

Development of a Healthier Alternative to Conventional Instant Noodles: A Review of Nutritional Formulation, Processing, and Product Development Strategies

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ABSTRACT

Instant noodles are widely consumed because they are inexpensive, convenient, quick to prepare, and adaptable to different tastes. However, conventional instant noodles are commonly associated with high levels of sodium and fat and relatively low amounts of dietary fiber, protein, and bioactive compounds. These nutritional limitations have increased interest in developing healthier alternatives without sacrificing convenience or consumer acceptability. This article reviews recent research on the development of nutritionally improved noodle products using alternative ingredients such as chickpea flour, lentil flour, sweet potato, modified cassava flour, rice by-products, soy-based ingredients, red palm olein, and seaweed. The reviewed studies demonstrate that replacing or supplementing refined wheat flour with nutrient-dense plant ingredients can improve protein, fiber, micronutrient, antioxidant, and functional properties. Chickpea-based instant noodles, for example, have demonstrated substantially lower calorie and sodium levels and higher dietary fiber than conventional products, while lentil incorporation has increased protein, fiber, minerals, and protein digestibility. Other studies demonstrate opportunities for utilizing agricultural by-products and locally available crops while improving sustainability. However, formulation remains challenging because nutritional improvements can influence texture, color, flavor, cooking quality, and consumer acceptance. Overall, healthier instant noodles should be developed through a balanced approach that integrates nutritional enhancement, appropriate processing, sensory optimization, affordability, and sustainability.

Keywords: Instant Noodles; Healthy Food; Product Development; Composite Flour; Chickpea; Lentil; Dietary Fiber; Functional Food; Nutritional Enhancement

Introduction

Instant noodles have become an important convenience food because they require minimal preparation time, have a relatively long shelf life, and are available at comparatively low cost. Their popularity has increased alongside urbanization, changing lifestyles, and irregular meal patterns. Recent research describes noodles as one of the most widely consumed staple and snack foods globally, with demand driven largely by convenience, affordability, and variety [1]. Despite

these advantages, conventional instant noodles present several nutritional concerns. Commercial products may contain considerable quantities of sodium and fat while providing limited dietary fiber and functional nutrients. The frequent consumption of highly processed foods with unfavorable nutritional profiles has been associated with dietary concerns including obesity and noncommunicable diseases [2]. Therefore, the development of healthier instant noodles represents an opportunity to combine the convenience consumers expect with improved nutritional quality.

A healthier noodle product does not necessarily require eliminating noodles from the diet. Instead, product development can focus on reformulating the basic ingredients, reducing unnecessary fat and sodium, incorporating protein- and fiber-rich ingredients, and improving the nutritional density of each serving. Recent studies have explored the use of legumes, root crops, alternative flours, agricultural by-products, natural binders, and functional oils for this purpose. This article therefore reviews recent research relevant to the development of a healthier alternative to conventional instant noodles, with particular attention to ingredient selection, nutritional improvement, processing methods, sensory quality, and sustainability.

Literature Review

Nutritional Limitations of Conventional Instant Noodles

The major challenge in reformulating instant noodles is that their convenience is often achieved through processing methods and formulations that can increase their energy density and sodium content. Costa da Silva et al. developed instant noodles using chickpea flour specifically in response to the nutritional limitations of conventional products [2]. Their comparison showed that the chickpea noodles contained no gluten or trans fat, less than half the calories, approximately 40% more dietary fiber, and substantially less sodium than conventional instant noodles [2]. This study is particularly relevant because it demonstrates that a healthier instant noodle can remain a practical food rather than simply becoming a conventional noodle with a small nutritional modification [2]. The authors also replaced deep-frying with oven drying, avoiding the addition of large quantities of fat during processing [2].

Legume-Based Flour as a Nutritional Strategy

Legumes provide an attractive alternative to highly refined cereal-based formulations because they can increase protein, fiber, minerals, and other functional components. Lentil flour has received particular attention because lentils contain protein, dietary fiber, minerals, and essential nutrients [1]. Investigated noodles containing 10%, 20%, 30%, and 40% lentil flour [1]. The 30% formulation produced the highest sensory acceptability and contained 15.84 g/100 g protein and 3.14 g/100 g fiber [1]. It also demonstrated a moderate predicted glycemic index of approximately 60.57 and an in-vitro protein digestibility of 72.59% [1]. The formulation showed increased iron, zinc, and manganese compared with control wheat noodles [1]. These findings suggest that a moderate level of legume incorporation may provide a useful compromise between nutritional improvement and sensory quality. Excessive substitution, however, may negatively influence the texture and flavor of noodles. Thus, formulation optimization is essential.

