Fortified Gluten-free Extruded Snacks for Children with Celiac Disease: Advancing Sustainable Development Goal 3 in Kazakhstan

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Abstract

Celiac disease in children requires a strict gluten-free diet, which increases the risk of vitamin and mineral deficiencies in the absence of affordable domestic products. The aim of this study was to analyze the dynamics of celiac disease among children aged 0-14 years in Kazakhstan (2013-2024) and to develop fortified gluten-free extruded snacks as a potential solution to this problem. The epidemiological analysis revealed a steady increase in cases and a concentration of prevalence in the southern and western regions, as well as in major cities. The developed samples, based on corn flour with the addition of rice, buckwheat, or chickpea flour and fruit-berry powders, contained B vitamins, vitamin C, and antioxidants at levels consistent with functional food products. All formulations met safety requirements; pathogenic microflora and toxic elements were not detected. The findings confirm the feasibility of creating affordable domestic products for children with celiac disease, thereby contributing to the achievement of SDG 3 “Good Health and Well-Being.”

Keywords

Gluten-Free Snacks, Celiac Disease, Vitamin-enriched Food, Functional Nutrition, Children’s Health