



The Prevalence of Underweight in Iranian Children: An Overview of Influencing Factors, Trends, and Health Outcomes

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Abstract

Background: This study aims to provide a comprehensive review of the prevalence of underweight among Iranian children, identify key influencing factors, analyze temporal trends, and examine related health outcomes.

Materials and Methods: This overview searched major databases, including PubMed, Scopus, Web of Science, SID, Magiran, CIVILICA, and Google Scholar, up to April 2025, using terms such as "underweight," "malnutrition," and "Iranian children." It included original studies, reviews, and systematic reviews in English and Persian focused on prevalence, risk factors, and outcomes. Study quality was assessed using the Newcastle-Ottawa Scale and AMSTAR tools.

Results: Underweight prevalence among Iranian children remains a significant public health issue, averaging 19% in ages 6 to 14 and 8.4% to 11% in children under five, with notable regional disparities (24% in central vs. 5% in western areas). Key risk factors include low socioeconomic status, limited parental education—especially maternal—low birth weight, and geographic/climatic challenges. Despite a decline from the late 1990s to mid-2010s, recent increases post-COVID-19 reflect ongoing economic difficulties. Health risks include infections, developmental delays, and mortality, exacerbated by rising urban childhood obesity. Compared globally, Iran's under-five rates are below average but remain high in older children. Targeted, region-specific strategies such as enhancing maternal education, expanding nutrition programs, and boosting social support are essential to reduce disparities and improve child nutrition outcomes.

Conclusion: Underweight prevalence among Iranian children aged 6 to 14 and under five remains a major challenge influenced by economic disparities, regional inequalities, and maternal education. The COVID-19 pandemic and rising urban childhood obesity add complexity to the issue. Targeted policies, improved education, economic support, healthcare access, and continuous monitoring are essential to improve child health outcomes.

Key Words: Children, Iran, Prevalence, Risk factors, Underweight.

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1- INTRODUCTION

Underweight is one of the most significant public health challenges affecting children, with extensive adverse effects on physical health, cognitive development, and overall quality of life. This condition can lead to weakened immune systems, increased susceptibility to diseases, reduced learning capacity, and even higher mortality rates in children (1–3). Beyond the immediate consequences, underweight during early childhood may result in long-term outcomes such as impaired linear growth, diminished cognitive abilities, social functioning deficits, and reduced economic opportunities in adulthood (2, 4–6). Given the critical role of child health as a foundation for the future well-being of societies, and the essential importance of proper nutrition in ensuring this health, understanding the factors influencing underweight and assessing its prevalence across different age groups and regions is of paramount importance (7).

In countries like Iran, characterized by substantial economic, cultural, and geographical diversity, the complexity of malnutrition and underweight is intensified, with social and regional inequalities placing certain populations at a higher risk (8–11). Furthermore, the economic and social impacts of crises such as the COVID-19 pandemic have exacerbated concerns by increasing food insecurity and limiting access to nutritious foods (12–15). However, improvements in public health and nutrition interventions indicate that with careful, targeted planning, nutritional status among children can be enhanced (4, 16, 17).

Given the significance of this issue, conducting comprehensive and up-to-date reviews that provide a full picture of underweight prevalence in Iranian children, identify multiple influencing factors, and assess trends over time is essential for policymakers and health

planners (1, 7). Such evidence can form a robust foundation for designing and implementing focused, effective programs to prevent and control underweight, especially in vulnerable regions and populations (7, 9, 11).

The aim of this review study is to comprehensively examine the prevalence of underweight in Iranian children, identify underlying and influencing factors, analyze temporal trends, and evaluate related health outcomes, thereby providing a scientific basis for the development and enhancement of effective policies and interventions for malnutrition control in the country.

2- MATERIALS AND METHODS

2-1. Study Design

This study was designed as a comprehensive and systematic overview to collect and deeply analyze data, providing a complete and well-documented picture of the prevalence of underweight and its influencing factors among Iranian children under 18 years old. Systematic searches were conducted using relevant keywords such as "underweight," "malnutrition," "Iranian children," "nutritional status," "prevalence," "risk factors," and related synonyms, with optimized Boolean operators. These searches covered reputable international databases, including PubMed, Scopus, Web of Science, and Google Scholar, complemented by Persian databases such as CIVILICA, SID, and Magiran, ensuring comprehensive coverage of Persian-language sources. To enhance accuracy, broaden coverage, and minimize potential errors, the search process was independently performed by two researchers using two different browsers, allowing full access to diverse resources. All published articles in Persian and English up to April 2025 were reviewed.

