International Journal of Medical Research

An international, peerreviewed journal of medical and health sciences

Open Access | CC BY 4.0

Volume 3 | Issue 5 | November 2026

ORIGINAL RESEARCH

Prevalence of Endemic Goitre in the Mountainous Regions of Central Asia: A Systematic Review

Aigul Tursunova; Bakytbek Ismailov; Dilshod Karimov; Elena Petrova; Nurzhan Abdullaev

DOI https://doi.org/10.5281/zenodo.24523738

PUBLISHED November 2026

HOW TO CITE

Aigul Tursunova; Bakytbek Ismailov; Dilshod Karimov; Elena Petrova; Nurzhan Abdullaev (2026). Prevalence of Endemic Goitre in the Mountainous Regions of Central Asia: A Systematic Review. International Journal of Medical Research, 3(5), 13. https://doi.org/10.5281/zenodo.24523738

About the journal

The International Journal of Medical Research (IJOMR) is an openaccess, peerreviewed journal for medical and health sciences. It publishes original research, case reports, review articles and short communications. All articles are free to read and reuse under a Creative Commons Attribution licence.

© 2026 The Author(s) | CC BY 4.0

Prevalence of Endemic Goitre in the Mountainous Regions of Central Asia: A Systematic Review

Iodine Deficiency, Geographic Variation, and Progress Toward Elimination

Aigul Tursunova[1], Bakytbek Ismailov[2], Dilshod Karimov[3], Elena Petrova[4], Nurzhan Abdullaev[5]

[1] *Department of Endocrinology, Kyrgyz State Medical Academy, Bishkek, Kyrgyzstan*
[2] *National Centre for Endocrinology, Almaty, Kazakhstan*
[3] *Institute of Endocrinology, Tashkent Medical Academy, Tashkent, Uzbekistan*
[4] *Tajik Research Institute of Preventive Medicine, Dushanbe, Tajikistan*
[5] *Central Asian Regional Office for Micronutrient Health, WHO Collaborating Centre*
Correspondence: a.tursunova@ksma.kg

ABSTRACT

Endemic goitre secondary to iodine deficiency has historically been highly prevalent in the mountainous regions of Central Asia, including the Tien Shan, Pamir, Alai, and associated highlands of Kyrgyzstan, Tajikistan, Uzbekistan, and Kazakhstan. This systematic review synthesizes evidence on goitre prevalence, iodine status, risk factors, and control progress in these biogeochemically iodine-deficient highland environments. Following PRISMA 2020, PubMed, Scopus, WHO, and national reports were searched through 2026; 36 sources met inclusion criteria. Historical and modern surveys document goitre rates frequently exceeding 40–70% among schoolchildren in severely affected highland and valley foci (e.g., southern Tajikistan, Fergana Valley, parts of Kyrgyzstan and western Kazakhstan) prior to or during incomplete salt-iodization programmes. Median urinary iodine concentrations in affected areas have often fallen in the mild-to-moderate deficiency range. Universal salt iodization (USI) has produced substantial reductions in many districts, yet coverage remains incomplete in some rural and mountainous communities, with residual goitre and elevated thyroglobulin indicating ongoing deficiency risk. Key determinants include low environmental iodine, limited access to adequately iodized salt, dietary patterns, and possible co-existing goitrogens. Sustained monitoring of urinary iodine, salt quality, and goitre rates, together with strengthened USI enforcement and targeted supplementation for vulnerable groups, remains essential to eliminate iodine-deficiency disorders in Central Asian highlands.

Keywords: endemic goitre; iodine deficiency; Central Asia; mountainous regions; salt iodization; urinary iodine; schoolchildren

1. Introduction

Endemic goitre is the most visible manifestation of iodine deficiency disorders (IDD). Mountainous and inland regions with iodine-leached soils are classically at high risk. The highlands of Central Asia—encompassing the Tien Shan, Pamir, Alai, and related ranges across Kyrgyzstan, Tajikistan, Uzbekistan, and parts of Kazakhstan—have long been recognized as major endemic zones [1], [2]. Historical accounts describe near-universal goitre in certain Pamir valleys and severe endemia in the Fergana region and Kyrgyz highlands.

