

## Child Malnutrition and Its Associated Health Consequences in Al-Jufra, Libya (2016-2017)

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سوء التغذية لدى الأطفال وعواقبه الصحية المرتبطة به في الجفرة، ليبيا (2016-2017)

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### المخلص:

يكتب هنا لا يزال سوء التغذية يمثل تحدياً رئيسياً للصحة العامة، ويتأثر الأطفال، وخاصة في المناطق النامية، بشكل غير متناسب. تبحث هذه الدراسة في انتشار سوء التغذية وأسبابه وعواقبه الصحية بين الأطفال في منطقة الجفرة في ليبيا خلال عامي 2016 و2017. استخدم البحث تصميمًا مقطعيًا، وجمع البيانات الديموغرافية والسريية والتغذية من الأطفال الذين تتراوح أعمارهم بين يوم واحد و14 عامًا. كشفت النتائج أن 43٪ من الأطفال الذين خضعوا للدراسة يعانون من شكل من أشكال سوء التغذية، مع حدوث 30٪ من الحالات لدى الذكور و13٪ لدى الإناث. كان فقر الدم هو الاضطراب الأكثر شيوعًا المرتبط بالتغذية، يليه سوء التغذية بالبروتين والطاقة (الكواشيوركور والماراسموس)، في حين لوحظت السمنة أيضًا كعبء غذائي ناشئ. وشملت العوامل المساهمة الممارسات الغذائية السيئة وانعدام الأمن الغذائي وانخفاض وعي الوالدين ومحدودية الوصول إلى الرعاية الصحية. تتوافق هذه النتائج مع الأنماط العالمية، لا سيما في المناطق التي تمر بمرحلة تحول غذائي حيث يتعايش نقص التغذية وفرط التغذية، مما يسبب عبئًا مزدوجًا من الأمراض. تُبرز الدراسة الحاجة الملحة لتدخلات مُستهدفة، تشمل التثقيف الغذائي، وبرامج توعية الأمهات، والمكملات الغذائية، والمبادرات الصحية المجتمعية. علاوة على ذلك، تُشدد الدراسة على دور الاستراتيجيات القائمة على السياسات في تحسين الإنتاجية الزراعية وإمكانية الحصول على الغذاء في المناطق الريفية الليبية. من خلال مقارنة البيانات المحلية بالتقارير العالمية، تُقدم هذه الورقة نظرة ثاقبة على الآثار الأوسع لسوء التغذية، وتُقدم توصيات قائمة على الأدلة للحد من معدلات الإصابة بالأمراض والوفيات بين الأطفال. في نهاية المطاف، يتطلب معالجة سوء التغذية نهجًا متعدد التخصصات يجمع بين الرعاية الصحية والتعليم والدعم الاجتماعي ومبادرات التنمية المُستدامة.

**الكلمات الدالة:** الأطفال، سوء التغذية، الصحة العامة ، فقر الدم، كواشيوركور.

### Abstract

Malnutrition remains a major public health challenge, and children, especially in developing regions, are disproportionately affected. This study investigates the prevalence, causes, and health consequences of malnutrition among children in the Al-Jufra region of Libya during 2016-2017. The research employed a cross-sectional design, collecting demographic, clinical, and nutritional data from children aged 1 day to 14 years. Results revealed that 43% of the studied children suffered from some

form of malnutrition, with 30% of cases occurring in males and 13% in females. Anemia was the most common nutrition-related disorder, followed by protein-energy malnutrition (Kwashiorkor and Marasmus), while obesity was also noted as an emerging nutritional burden. Contributing factors included poor dietary practices, food insecurity, low parental awareness, and limited access to healthcare. These findings align with global patterns, particularly in regions undergoing nutritional transition where undernutrition and overnutrition coexist, creating a double burden of disease. The study highlights the urgent need for targeted interventions, including nutritional education, maternal awareness programs, food supplementation, and community-based health initiatives. Furthermore, it emphasizes the role of policy-driven strategies to improve agricultural productivity and food accessibility in rural Libya. By comparing local data with global reports, this paper provides insight into the broader implications of malnutrition and offers evidence-based recommendations for reducing child morbidity and mortality. Ultimately, tackling malnutrition requires a multidisciplinary approach that combines healthcare, education, social support, and sustainable development initiatives.