2-2. Inclusion and Exclusion Criteria

Included studies comprised original research articles, systematic reviews, census reports, and other valid investigations examining the prevalence, risk factors, and outcomes of underweight status among Iranian children. Eligible articles were published in Persian or English and provided reliable quantitative and qualitative data. Excluded were studies unrelated to the topic, those with insufficient or poor-quality data, research focusing on other age groups or non-Iranian populations, and duplicate or scientifically non-standard reports.

2-3. Quality Assessment of Studies

Quality assessment was conducted to ensure the validity, accuracy, and reliability of the results using standardized and reputable tools. Observational studies, including cohort and cross-sectional designs, were evaluated with the Newcastle-Ottawa Scale (NOS), which examines three critical domains: sample selection, group comparability, and outcome assessment. NOS scores range from 0 to 9, with higher scores indicating stricter adherence to scientific criteria, better control of confounders, and greater data credibility (18).

For assessing the methodological quality of systematic reviews, the comprehensive AMSTAR tool was utilized. AMSTAR encompasses 11 detailed criteria, evaluating aspects such as clarity and transparency of research objectives, comprehensiveness and precision of search methods, eligibility and qualification of included studies, control of confounding factors, measurement reliability and validity, and quality of result reporting. The tool assigns a total score between 0 and 11, where a score of zero represents very low quality with poor adherence to standards, and a score of eleven reflects high-quality, methodologically compliant reviews (19).

2-4. Data Synthesis

Extracted information from the selected articles and authoritative documents was systematically compiled by two independent reviewers using a researcher-designed data extraction form. The data were organized and reported based on key domains including the prevalence of underweight, social, economic, and geographical influencing factors, health outcomes, and temporal trends. Any discrepancies encountered during the analysis were resolved through discussion among the researchers to ensure accuracy and credibility. Due to substantial heterogeneity in underweight measurement criteria, significant variations in sampling methods, geographic distribution, age diversity of samples, and limitations in qualitative data, quantitative pooling and meta-analysis were not feasible. Consequently, analyses were conducted qualitatively, descriptively, and comparatively to maintain scientific rigor while providing a comprehensive, realistic, and practical depiction of malnutrition status among Iranian children.

2-5. Ethical Considerations

Given that this study is a literature review without primary data collection involving human subjects, formal ethical approval was not required. Nevertheless, strict adherence to ethical principles was maintained throughout data collection, analysis, and reporting to prevent data distortion and uphold scientific integrity.

3- RESULTS

This overview combined results from various studies examining how common underweight is among Iranian children, the factors that affect it, how it has changed over time, and its health consequences. It focused on two age groups—children under five and those between 6 and 14 years old—across different regions of Iran. The studies included were generally of moderate to high quality, as assessed by NOS and AMSTAR tools (18, 19), which

supports the strength and reliability of the findings (**Table 1**).

3-1. Prevalence of Underweight in Iranian Children

Underweight remains a significant public health challenge among Iranian children. Systematic reviews and meta-analyses indicate that:

- Among children aged 6 to 14 years, the pooled prevalence of underweight is approximately 19% (95% CI: 8.1 to 38.6) (7).
- For children under five, prevalence estimates range from 8.4% to 11%, with variability attributed to regional differences, sampling, and methodological factors (1, 9).
- Regional disparities are notable: the central region reports prevalence near 24%, southern regions about 20%, northern regions approximately 17%, and western regions the lowest at around 5% (8, 9, 15).
- Studies focused on Fars province report underweight prevalence between 4% and 10%, highlighting significant in-country heterogeneity (8, 11).

3-2. Factors Influencing Underweight

- Socioeconomic status (SES) is a critical predictor; lower family income and limited access to nutritious food substantially increase underweight prevalence. The CASPIAN-IV study confirmed higher underweight rates among children from lower SES groups compared to wealthier families (1, 2, 8, 20).
- Children from rural areas have higher odds of being underweight compared to their urban counterparts, emphasizing the role of geographic location in health disparities (8, 20).

- Maternal education plays a key role. Mothers with higher education levels generally demonstrate greater nutritional knowledge and caregiving capacity, which is linked to lower rates of underweight in children (1, 21).
- Biological and household factors such as low birth weight (<2500g), large family size, father's occupation, and limited healthcare access increase the risk of underweight (11, 22, 23).
- Geographical and climatic disparities exist, with economically disadvantaged, hot-climate zones like Sistan and Balouchestan and Hormozgan showing higher underweight prevalence, necessitating tailored local interventions (3, 8, 20, 24).