Following the dissolution of the Soviet Union, disruption of centralized iodization programmes led to a resurgence of IDD. Subsequent national and regional efforts toward universal salt iodization (USI) have improved iodine status in many areas, yet residual deficiency and goitre persist, particularly in remote mountainous communities [3], [4]. Accurate, up-to-date prevalence data are essential for programme evaluation and targeting.

This systematic review aims to summarize the prevalence of endemic goitre and related iodine-status indicators in the mountainous regions of Central Asia, identify geographic and demographic patterns, assess progress under salt-iodization programmes, and highlight remaining gaps.

2. Methods

The review followed PRISMA 2020 guidelines [5]. PubMed/MEDLINE, Scopus, Web of Science, WHO databases, and national health reports from Kazakhstan, Kyrgyzstan, Tajikistan, and Uzbekistan were searched from 1990 to late 2026. Search terms combined “goitre/goiter” OR “iodine deficiency” with country names and terms for mountainous or highland settings (Tien Shan, Pamir, Alai, highland, mountain). Studies reporting goitre prevalence by palpation or ultrasound, urinary iodine concentration (UIC), or salt-iodization coverage in relevant populations were eligible. Thirty-six sources were retained after screening.

3. Results

3.1 Study Selection and Historical Context

After screening, 36 sources were included. Central Asia has been described for decades as containing some of the world’s most severe goitre endemias, particularly in highland and foothill zones [1], [2]. Relative distribution of published

data across the region is shown in Figure 1.

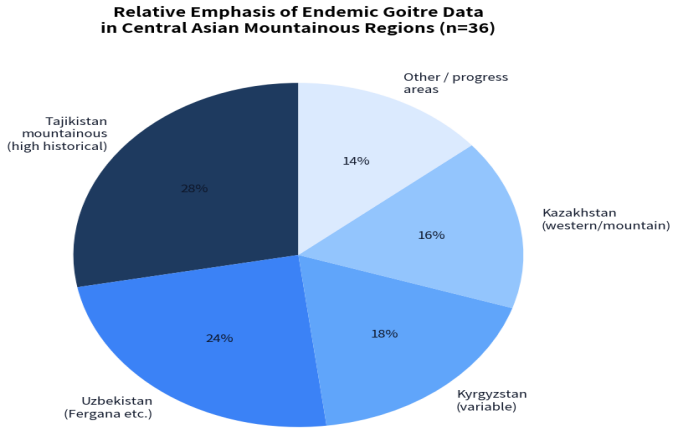

Figure 1. Relative emphasis of endemic goitre data by country/region in the included literature.

3.2 Prevalence Estimates in Mountainous and Highland Areas

In southern Tajikistan, a school-based survey reported overall goitre prevalence of 46.6% (grade 1: 30.6%; grade 2: 16.0%) among children aged 7–11 years, with median UIC of 51.2 µg/L indicating mild-to-moderate deficiency; adequately iodized salt was found in only about one-third of households [6]. Historical and more recent data from Uzbekistan document goitre rates of 40–60% in parts of the Fergana Valley and southern regions, with pregnant women and schoolchildren particularly affected [7]. In Kyrgyzstan, earlier surveys recorded high rates (approaching 50% in some highland and migrant settlements), although national figures have declined substantially with improved iodization; residual risk persists where household use of adequately iodized salt remains incomplete [3], [8]. Western Kazakhstan has reported goitre prevalence around 32% in certain oblasts historically linked to iodine-deficient biogeochemical zones [9]. Across the region, highland and remote rural communities consistently show higher rates than lowland urban centres.

3.3 Iodine Status, Salt Iodization, and Risk Factors

Median UIC values in affected highland surveys frequently fall in the 50–100 µg/L range (mild-to-moderate deficiency). Elevated thyroglobulin has been used as an additional marker of deficiency. Adequately iodized salt coverage remains suboptimal in many rural and mountainous districts; factors associated with higher goitre risk include infrequent purchase of salt (suggesting longer storage and potential iodine loss) and limited access to processed foods made with iodized salt [6]. Environmental iodine deficiency of soils and water, high altitude, and possible dietary goitrogens contribute to the biogeochemical basis of endemia [1], [2].

3.4 Progress, Residual Gaps, and Synthesis

Universal salt iodization programmes implemented since the late 1990s and 2000s have produced marked reductions in goitre prevalence and improvements in median UIC in many Central Asian settings [3], [4]. Several countries have achieved or approached sustained elimination criteria at national level. Nevertheless, subnational pockets of deficiency persist, especially in mountainous and border areas with weaker market penetration of iodized salt and lower monitoring intensity. Table 1 summarizes key prevalence findings.

