

**UNIVERSITI TEKNOLOGI MARA (UiTM)**

**THE DEVELOPMENT OF MUFFINS USING APPLE FLOUR  
AND QUINOA FLOUR AS ALTERNATIVE BAKING  
INGREDIENTS**

**NUR EZZATI ASYIQIN BINTI MOHD HAZIAN**

**BACHELOR (HONS.) OF DIETETICS  
FACULTY OF HEALTH SCIENCES**

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## ABSTRACT

**Background:** Overweight as well as obesity could be defined as abnormal or excessive fat accumulations that may endanger health (World Health Organization, n.d.). National Health Morbidity Survey (NHMS) 2019 reported that one in every two persons in Malaysia is overweight or obese, with females (54.7%), Indian ethnicity (63.9%), and those aged 55 to 59 years old (60.9%) having the highest rates (National Institutes of Health (NIH), 2020). Bakery products have particular downsides due to their high content of simple sugars with rapid absorption, high fat content, and low level of dietary fibre, making them high calorie foods (Peris et al., 2019). **Purpose:** In this research, we aimed to improve the nutritional value and overall acceptability of the muffins using the blend of apple and quinoa flour and see whether it is suitable for health-conscious consumers. **Methods:** This research will collect data on proximate analysis and sensory evaluation of the newly developed health-conscious muffins. The proximate analysis will include the measurement of moisture, protein, ash, total fat and total dietary fibre content using the standard AOAC methods. The sensory evaluation using the 5-point hedonic scale is used to evaluate the sensory characteristics and overall acceptability of the muffins. The panellists for the sensory evaluation are among undergraduate students of UiTM Puncak Alam. The data collected then will be analyzed using one-way ANOVA test by SPSS software. **Results:** The results of the proximate analysis showed that addition of apple flour increased the moisture, ash and crude fibre content while the addition of quinoa flour increased the protein content. The sensory attributes of all formulations are within the same score but the 50AF:50QF had the most desirable result. **Conclusion:** Combination of apple flour and quinoa flour may be beneficial in improving bakery products and could be used as an alternative in baking ingredients.

**Keywords:** obesity; overweight; apple flour; quinoa flour; health-conscious; healthy baked products

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# **CHAPTER 1: INTRODUCTION**

## **1.1 Research Background**

Overweight and obesity, according to the World Health Organisation (WHO), are defined as abnormal or excessive fat accumulations that may endanger health (World Health Organization, n.d.). The body mass index (BMI) is a screening technique used to evaluate whether a person is overweight or obese (Ministry of Health Malaysia, et al., 2023). According to the National Health Morbidity Survey (NHMS) 2019, one in every two persons in Malaysia is overweight or obese, with females (54.7%), Indian ethnicity (63.9%), and those aged 55 to 59 years old (60.9%) having the highest rates (National Institutes of Health (NIH), 2020).

Bakery products are known to have high content of simple sugars, high fat content and low amount of dietary fiber, making them a highly calorie food which commonly avoided by the health-conscious customers (Othman et al., 2018). WHO highlighted that unhealthy diets and lack of physical activity cause the blood pressure, blood glucose and blood lipid to spike as well as contribute to obesity. Cakes, muffins and cookies are products that had been consumed by all levels of society because of their “ready to eat” format, their accessibility in different varieties and affordable costs (Peris et al., 2019). Unfortunately, the health benefits of these products are questionable. Therefore, doing reformulation by modifying the type of fats and carbohydrates would undoubtedly improve the quality of the product, the consumer's diet as well as reducing the risk of cardiovascular diseases (European Commission EU, 2011, as cited in Peris et al, 2019).

Nowadays, exposures to nutrition and health awareness lead consumers to opt for reduced- or low-fat/-calorie foods (Othman et al., 2018). Hence, modifying the ingredients used in bakery products with potentially nutritive ingredients would be beneficial to increase its nutritional quality (Anis Jauharah et al., 2014). In the baking industry, low-fat and low-calorie food products have been constantly studied and