**Keywords:** Children, malnutrition, public health, anemia, kwashiorkor.

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## **introduction**

Child malnutrition continues to represent one of the most pressing global health concerns, particularly in low- and middle-income countries where poverty, food insecurity, and limited healthcare access converge to exacerbate nutritional challenges. Malnutrition is a multidimensional problem encompassing both undernutrition—such as stunting, wasting, and micronutrient deficiencies—and overnutrition, including overweight and obesity. Globally, the World Health Organization [1, 2] estimates that more than 45 million children under five years of age suffer from wasting. While about 149 million and about 39 million children suffer from stunting and overweight, respectively. This double burden of malnutrition reflects the ongoing nutritional transition observed in many developing nations, where traditional dietary patterns are increasingly replaced by calorie-dense but nutrient-poor foods [3, 4, and 5].

In the Middle East and North Africa (MENA) region, socioeconomic instability and conflict have further aggravated food insecurity, leading to higher rates of childhood malnutrition. Libya, despite its relatively high per capita income compared to neighboring countries, has faced political unrest and economic disruption since 2011, which has significantly weakened its healthcare infrastructure and food systems [6, 7]. Consequently, malnutrition among Libyan children has become an urgent public health issue, with both acute and long-term consequences, including impaired cognitive development, increased susceptibility to infections, and elevated risks of chronic diseases in adulthood. The Al-Jufra region, located in central Libya, is particularly vulnerable due to its geographical isolation and limited access to healthcare facilities.

Previous reports indicate that children in rural Libyan communities face higher risks of anemia and protein-energy malnutrition, largely driven by poor dietary diversity and low parental awareness of nutritional needs [8, 9]. Against this backdrop, the present study aims to investigate the prevalence, determinants, and health implications of child malnutrition in Al-Jufra during 2016–2017. By situating the findings within global and regional contexts, this research provides essential evidence for policymakers, healthcare providers, and community stakeholders to design targeted, sustainable interventions that address both immediate nutritional deficits and long-term health outcomes.

## **Literature Review**

The literature on child malnutrition highlights a persistent global challenge. Studies emphasize that malnutrition contributes to nearly half of all deaths in children fewer than five years of age, primarily in low- and middle-income countries [10]. Nutritional deficiencies, especially iron-deficiency anemia, protein-energy malnutrition, and micronutrient deficiencies such as vitamin A and zinc, remain prevalent across Africa and the Middle East. Recent research shows that the Middle East and North Africa (MENA) region faces a “nutritional transition” characterized by the coexistence of undernutrition and rising obesity levels [11].

**Expanded Literature Review** Recent studies emphasize that child malnutrition is shaped by a complex interplay of biological, environmental, and socioeconomic factors. According to UNICEF (2021) [12], maternal education, household food security, and sanitation conditions are among the strongest

determinants of child nutritional outcomes. In conflict-affected regions, disruption of healthcare services further intensifies the risks [13, 14]. In Libya, Elamein et al. (2020) [8], reported alarming increases in child anemia and undernutrition following the country's prolonged political crisis. A more recent multi-country analysis by Akseer et al. (2022) [15], highlighted that nutritional transitions in the MENA region are producing a paradoxical coexistence of stunting and obesity within the same communities. Similarly, Popkin et al. (2020) stressed [3], the global rise of the doubleburdenofmalnutrition, warningofitslong-termimplicationsfornon-communicablediseases. These findings underscore the need for integrated strategies that not only provide emergency nutrition support but also strengthen community resilience through education, sustainable agriculture, and improved access to healthcare. The current study contributes to this growing body of evidence by focusing on Al-Jufra, offering localized insights that align with global patterns while addressing specific regional vulnerabilities.

