product ingredients, INS numbers, functional classes of additives, and key nutrition facts. The analysis focused on identifying the most frequently occurring food additives in each category, the types of artificial sweeteners used, and the prevalence of hidden salt.

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RESULTS AND DISCUSSION

The survey documented a total of 102 UPF products. The products were classified primarily into 56 Snacks/Chips and 46 Quality-Defined Foods (which included 9 bakery and 7 plant-based items). The labels revealed the presence of 73 distinct types of food additives.

Product Category	Total Sample	Sweeteners Found	Hidden Salt Found	Top 3 Additives
Snacks/Chips	56	7 types	53 products	1. INS 621 (MSG, 16 units) 2. INS 330 (Citric Acid, 16 units) 3. INS 551 (Silicon Dioxide, 14 units)
Quality-Defined Foods	46	4 types	30 products	1. INS 407 (Carrageenan, 8 units) 2. INS 471 (Mono/Di-glycerides, 5 units) 3. INS 322(i) / INS 621 (4 units each)

Dominant Additive Functions:

The most frequently found additives across categories largely serve to enhance flavor, modify texture and extend shelf life.

- Flavor Enhancement: Monosodium L-Glutamate (INS 621) was the most common additive in snacks (16 units) and was also found in quality-defined foods (4 units) and plant-based items (2 units).
- Emulsification/Stabilization: Mono- and Di-glycerides of fatty acids (INS 471) and Lecithin (INS 322(i)) were highly prevalent across snacks, quality-defined foods, and bakery items. Carrageenan (INS 407) was the top additive in quality-defined foods.
- Anti-Caking/Acidity Regulation: Amorphous Silicon Dioxide (INS 551) was frequently observed in snacks (14 units), while Citric Acid (INS 330) was also highly represented (16 units)

Nutritional Implications:

The study confirmed that UPF products generally possess high energy content and low nutritional value. Several products utilized more than five to seven additives per item. The average total energy content was found to be 159.1 ± 86.1 kcal per serving for snacks ($n=56$) and 209.0 ± 308.8 kcal per serving for quality-defined foods ($n=46$). The extensive use of flavor enhancers and synthetic sweeteners (such as Sucralose, INS 955) results in hyperpalatability, potentially leading consumers to overeat and subsequently suffer from nutritional imbalance and chronic diseases. Furthermore, the high concentration of hidden salt (sodium) across snacks and categorized foods suggests a significant risk factor for consumers. The discussion emphasizes that despite comprehensive nutritional labels being present on many items, the reliance on attractive marketing and packaging often causes consumers to underestimate the actual nutritional risks

CONCLUSION

The comprehensive survey of 102 Ultra-Processed Foods in Thai convenience stores confirms the widespread and complex integration of food additives, with **73 different types identified**. The products typically exhibit profiles marked by high energy density and frequent use of flavor enhancers, emulsifiers, artificial sweeteners, and hidden salt, supporting existing literature linking UPF consumption to poor nutritional quality.

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