



The Impact of Iron, Magnesium, And Potassium Deficiencies on the Nutritional Status of Individuals Who Consume Instant Noodles

Zainab Sadeq Yousif

Ministry of Education, Directorate of Education Thi-Qar, 64001, Iraq.

ARTICLE INFO	ABSTRACT
Published Online: 07 October 2025	Instant noodles are widely consumed by Iraqi children. However, few studies have investigated the relationship between instant noodles and nutritional status, including iron, magnesium, and potassium, in Iraq. This study aimed to examine the association between instant noodle consumption and food and nutrient intake in Iraqi children. The study analyzed the levels of Iron, Magnesium, and Potassium in 30 individuals taken from different schools' students, categorized into two groups: Group A: Students who consume instant noodles (20 students). Group B: Students who do not consume instant noodles (10 students). The participants' ages ranged from 8 to 12 years, with both male and female students included in the analysis. The findings indicate that iron, potassium, and magnesium levels were notably lower in individuals who frequently consumed instant noodles. This study provides clear evidence that frequent consumption of instant noodles is associated with a decline in essential mineral levels. The data shows that individuals who rarely consume instant noodles maintain normal levels of iron, magnesium, and potassium, while frequent consumers exhibit deficiencies.
Corresponding Author: Zainab Sadeq Yousif	
KEYWORDS: Noodles, Iron, Magnesium, Potassium, Nutritional Deficiencies.	

I. INTRODUCTION

Noodles are a type of food with useful elements. It does not contain enough protein, does not contain the fibers that the digestive system needs, and does not provide vitamins and essential minerals for the growth of the body and the health of its organs. Therefore, eating it regularly as a main or alternative meal for balanced food may lead to malnutrition, especially in children and adolescents, which may affect physical and mental development, and weaken their immune system. Also, due to their high content of simple carbohydrates, noodles raise blood sugar quickly after eating, which may be a risk to people with diabetes, and it may raise the risk of infection over time in people who eat them excessively without proper food regulation (Kiani et al., 2022).

Instant noodles frequently lack critical components such as vitamins and minerals, as opposed to natural or prepared dishes that provide complete nourishment. Preservatives and colorings: Some types include artificial colorings and preservatives, which, if consumed in large quantities, might be harmful to one's health. Impact on blood sugar: The rapid absorption of carbohydrates in instant noodles causes blood sugar levels to fluctuate, which is especially harmful for diabetics. To avoid these side effects, instant noodles should be used in moderation as part of a well-balanced diet. Instant

noodles can affect the body's potassium levels in a variety of ways, depending on their components and influence on nutritional balance (Adejuwon et al., 2020).

Phosphate, a popular addition used to improve flavor or preserve food, is often found in high concentrations in noodles. Excess phosphate can throw off the body's mineral equilibrium and might make it harder for the intestines to absorb magnesium. Noodles' high salt content also causes an increase in the excretion of magnesium in the urine (Saito et al., 2021). This occurs because the body's attempt to clear excess sodium leads it to lose other essential minerals like magnesium. As a result, the chances of developing a persistent deficiency increase significantly. Furthermore, because noodles contain industrial chemicals and hydrogenated fats, regular consumption may result in low-grade inflammation in the body. The absorption of magnesium and other nutrients is hampered by this inflammation. Chronic inflammation impairs the body's capacity to absorb and utilize nutrients, affecting magnesium-dependent activities such as mood modulation, heart rhythm regulation, and muscle relaxation (Maruyama et al., 2024).

Dietary disorders may not manifest immediately, but they can accumulate over time and create symptoms such as muscular cramps, difficulty focusing, worry, melancholy, sleeplessness, and, on rare occasions, cardiac problems. If a

person continues to eat foods like noodles without modifying their diet, these symptoms may worsen and reduce their overall quality of life (Kris-Etherton et al., 2021).

Iron is an essential element in the body, responsible for producing hemoglobin, which transports oxygen to cells and tissues. Its deficiency leads to serious health problems such as anemia, fatigue, poor concentration, and dizziness. Noodles, by nature, do not contain a significant amount of iron. They are not made from whole grains, but rather from refined flour with low nutritional value. This means that when a person eats this meal, they are not getting any significant support for their daily iron needs. With the frequent consumption of noodles as a main meal or as a substitute for iron-rich meals, the body gradually begins to lose its nutritional balance and suffer from a deficiency of this vital element (Kumar et al., 2022).