Root Crops and Alternative Cereal Ingredients

Sweet potato and modified cassava flour also offer opportunities for developing healthier noodle products while utilizing locally

available agricultural resources. [3]. investigated the incorporation of white sweet potato (*Ipomoea batatas*) into noodles [3]. Sweet potato was considered valuable because of its carbohydrate content and the presence of beta-carotene and antioxidant compounds [3]. The study evaluated sensory characteristics including aroma, color, firmness, taste, and texture and reported high acceptability among respondents [3]. Similarly, [4] investigated noodles prepared using modified cassava flour (mocaf), with a formulation containing 63% mocaf and 36% wheat flour [4]. The researchers compared different binders, including carboxymethyl cellulose, carrageenan, and *Caulerpa lentillifera* (latoh) [4]. The CMC formulation achieved the highest overall liking score of 7.30, while latoh showed functional potential but introduced a distinctive seaweed flavor that reduced some sensory scores [4]. The findings illustrate an important principle in healthier food development: an ingredient can provide nutritional or functional benefits while still requiring optimization to achieve consumer acceptance.

Agricultural By-Products and Sustainability

Healthier noodle development can also contribute to sustainability by incorporating underutilized agricultural materials. [5] explored noodles formulated from rice middlins, Irish potato, and soy cheese [5]. The optimized formulation contained 40.34% rice middlins, 28.89% Irish potato, and 30.77% soy cheese [5]. It provided 32.11% protein, 690.14 mg/100 g potassium, 4.85 mg/100 g niacin, and substantial antioxidant-related activity while maintaining favorable sensory acceptance [5]. The significance of this approach extends beyond nutrition. Rice middlins are generated during rice processing and may have relatively low economic value [5]. Converting such materials into a food product can reduce waste and create additional economic value while contributing to food security [5].

Functional Oils and Health-Oriented Formulations

Another approach is modification of the seasoning component rather than completely replacing the noodle flour. [6] developed an instant noodle formulation using red palm olein oil (RPOO) and konjac flour [6]. RPOO contains compounds including tocopherols, tocotrienols, and beta-carotene, while konjac can contribute to the development of low-calorie formulations [6]. The study reported that the RPOO-enhanced noodles had increased vitamin E and that a 75:25 RPOO-to-seasoning-oil ratio received the highest sensory acceptance for color, aroma, and taste [6]. Although functional oils can contribute desirable bioactive compounds, their inclusion should be carefully controlled because the overall nutritional profile of an instant noodle depends on the combined effects of the noodle base, seasoning, oil, and processing method.

Consumer Acceptance and Sustainable Product Concepts

Nutritional improvement alone does not guarantee successful product development. Consumers still expect instant noodles to possess familiar texture, appearance, taste, aroma, and preparation characteristics. [7] investigated the concept of a gluten-free instant

noodle prototype through a cross-national qualitative study involving Thai and Danish consumers [7]. Their work demonstrates that healthier and more sustainable noodle development also needs to consider consumer expectations and environmental aspects [7]. Consequently, successful product development should treat health, taste, convenience, price, and sustainability as interconnected rather than separate objectives.

Proposed Methodology for Product Development

Based on the reviewed literature, a healthier instant noodle can be developed through a systematic formulation and evaluation process.

Ingredient Selection and Formulation

The proposed product should use a composite flour rather than relying exclusively on refined wheat flour. Chickpea or lentil flour could be incorporated as the principal protein- and fiber-enhancing ingredient, while sweet potato or modified cassava flour could contribute desirable carbohydrate, functional, and textural properties. A small quantity of a suitable natural or conventional hydrocolloid may be incorporated to improve noodle structure. The formulation should be developed using several substitution levels, for example 10%, 20%, 30%, and 40%, allowing the nutritional and sensory effects of increasing substitution to be compared. This approach is consistent with the experimental design used in lentil noodle research, where different incorporation levels were evaluated before selecting the most acceptable formulation [1].

Processing

The selected flour ingredients should be cleaned, dried, milled, and sieved before blending. Dough can then be prepared by combining the composite flour with water, salt, and the selected binding ingredient. After mixing and resting, the dough can be sheeted and cut or extruded into noodle strands. An important modification would be to avoid deep-frying where possible. The chickpea noodle study demonstrated the potential of oven drying as an alternative to fat-intensive processing, producing a lower-fat product [2].

Nutritional and Physicochemical Evaluation

The developed product should be evaluated for moisture, protein, fat, ash, carbohydrate, dietary fiber, sodium, and selected minerals. Where laboratory facilities permit, antioxidant activity and predicted glycemic index may also be determined. Cooking quality should be assessed through cooking time, cooking loss, water absorption, and texture. These measurements are important because increasing nutritional ingredients can change starch behavior and noodle structure.

Sensory Evaluation

A nine-point hedonic scale can be used to assess appearance, aroma, taste, texture, mouthfeel, and overall acceptability. This approach

has been successfully applied in both lentil and mocaflour noodle studies [1,4]. The formulation with the strongest nutritional improvement should not automatically be selected as the final product. Instead, the optimal formulation should provide a balance between nutritional value and consumer acceptability.