Recent reports from UNICEF [16], WHO, and the World Bank (2024–2025) indicate persistent challenges in reducing child malnutrition in the MENA region. The prevalence of stunting, wasting, and overweight has shown slow progress, underscoring the complexity of addressing both undernutrition and obesity simultaneously. In Libya, the Global Nutrition Report (2022–2024) highlights high rates of stunting and a concerning rise in overweight cases among children and adolescents [16]. Studies conducted in different Libyan provinces consistently reveal disparities between rural and urban areas, with rural regions experiencing higher levels of undernutrition.

Anemia remains one of the most pressing issues. A recurring theme in recent literature is the role of dietary diversity as a critical factor. Children with limited access to a diverse range of food groups are at a significantly higher risk of micronutrient deficiencies, particularly iron deficiency [23]. Despite the availability of data, gaps remain in longitudinal studies and comprehensive surveys across Libya that integrates dietary quality, socioeconomic status, and biochemical indicators.

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### **Methodology**

This study employed a cross-sectional design to evaluate the prevalence and determinants of malnutrition among children in the Al-Jufra region, Libya, during 2016–2017. A total of 620 children aged between 1 day and 14 years were included in the study. The sample was selected using a multi-stage random sampling technique:

- **First Stage:** Random selection of 5 municipalities within Al-Jufra district.
- **Second Stage:** Random selection of 10 primary healthcare centers from these municipalities.

- **Third Stage:** Systematic random sampling of children visiting these centers for routine check-ups or vaccinations during the study period.

**Inclusion Criteria:** Children aged 0–14 years, resident in Al-Jufra, and whose parents provided informed consent.

**Exclusion Criteria:** Children with chronic non-nutritional illnesses (e.g., congenital heart disease, renal failure) or those refusing to participate.

Data collection included anthropometric measurements (weight, height, and mid-upper arm circumference), clinical examinations, and demographic information such as age and gender. Nutritional status was assessed using WHO growth standards.

### Study Limitations

This study has several limitations. First, its cross-sectional design prevents causal inference between risk factors and malnutrition outcomes. Second, the sample was drawn primarily from healthcare centers, which may underrepresent children who do not access formal health services. Third, dietary data were based on recall, which is subject to bias. Finally, the study was conducted during a period of political instability, which may have affected data collection consistency and generalizability to other regions or time periods.

### Results

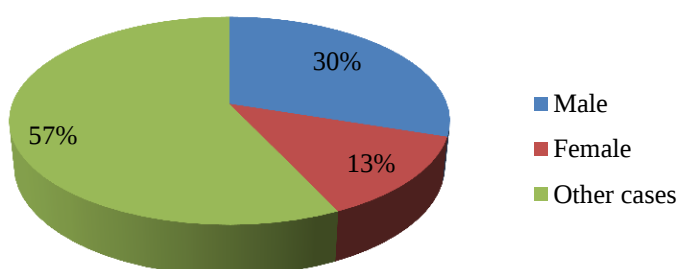
The study found that 43% of children in Al-Jufra were affected by some form of malnutrition. Males represented a larger proportion (30%) compared to females (13%).

A total of 620 children participated in the study, with a nearly equal gender distribution (52% male, 48% female). The study found that 43% OF children in Al-jufra were affected by some form of malnutrition

**Table 1:** Specific types of malnutrition and their prevalence

| Type of Malnutrition        | Prevalence (%) | Age Group Most Affected |
|-----------------------------|----------------|-------------------------|
| Anemia                      | 22             | 6–12 years              |
| Protein-Energy Malnutrition | 12             | 1–5 years               |
| Obesity                     | 5              | 10–14 years             |
| Underweight                 | 4              | 2–7 years               |

Children Affected by Some Malnutrition



**Figure 1:** Prevalence of malnutrition by gender (Al-Jufra, 2016–2017)

### Discussion

The findings of this study underscore the persistent challenge of child malnutrition in Al-Jufra, Libya, where 43% of children were affected by some form of nutritional disorder. The high prevalence of anemia (22%) aligns with regional evidence indicating that iron-deficiency anemia remains it is considered one of the most common public health problems in North Africa and the Middle East [19, 20]. This condition is strongly linked to poor dietary diversity and limited intake of iron-rich foods such as meat, legumes, and leafy vegetables.