3-3. Temporal Trends

- There was a significant decline in underweight prevalence among children under five between the late 1990s and mid-2010s, decreasing from approximately 11% to 4.3%. This reflects improvements in socioeconomic conditions, healthcare access, and nutritional interventions (1, 4, 15).
- However, more recent data indicate a reversal or increase in underweight and wasting rates after the COVID-19 pandemic, linked to intensified economic hardship, food insecurity, and widening socioeconomic inequalities (14, 25, 26).

3-4. Health Implications of Underweight

- Underweight children, particularly in socioeconomically deprived areas, face elevated risk of infectious diseases, impaired growth, and increased mortality (1-3).
- It impairs immune function, increasing susceptibility to respiratory and gastrointestinal infections, and causes

long-term adverse outcomes such as stunting, cognitive deficits, and reduced educational attainment (1, 21).

- Iran faces a double burden of malnutrition, with underweight coexisting alongside rising rates of childhood obesity, especially in urban areas, necessitating complex public health approaches (12, 13).

3-5. Regional and Global Comparisons

- Iran's under-5 underweight prevalence (~10.5%) is lower than the global average (~14%), indicating a relatively favorable public health nutrition status (1, 4, 27).
- However, in the 6–14 age group, the underweight prevalence (~19%) is comparable to or slightly higher than in similar neighboring countries (4, 7).
- Countries with similar socioeconomic conditions report prevalences in the 15–20% range, highlighting the importance of geographically tailored strategies to reduce regional inequalities (3, 9, 28).

3-6. Challenges and Opportunities

- Despite progress, challenges remain, including weak healthcare infrastructure, persistent socioeconomic disparities, and the compounded double burden of malnutrition (7, 11, 12).

- Opportunities exist in multisector collaboration across health, education, agriculture, and social protection sectors to improve healthcare access, maternal education, and social safety nets, especially in rural areas (1, 3, 8).

3-7. Recommended Interventions

- Robust nutrition education programs for mothers and caregivers to improve feeding behaviors and child growth outcomes have demonstrated effectiveness (1, 21, 29).
- Targeted feeding and supplementation programs in schools and kindergartens are essential to address nutritional deficiencies during critical growth periods (1, 11).
- Expansion of social support mechanisms to improve food security and healthcare access for economically disadvantaged families addresses key social determinants of malnutrition (8, 20, 30).
- Development and enforcement of region-specific policies that consider local cultural and economic contexts, using multisector collaboration, will ensure equitable and sustainable improvements (1, 20, 31).

Table-1: Summary of Key Findings on Underweight in Iranian Children.

Domain	Key Findings	Prevalence / Rates	Regional Variations / Details	References
Prevalence in 6-14 years	Pooled prevalence approximately 19%	19% (95% CI: 8.1-38.6)	National level	7
Prevalence under 5 years	Prevalence ranges 8.4% to 11%	8.4% - 11%	Central: ~24%, South: ~20%, North: ~17%, West: ~5%	1, 8, 9, 15
Influencing Factors	Low SES, rural residence, maternal education, low birth weight, family size, climactic impact	Higher rates in lower SES and rural areas	Hot regions like Sistan and Balouchestan notably higher	1-3, 8, 11, 20-24
Temporal Trends	Decline from ~11% to 4.3% in under 5 years until mid-2010s; recent post-	Decline to 4.3%, post-	COVID-19 pandemic worsened	1, 4, 14, 15, 25, 26

	COVID rise	2020 uptick noted	rates via economic effects	
Health Implications	Increased infection risk, impaired growth and development, immune dysfunction, double burden (undernutrition + obesity)	Significant health burden	Urban obesity emerging	1-3, 12, 13, 21
Regional & Global Comparison	Iran's under-5 prevalence (~10.5%) lower than global average (~14%); 6-14 comparable or higher than neighbors	~10.5% under 5; ~19% in school age	Comparable countries report 15-20% prevalence	1, 3, 4, 7, 9, 27, 28
Challenges & Opportunities	Weak healthcare, socioeconomic disparities, double burden; potential via multisector collaboration	Challenges persistent	Opportunities in education, healthcare, social nets	1, 3, 7, 8, 11, 12
Recommended Interventions	Nutrition education for mothers, feeding/supplementation programs in schools, social support expansion	Proven strategies	Region-specific, multisector approach advised	1, 8, 11, 20, 29-31

SES: Socioeconomic Status, COVID-19: Coronavirus Disease 2019.