Expected Product Characteristics

The proposed healthier instant noodle should have a higher protein and dietary fiber content than conventional wheat-based instant noodles while reducing unnecessary fat and sodium. A legume-based component can provide protein and minerals, while sweet potato or modified cassava flour can contribute functional properties and local agricultural value. The product should also be designed to maintain acceptable texture and taste. Evidence from lentil noodles suggests that approximately 30% lentil incorporation can achieve a favorable balance between nutrition and sensory quality [1]. Meanwhile, chickpea-based instant noodles demonstrate that changing both formulation and processing can substantially improve the nutritional profile of an instant product [2].

Discussion

The reviewed studies demonstrate that healthier instant noodle development is feasible through multiple complementary strategies. The most promising approach is not simply replacing wheat flour with a single alternative ingredient. Instead, product developers can combine complementary ingredients to address different nutritional and technological requirements. Legumes such as chickpeas and lentils primarily improve protein and fiber content [1,2], whereas root crops such as sweet potato and cassava can provide alternative carbohydrate sources and functional properties [4,3]. Rice-processing by-products can increase resource efficiency [5], while ingredients such as red palm olein can introduce bioactive compounds [6]. Natural materials such as lathyrus may additionally provide functional binding properties [4]. However, each nutritional improvement creates technological challenges. Higher levels of alternative flours may alter dough formation, elasticity, firmness, color, taste, or cooking behavior. The sensory findings of Azkia, Wahjuningsih [4] illustrate this clearly: lathyrus provided functional potential but its characteristic flavor affected consumer preference [4].

Therefore, the ideal healthier instant noodle should be considered a multi-objective product-development problem. Nutritional value, sensory quality, processing efficiency, cost, consumer expectations, and environmental sustainability must all be considered simultaneously.

Conclusion

The development of healthier alternatives to conventional instant noodles is both nutritionally and technologically promising. Recent research demonstrates that replacing or supplementing convention-

al formulations with chickpea, lentil, sweet potato, modified cassava flour, rice-processing by-products, soy-based ingredients, and functional oils can improve nutritional density while maintaining acceptable sensory characteristics. Among the reviewed approaches, legume incorporation appears particularly promising because it can increase protein and dietary fiber while supporting improved glycemic characteristics [1]. Alternative drying methods can further reduce the fat content associated with conventional instant noodle processing [2]. At the same time, the utilization of agricultural by-products can contribute to waste reduction and sustainability [5]. Nevertheless, nutritional enhancement must not occur at the expense of consumer acceptance. Future product development should therefore focus on optimizing ingredient ratios, processing conditions, texture, flavor, sodium reduction, shelf stability, and affordability. A successful healthier instant noodle should ultimately provide convenience comparable to conventional products while offering a substantially improved nutritional profile and a more sustainable ingredient system.

References

1. Anushree RK, Kushwaha A, Panwar RK, Lohani UC, Devi, OR, et al. (2025) Effect of lentil flour incorporation on the sensory, nutritional, and functional properties of noodles. *Discover Food* 5(390).
2. Costa da Silva SR, dos Santos Tanno FS, Teixeira MV, dos Santos CA, Aruga FH, et al. (2025) Development of healthy and gluten-free instant chickpea noodles and nutritional comparison with conventional versions found in markets. *DEMETRA: Food, Nutrition & Health* 20: e81689.
3. Pado HP, Caluza GL, Palasigue JA, Macadaag OU (2025) Utilization of sweet potato (*Ipomoea batatas* L.) into noodles: Its sensory evaluation and acceptability. *International Journal of Applied Research* 11(10): 442-444.
4. Azkia MN, Wahjuningsih SB (2025) Sensory characteristics of mocaf-substituted noodles enriched with lathyrus (*Caulerpa lentillifera*). *Journal of Agri-Food Science and Technology* 6(3): 141-151.
5. Uchegbu NN, Giovanni CC, Adepeju AB, Fasuan TO (2026) Exploring the quality characteristics of noodles from rice-middlins and Irish potato composite enriched with soy-cheese. *Nutrition & Food Science* 56(1): 212-234.
6. Budiyo B, Silsia D, Anis U, Fatharani A, Azima F, et al. (2026) Red palm olein oil-enhanced instant noodle: A functional food innovation for diabetes-friendly formulation. *Indonesian Food Science and Technology Journal* 9(2).
7. Sae Eaw A, Wongsachia S, Giacalone D, Naruetharadhol P, Ketkaew C (2022) Conceptualizing a gluten-free instant noodle prototype using environmental sustainability aspects: A cross-national qualitative study on Thai and Danish consumers. *Foods* 11(16): 2437.

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