Protein-energy malnutrition (12%), predominantly observed among children aged 1–5 years, raises particular concern given the critical importance of this age range for physical growth and cognitive development. Malnutrition in early childhood is known to increase vulnerability to infectious diseases, perpetuating a vicious cycle of illness and undernutrition.

Interestingly, the emergence of childhood obesity (5%), especially among those aged 10–14 years, reflects the broader nutrition transition occurring in Libya, as in other developing nations [11, 21, and 22]. A gradual shift toward energy-dense, low-nutrient foods and sugar-sweetened beverages is replacing traditional dietary practices. This phenomenon highlights the presence of the double burden of malnutrition, where undernutrition and overnutrition coexist within the same community and sometimes even within the same household.

Gender disparities were also observed, with males (30%) showing higher rates of malnutrition compared to females (13%). This may be attributed to cultural and behavioral differences in dietary allocation, as well as the higher energy requirements of boys engaged in more physically demanding activities.

When compared to recent national surveys, the anemia prevalence recorded in this study (22%) is lower than the 30–40% reported in Libya during 2023–2025, suggesting a deterioration of nutritional status in recent years due to ongoing political and economic instability. This indicates that the burden of child malnutrition may have worsened beyond the period of this study, reinforcing the need for urgent interventions.

Overall, these findings underscore the need for a multifaceted approach to addressing malnutrition in Al-Jufra. Priority interventions should include:

1. Nutritional education programs targeting mothers and caregivers to improve dietary knowledge and practices.
2. Food diversification initiatives, including support for local agriculture and food fortification.
3. Routine nutritional screening and treatment, particularly in rural healthcare centers.
4. Policy-driven strategies that simultaneously address undernutrition and obesity, reflecting the dual burden of malnutrition.

In the Libyan context, our findings are consistent with earlier national studies. For instance, El Taguri et al. (2019) reported similar patterns of anemia and stunting in western Libya, attributing them to disrupted health services and food insecurity. More recently, local surveys by the Libyan Ministry of Health (2023–2025) have noted a rise in anemia prevalence to 30–40%, suggesting that the situation in Al-Jufra may have worsened post-2017 due to ongoing socioeconomic challenges. This alignment with prior and subsequent local evidence strengthens the validity of our findings and highlights the persistent nature of child malnutrition in Libya.

## **Conclusion**

This study has demonstrated that child malnutrition in Al-Jufra remains a critical public health issue, with 43% of children affected—a finding that directly aligns with the study's primary objective of assessing the prevalence and determinants of malnutrition in this region. The high rates of anemia (22%) and protein-energy malnutrition (12%) highlight urgent gaps in dietary quality and healthcare access, while the emergence of obesity (5%) signals a nutritional transition in line with global trends.

These results underscore the dual burden of malnutrition and reinforce the need for integrated interventions as outlined in the recommendations—ranging from nutritional education and supplementation to policy reforms aimed at improving food security. By linking these findings to the study's original aims, we conclude that sustainable progress requires not only immediate clinical and nutritional support but also long-term strategies that address socioeconomic determinants such as parental awareness, agricultural productivity, and rural healthcare access.

Ultimately, investing in child nutrition is foundational to Libya's development—reducing future disease burdens, enhancing educational outcomes, and breaking the intergenerational cycle of malnutrition.

## **Recommendations**

**Nutritional Education** – Implement school- and community-based awareness programs to improve maternal and caregiver knowledge of balanced diets.

Supplementation Programs – Provide iron, vitamin A, and protein supplements to high-risk groups, especially children under five and pregnant women.

Healthcare Strengthening – Expand access to routine nutritional screening and treatment for anemia and malnutrition in rural healthcare centers.

Food Security Initiatives – Support local agricultural production and food fortification programs to ensure availability of affordable, nutrient-rich foods.

Policy Integration – Develop national strategies that address both undernutrition and obesity simultaneously, reflecting the dual burden of malnutrition.

Further Research – Encourage longitudinal studies to track the long-term effects of malnutrition and evaluate intervention outcomes.

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