Additionally, noodles often contain ingredients that can hinder iron absorption in the body, such as phosphates, preservatives, and artificial colors, which are added to extend their shelf life and improve their taste and appearance. These substances can affect the lining of the digestive tract and impair its ability to absorb nutrients, including iron. The high levels of sodium found in noodles can also cause mineral imbalances in the body, prompting the kidneys to excrete some of these minerals in the urine, indirectly increasing iron loss (Lanser et al., 2021).

It's worth noting that iron deficiency resulting from malnutrition isn't immediately apparent. Rather, it accumulates slowly, beginning to manifest through symptoms such as chronic fatigue, cold extremities, hair loss, weakened immunity, and even impaired mental and physical development in children. All these outcomes can be directly or indirectly linked to a diet that relies on instant foods like noodles, which lack the essential micronutrients necessary for maintaining health (Świątczak et al., 2022).

Noodles, especially instant or processed ones, contain high amounts of sodium (salt) and low amounts of other nutrients such as potassium. When people consume noodles in excess, the excess sodium in the body can lead to an imbalance of electrolytes, including potassium. The body maintains a delicate balance between sodium and potassium, two elements that work together to regulate cellular function, especially in muscles and nerves. High sodium causes fluid retention and increased blood pressure, which forces the kidneys to work harder to excrete excess sodium. During this process, potassium loss through urine can increase (Widjaya, 2024).

A potassium deficiency can lead to symptoms such as muscle weakness, cramps, irregular heartbeat, and fatigue. If noodles are a regular part of the diet without being replaced with potassium-rich foods such as bananas, potatoes, spinach, or legumes, the deficiency can develop gradually. Additionally, certain sauces that are provided with noodles have ingredients that hinder the absorption of minerals or further disrupt electrolyte balance, which can ultimately make the issue worse (Ramos et al., 2021).

These consequences consist of Elevated sodium and its impact on potassium. Because instant noodles include a lot of salt, the kidneys may have to excrete more potassium from the body (Rebellato et al., 2021). Those who consume them in high numbers may develop a potassium deficit as a result. Low potassium content: Most instant noodles don't contain potassium-rich foods like fruits, vegetables, or nuts, so they can't help you keep your potassium levels in check. Impact on renal function: Because instant noodles are heavy in salt and preservatives, consuming too many of them might strain the kidneys and impair their capacity to control the body's potassium levels. When consuming instant noodles, keep your potassium levels stable: Include potassium-rich veggies like sweet potatoes, spinach, and tomatoes (McLean et al., 2021).

Limit your intake of quick noodles and swap them out for well-balanced meals. To lessen the impact of salt on the body's mineral balance, drink enough water. Because of its nutritional value and composition, instant noodles can have a variety of effects on the body's magnesium levels. Included Insufficient amounts of magnesium. Magnesium, which is necessary for healthy bones, muscles, and nerves, is not present in sufficient amounts in instant noodles (Strizhevskaya et al., 2020).

Magnesium deficiency may eventually develop from a sustained reliance on these foods at the cost of other magnesium-rich diets. Elevated magnesium excretion with high sodium: The high sodium content of instant noodles may cause a larger loss of magnesium through urine, reducing magnesium levels in the body. A person who consumes a lot of salty foods may be more prone to magnesium insufficiency. Preservatives and bad fats have the following effects: The inclusion of preservatives and saturated and hydrogenated fats in instant noodles may promote chronic inflammation, impairing the body's capacity to absorb nutrients such as magnesium (Kumagai et al., 2021).

When discussing how noodles impact magnesium, it is crucial to understand the relationship between their components and the body's absorption or consumption of this vital component. Magnesium is a vital mineral that is involved in hundreds of physiologic functions, including neuron and muscle function, blood sugar regulation, and protein and bone production. Noodles and other nutrient-poor meals can have a negative influence on magnesium levels in the body when a diet is out of balance (Fiorentini et al., 2021).

Many countries, particularly those where noodles are often consumed, have performed studies on their impact on the human body. For example, several studies in South Korea have looked into the link between eating noodles straight away and an increased risk of obesity and heart disease. Seoul National University conducted one such study, which discovered that eating noodles on a regular basis may raise the risk of metabolic syndrome, a collection of health disorders characterized by high blood pressure and abnormal blood sugar levels. The impact of instant noodles' high salt content, as well as its link to high blood pressure and other health

hazards, was the focus of a study in China, one of the world's largest consumers of noodles. Some research discovered that excessive intake of these noodles might induce fluid imbalance in the body and boost the risk of renal disease (Park et al., 2023).