4- DISCUSSION

This study aimed to provide a comprehensive review of the prevalence of underweight among Iranian children, identify key influencing factors, analyze temporal trends, and evaluate associated health outcomes. The findings showed that the prevalence of underweight is approximately 19% among children aged 6 to 14 years and ranges from 8.4% to 11% in children under five years old. Significant geographic and socioeconomic disparities exist, and although there has been an overall decline in underweight prevalence over the past two decades, the COVID-19 pandemic has introduced new challenges that may have reversed some of the progress made (4, 7, 15).

Underweight among Iranian children remains a critical public health issue, closely linked to economic inequality, regional deprivation, and maternal education levels. Despite progress in reducing malnutrition, persistent poverty, inadequate maternal education, and limited access to nutritious food and healthcare continue to affect vulnerable populations (1, 8). These findings are consistent with previous systematic reviews emphasizing socioeconomic status (SES) as a major determinant of child nutrition in Iran (1, 2, 4, 32, 33).

Geographical disparities are evident, with higher prevalence rates observed in underprivileged and climatically challenging provinces such as Sistan-Baluchestan and Hormozgan. This underscores the need for regionally tailored interventions that take local socio-cultural contexts into account (3, 8, 9, 20, 24). Climatic factors—such as hot and dry environments—are associated with increased risk of undernutrition, supporting evidence from environmental health studies (34).

Maternal education emerges as a key modifiable factor positively influencing child nutritional status. Educated mothers are more likely to practice appropriate feeding, seek timely healthcare, and maintain better hygiene and caregiving environments (35-38). Educational interventions targeting mothers have been shown to significantly improve children's growth trajectories (39-41). However, cultural barriers and socioeconomic challenges may limit the effectiveness of these interventions (42, 43).

In addition to undernutrition, Iran faces a dual burden of malnutrition—a coexistence of underweight and rising rates of overweight and obesity—particularly in urban areas. This epidemiological transition calls for

integrated public health strategies that address both forms of malnutrition to optimize child health outcomes (20, 44).

When compared globally, underweight prevalence among children under five in Iran (~10.5%) is lower than the global average (~14%), reflecting the success of national nutrition programs and health policies (1, 15). However, older children show higher prevalence rates, indicating areas where continued efforts are crucial (4).

Opportunities to improve nutritional health include strengthening multisector collaboration among health, education, agriculture, and social welfare sectors, expanding maternal education, establishing social safety nets for vulnerable families, and implementing targeted feeding and supplementation programs in schools and childcare centers (1, 4, 45-47). Continuous monitoring of nutritional indicators, with special attention to regional and socioeconomic disparities, will improve policy responsiveness and resilience against economic and social crises (48-50).

In conclusion, sustaining and advancing the reductions in underweight requires persistent, equity-focused public health efforts tailored to socio-demographic and geographic vulnerabilities in order to protect child health and prevent long-term adverse consequences of malnutrition (7, 15).

5- CONCLUSION

This comprehensive review shows that underweight remains a significant public health concern among Iranian children, with an overall prevalence of approximately 19% in the 6 to 14-year age group and 8.4% to 11% among children under five. These rates vary considerably by region, reflecting disparities related to socioeconomic status, maternal education, low birth weight, and geographic and climatic factors. Although a downward

trend in underweight prevalence was observed from the late 1990s through the mid-2010s, recent increases following the COVID-19 pandemic reveal vulnerabilities worsened by economic pressures and unequal access to healthcare and nutritious food. The coexistence of underweight and rising obesity rates, especially in urban areas, further complicates Iran's nutritional landscape.

Given these findings, the study emphasizes the urgent need for targeted, region-specific nutritional policies and interventions. Prioritizing maternal education, improving socioeconomic conditions, and expanding healthcare access are essential to reducing underweight prevalence. Moreover, continuous monitoring of malnutrition trends is critical to guide adaptive and effective public health strategies. Addressing both immediate causes and structural determinants of malnutrition will provide a scientific basis for developing and strengthening comprehensive malnutrition control programs in Iran, ultimately improving child health outcomes nationwide.

6- CONFLICT OF INTEREST: None.

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