Japan has conducted research on the impact of industrial chemicals such as monosodium glutamate (MSG) in instant noodles. Some studies discovered that the substance may damage the neurological system and create headaches in certain sensitive persons, while others found that eating a lot of noodles may degrade the quality of the diet since they lack fiber and key minerals (Beštak, 2022). In the United States, research has been conducted at universities such as Harvard University and Baylor University on the impact of noodles on public health, as some studies have shown that women who eat immediate noodles are more likely to have metabolic problems compared to others, even if they are exercising. In Indonesia, which is one of the largest consumers of noodles in the world, studies have been conducted on the effect of noodles on nutrition and public health, especially among the low -income groups that depend on noodles as a main source of food, as some research indicated that excess consumption may lead to a decrease in some basic nutrients such as proteins and vitamins, which affects growth and general health (Knežević, 2024).

This study aimed to examine the association between instant noodle consumption and food and nutrient intake in Iraqi children.

II. MATERIALS AND METHODS

A. Study design and patients

A case-control study, where the study analyzed the levels of Iron, Magnesium, and Potassium in 30 individuals taken from different schools’ students, categorized into two groups:

- Group A: Students who consume instant noodles (20 students).
- Group B: Students who do not consume instant noodles (10 students).

The participants' ages ranged from 8 to 12 years, with both male and female students included in the analysis. Basic information about the participants was collected through a questionnaire that included dietary habits and frequency of instant noodle consumption. The experiments were conducted in the Department of Medical Lab Technology.

B. Samples collection and preparations

About Five milliliters of venous blood was collected from these participants and placed into tube contains clotting activators (gel tube) and then centrifuged at 3000 rpm for 10 minutes to separate serum. Then, the serum was transferred into labeled Eppendorf tubes, and stored at 2-8°C until biochemical analysis.

C. Determination of biochemical parameters

The levels of magnesium (Mg), Potassium (K), and iron in all serum specimens were measured using the Mindray BS-240 Fully Automatic Biochemistry Analyzer (China).

D. Statistical analysis

Data were expressed as Mean ± SD. Consumes Noodles and Does Not Consume noodles of the different analytes were compared for the groups of male and female subjects using unpaired t-tests. All statistical analyses were generated by using SPSS (version 7.0) and Microsoft excel. A confidence level of $p < 0.05$ was considered statistically significant for all analyses.

E. Ethical Consideration

- The study was conducted in accordance with ethical guidelines, and informed consent was obtained from all participants before sample collection.
- Samples were collected exclusively for research purposes and handled with strict confidentiality.

III. RESULTS

A. The comparative of Iron levels

Regarding the results that clarify in table 1 that showed presents the distribution of iron levels among participants in both groups: those who consume instant noodles (Group A) and those who do not (Group B). The data shows that individuals in Group A have a higher percentage of iron deficiency (35%) compared to Group B (20%). Additionally, none of the participants in either group exhibited high iron levels. The mean iron level in Group A was 13.21 ± 6.47 $\mu\text{mol/L}$, while in Group B it was higher at 15.85 ± 7.58 $\mu\text{mol/L}$.

Table 1: Iron Levels in Group A and Group.

Groups	Deficiency (%)	Normal (%)	High (%)	Mean± SD (μmol/L)	p-value
A (Consumes Noodles)	35 %	65 %	0 %	13.21±6.47	0.326
B (Does not Consume Noodles)	20 %	80 %	0 %	15.85±7.5	

Note. Data were expressed as Mean ± SD, frequency and percentage; Statistical analyses were performed by Chi-square followed by a t test (paired test) for multiple comparisons; ‡ t test significance (2-tailed).

B. The comparative of Iron levels

In this study, we investigated whether serum magnesium levels differed group of study. Table 2 illustrates the serum magnesium levels among the same groups. Group A (instant noodle consumers) showed a magnesium deficiency rate of 25%, whereas Group B recorded no deficiencies at all. The mean magnesium level in Group A

was 1.82 ± 0.20 mg/dL, compared to 2.04 ± 0.09 mg/dL in Group B.

Table 2: Magnesium Levels in Group A and Group B

Groups	Deficiency (%)	Normal (%)	High (%)	Mean± SD (μmol/L)	p-value
A (Consumes Noodles)	25 %	75 %	0 %	1.82 ± 0.20	0.0027
B (Does not Consume Noodles)	0 %	100 %	0 %	2.04 ± 0.09	

Data were expressed as Mean ± SD; Statistical analyses were performed by t test (paired test) for multiple comparisons; ‡ t test significance (2-tailed); p-value less than 5% is significant difference.

C. The comparative of potassium levels

Regarding to table 3 that shows the potassium levels among participants. Group A exhibited a 20% deficiency rate, while Group B showed no deficiency. The mean potassium level in Group A was 3.87 ± 0.45 mg/dL, lower than the 4.28 ± 0.37 mg/dL recorded in Group B..

Table 3: potassium Levels in Group A and Group B.

Groups	Deficiency (%)	Normal (%)	High (%)	Mean± SD (μmol/L)	p-value
A (Consumes Noodles)	20 %	80 %	0 %	3.87 ± 0.45	0.0192
B (Does not Consume Noodles)	0 %	100 %	0 %	4.28 ± 0.37	

Data were expressed as Mean ± SD; Statistical analyses were performed by t test (paired test) for multiple comparisons; ‡ t test significance (2-tailed); p-value less than 5% is significant difference.

Figure 1 offers a visual comparison of the mean nutrient levels (iron, magnesium, and potassium) between consumers and non-consumers of instant noodles. The chart clearly indicates that nutrient levels are consistently lower in the group that consumes instant noodles. The disparity is most evident in iron levels, followed by magnesium and potassium. This pattern aligns with the tabulated results and reinforces the argument that frequent consumption of instant noodles correlates with reduced levels of key nutrients. The lack of essential nutrients and the presence of additives in instant noodles may play a role in decreasing the body’s ability to absorb or retain these minerals effectively.

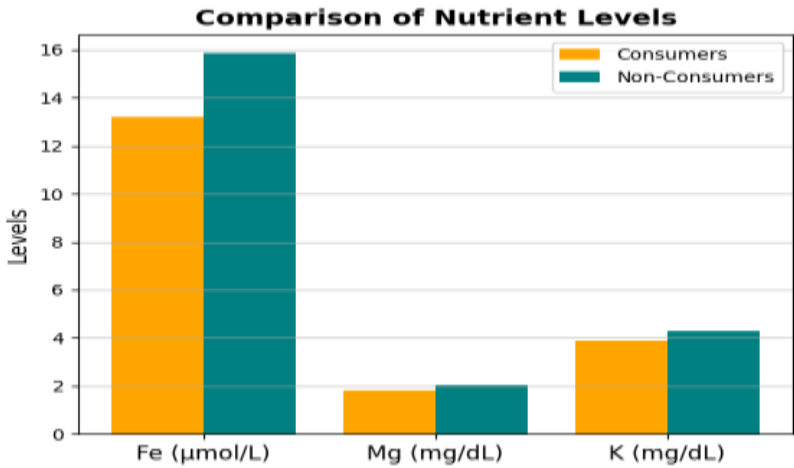


Figure (1): Nutrient Level Comparison between Consumers and Non-Consumers

Figure 2 displays the distribution of iron, magnesium, and potassium levels across different age groups (8, 10, and 11 years old). The data reveal a noticeable increase in iron levels with age, suggesting improved iron intake or absorption mechanisms as children grow. The fact that magnesium levels are largely constant with just slight variations suggests that dietary intake or control is constant throughout age groups. As people age, their potassium levels

also exhibit a slight rising trend, which may be the result of improved retention or higher ingestion of foods high in potassium. Overall, the graph shows that nutrient levels clearly alter with age, especially for iron, which rises when dietary habits and metabolic demands change.

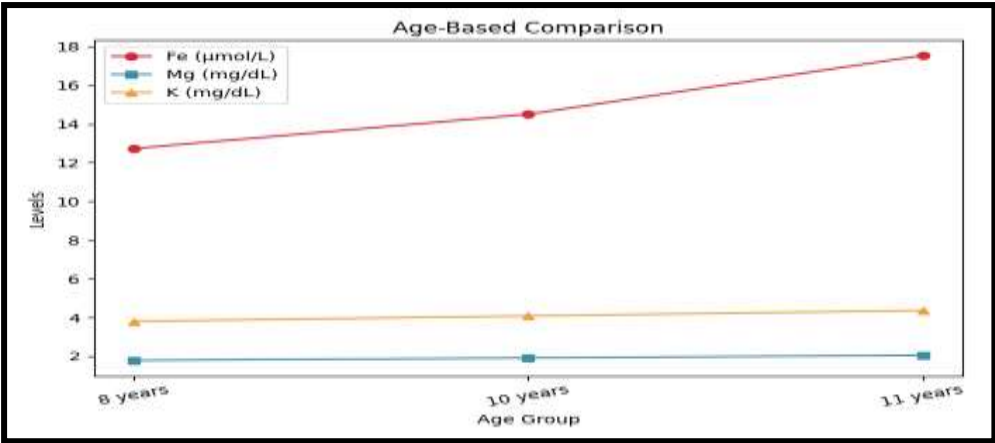


Figure 2: Distribution of Iron, Magnesium, and Potassium levels across age groups.

Nutrient levels are compared by gender in Figure 3. According to the findings, men typically have somewhat greater iron levels than women. This discrepancy might be explained by physiological variables like hormone balance or men's higher dietary iron consumption. Females, on the other hand, showed greater amounts of potassium and magnesium,

which may be because of variations in hormone levels, dietary practices, or absorption efficiency. Given that nutrient requirements and absorption might differ greatly between males and females, our findings highlight the need to take gender variations into account when doing nutritional evaluations and recommending diets.

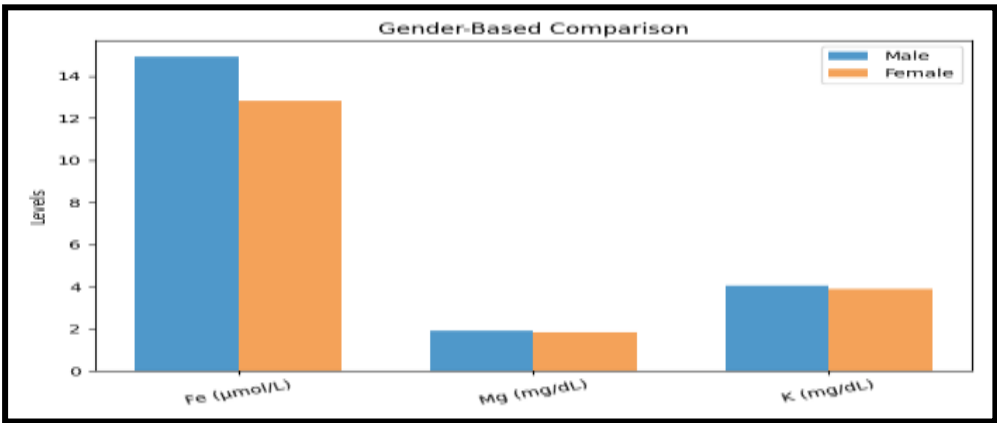


Figure 3: Mean Levels of Iron, Magnesium, and Potassium in Males and Females.

The possible relationship between iron, magnesium, and potassium is depicted in Figure 4. The graph indicates a positive trend, with greater potassium and magnesium levels being linked to increasing iron levels. This association points to a potential dietary or physiological connection between these vital elements. Understanding how deficits or

imbalances in one nutrient might affect others requires the ability to recognize such relationships. Additionally, it highlights that rather than concentrating on certain minerals alone, complete dietary regimens that meet numerous nutrient demands are necessary.

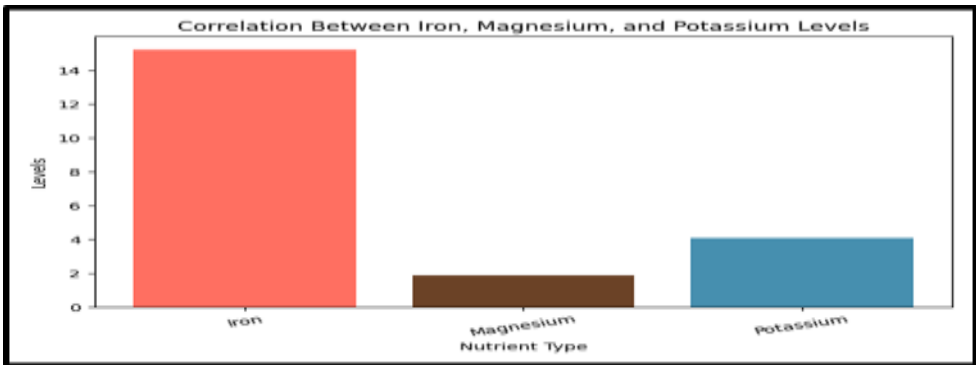


Figure 4: Relationship between Iron, Magnesium, and Potassium Levels

IV. DISCUSSION

The results of this study show that people who regularly eat quick noodles have significantly lower iron levels. The absence of iron-rich substances or the presence of preservatives that hinder iron absorption might be the cause of this. The findings highlight the possible nutritional hazards associated with regular use of instant noodles and point to a significant correlation between dietary practices and iron status. Energy metabolism and oxygen transport depend on iron. Iron absorption may be impeded by the high salt concentration in instant noodles, which have a low iron content. Reduced iron levels have been linked to diets heavy in processed foods, according to studies. Anemia, exhaustion, lightheadedness, and cognitive impairment can all be caused by low iron levels. A study by (Semagn et al., 2023) found that processed food consumers had 25% lower iron levels than those with balanced diets. The findings in this study suggest that frequent consumption of instant noodles may contribute to a decrease in iron levels among young adults. As shown in table (1) and figure (1).

These findings suggest that regular instant noodle eating is linked to decreased magnesium levels. Since magnesium is essential for the function of muscles and nerves, a lack may have negative health effects. People who eat quick noodles may have lower levels because they don't eat foods high in magnesium, such as leafy greens, nuts, and seeds. According to the findings, eating a balanced diet is crucial to ensuring that you get enough magnesium and avoid any deficits. Bone health, blood sugar regulation, and neuron and muscle function all depend on magnesium. One possible cause of low magnesium levels is the lack of items high in magnesium in an instant noodle diet. Symptoms, including headaches, exhaustion, and cramping in the muscles, are associated with magnesium insufficiency. Preservatives in instant noodles, such as TBHQ, may interfere with magnesium absorption. According (Pickering et al., 2020), a diet lacking fresh vegetables and whole grains leads to a 30% decrease in serum magnesium levels. As shown in table (2) and figure (1). This difference reinforces the concern that high sodium content in processed foods like instant noodles may increase potassium excretion, thereby reducing its serum concentration. Since potassium is essential for proper heart and muscle function, its deficiency may have serious implications. The findings support existing literature suggesting that excessive sodium intake, common in instant noodles, disrupts electrolyte balance and can lead to a reduction in potassium levels. Potassium plays a crucial role in maintaining heart function, muscle contractions, and nerve signaling. The high sodium content in instant noodles promotes potassium excretion, leading to deficiencies. Potassium deficiency can cause irregular heartbeats, muscle weakness, and increased blood pressure. A study by (Yolanda et al., 2022) reported a correlation between high sodium

intake and decreased potassium retention in young adults. As shown in table (3) and figure (1).

V. CONCLUSION

This study provides clear evidence that frequent consumption of instant noodles is associated with a decline in essential mineral levels. The data shows that individuals who rarely consume instant noodles maintain normal levels of iron, magnesium, and potassium, while frequent consumers exhibit deficiencies.

The possible explanations included the effect of Instant Noodles on Nutrient Absorption by contain preservatives and artificial additives that may interfere with nutrient absorption. Also, the lack of fiber and essential vitamins in processed foods reduces the body's ability to absorb minerals. In addition ,The participants consuming instant noodles regularly may also have poor dietary habits..

REFERENCES

1. Adejuwon, O. H., Jideani, A. I., & Falade, K. O. (2020). Quality and public health concerns of instant noodles as influenced by raw materials and processing technology. *Food Reviews International*, 36(3), 276-317.
2. Beštak, G. (2022). *Financijska analiza poslovanja poduzeća X*. The University of Applied Sciences Baltazar Zaprešić. Chair of Finance and Fiorentini, D., Cappadone, C., Farruggia, G., & Prata, C. (2021). Magnesium: biochemistry, nutrition, detection, and social impact of diseases linked to its deficiency. *Nutrients*, 13(4), 1136.
3. Kiani, A. K., Dhuli, K., Donato, K., Aquilanti, B., Velluti, V., Matera, G., . . . Bertelli, M. (2022). Main nutritional deficiencies. *J Prev Med Hyg*, 63(2 Suppl 3), E93-e101. doi:10.15167/2421-4248/jpmh2022.63.2S3.2752
4. Knežević, M. (2024). *IZRADA BUDŽETIRANOG RAČUNA DOBITI I GUBITKA ZA PODRAVKA DD*. University of Split. University Department of Professional Studies
5. Kris-Etherton, P. M., Petersen, K. S., Hibbeln, J. R., Hurley, D., Kolick, V., Peoples, S., . . . Woodward-Lopez, G. (2021). Nutrition and behavioral health disorders: depression and anxiety. *Nutrition reviews*, 79(3), 247-260.
6. Kumagai, A., Takeda, S., Sohara, E., Uchida, S., Iijima, H., Itakura, A., . . . Kanasaki, K. (2021). Dietary magnesium insufficiency induces salt-sensitive hypertension in mice associated with reduced kidney catechol-o-methyl transferase activity. *Hypertension*, 78(1), 138-150.
7. Kumar, A., Sharma, E., Marley, A., Samaan, M. A., & Brookes, M. J. (2022). Iron deficiency anaemia:

- pathophysiology, assessment, practical management. *BMJ open gastroenterology*, 9(1).
8. Lanser, L., Fuchs, D., Kurz, K., & Weiss, G. (2021). Physiology and inflammation driven pathophysiology of iron homeostasis—mechanistic insights into anemia of inflammation and its treatment. *Nutrients*, 13(11), 3732.
 9. Maruyama, C., Uchiyama, M., Umezawa, A., Tokunaga, A., Yasuda, A., Chibai, K., . . . Shinohara, M. (2024). A cross-sectional pilot study on association of ready-to-eat and processed food intakes with metabolic factors, serum trans fat and phospholipid fatty acid compositions in healthy Japanese adults. *Nutrients*, 16(7), 1032.
 10. McLean, R. M., & Wang, N. X. (2021). Potassium *Advances in food and nutrition research* (Vol. 96, pp. 89-121): Elsevier.
 11. Park, S., & Liu, M. (2023). A positive causal relationship between noodle intake and metabolic syndrome: a two-sample mendelian randomization study. *Nutrients*, 15(9), 2091.
 12. Pickering, G., Mazur, A., Trousselard, M., Bienkowski, P., Yaltsewa, N., Amessou, M., . . . Pouteau, E. (2020). Magnesium status and stress: the vicious circle concept revisited. *Nutrients*, 12(12), 3672.
 13. Ramos, C. I., González-Ortiz, A., Espinosa-Cuevas, A., Avesani, C. M., Carrero, J. J., & Cuppari, L. (2021). Does dietary potassium intake associate with hyperkalemia in patients with chronic kidney disease? *Nephrology Dialysis Transplantation*, 36(11), 2049-2057.
 14. Rebellato, A. P., Tavares, P. F., Trindade, G. N., Pallone, J. A. L., Campelo, P. H., & Clerici, M. T. P. S. (2021). Alkaline instant noodles: use of alkaline salts to reduce sodium and assessment of calcium bioaccessibility. *Research, Society and Development*, 10(2), e51210212778-e51210212778.
 15. Saito, Y., Sakuma, M., Narishima, Y., Yoshida, T., Kumagai, H., & Arai, H. (2021). Greater consumption of noodle is associated with higher serum phosphorus levels: a cross-sectional study on healthy participants. *Journal of Clinical Biochemistry and Nutrition*, 68(1), 78-85.
 16. Semagn, B. E., Gebreegziabher, Z. A., & Abebaw, W. A. (2023). Iron-rich food consumption and associated factors among children aged 6–23 months in Sierra Leone: multi-level logistic regression analysis. *BMC Public Health*, 23(1), 1793.
 17. Strizhevskaya, V., Simakova, I., Perkel, R., & Phedonnikov, A. (2020). *Technological and medical aspects of instant noodle safety*. Paper presented at the E3S Web of Conferences.
 18. Świątczak, M., Młodziński, K., Sikorska, K., Raczak, A., Lipiński, P., & Daniłowicz-Szymanowicz, L. (2022). Chronic fatigue syndrome in patients with deteriorated iron metabolism. *Diagnostics*, 12(9), 2057.
 19. Widjaya, C. (2024). *The impact of ingredient formulation and processing parameters on colour and texture of instant noodles*. RMIT University.
 20. Yolanda, A., Diana, F. M., & Arza, P. A. (2022). The risk factors of sodium, potassium intake, and physical activity on hypertension in the elderly. *Department of Nutrition, Faculty of Public Health, Universitas Andalas, Padang, West Sumatra, Indonesia*.