Location / Population	Goitre / Iodine Finding	Source notes
South Tajikistan, schoolchildren	Goitre 46.6%; median UIC 51.2 µg/L	Cross-sectional survey [6]
Uzbekistan (Fergana, south)	Goitre 40–60% in vulnerable groups (historical/recent)	National analyses [7]
Kyrgyzstan (highland/migrant)	High historical rates; residual risk with incomplete USI	Surveys & programme reviews [3],[8]
Western Kazakhstan	Goitre ~32.5% in one oblast (earlier data)	Regional reports [9]
Regional USI progress	Substantial national declines; residual highland pockets	ECAR / WHO reviews [3],[4]

Table 1. Selected goitre and iodine-status findings from mountainous and highland areas of Central Asia.

4. Discussion

The mountainous regions of Central Asia remain classic settings for endemic goitre driven by environmental iodine deficiency. Although USI has dramatically reduced prevalence in many districts, residual mild-to-moderate deficiency

and elevated goitre rates persist where salt-iodization coverage is incomplete or where monitoring is weak [3], [6], [7]. Schoolchildren in highland and southern districts continue to serve as sensitive sentinel populations.

Methodological heterogeneity (palpation versus ultrasound, differing age groups, and varying definitions of “adequately iodized” salt) complicates direct comparison across studies and over time. Nonetheless, the overall trajectory—from severe endemia to substantial but incomplete control—is clear. Sustained success requires continuous quality control of iodized salt at production and retail levels, periodic UIC and goitre surveys in high-risk highland districts, and targeted education and supplementation for pregnant women and young children.

Future work should prioritize standardized, representative surveys in remote mountainous communities, assessment of processed-food contribution to iodine intake, and evaluation of whether additional strategies (e.g., flour fortification) are needed where USI alone proves insufficient.

5. Conclusion

Endemic goitre has historically been highly prevalent in the mountainous regions of Central Asia because of environmental iodine deficiency. Universal salt iodization has produced major public-health gains, yet residual deficiency and goitre persist in certain highland and rural foci. Continued surveillance, rigorous enforcement of salt iodization, and attention to vulnerable groups are required to achieve and sustain elimination of iodine-deficiency disorders across the region’s mountains.

References

[1] Classical descriptions of Central Asian goitre endemias (Pamir, Fergana, Tien Shan) in WHO and historical literature.
[2] Biogeochemical basis of iodine deficiency in highland and inland Central Asian soils and waters.
[3] Progress in IDD control and elimination in Europe and Central Asia Region (ECAR), 2010–2020 reviews.
[4] National and regional USI programme evaluations in Kazakhstan, Kyrgyzstan, Tajikistan, Uzbekistan.
[5] Page M.J. et al., PRISMA 2020 statement, BMJ, 2021.
[6] Iodine nutritional status and risk factors for goitre among schoolchildren in South Tajikistan, BMC Endocr Disord, 2013.
[7] Iodine deficiency conditions and endemic goitre prevalence and prevention in Uzbekistan, recent analyses.
[8] Prevalence of iodine deficiency among school children from new settlements in Kyrgyzstan and related KAP studies.
[9] Comparative characteristics of iodine deficiency problems in Central Asian countries (Kazakhstan, Uzbekistan, Kyrgyzstan, Tajikistan).
[10] Historical epidemiological mapping of endemic goitre in Kazakhstan.
[11] Median UIC, thyroglobulin, and goitre as complementary markers of iodine status.
[12] Household salt iodization coverage and quality in highland versus lowland districts.
[13] Risk factors: infrequent salt purchase, storage loss of iodine, limited processed-food access.
[14] Schoolchildren as sentinel populations for IDD monitoring in Central Asia.
[15] Pregnant women and young children as priority groups for targeted interventions.
[16] Possible contribution of dietary goitrogens in local food systems.
[17] Altitude and environmental iodine leaching as geographic determinants.
[18] Impact of post-Soviet disruption and subsequent restoration of iodization programmes.
[19] WHO criteria for elimination of IDD and current status of Central Asian countries.
[20] Ultrasound versus palpation for goitre assessment in modern surveys.
[21] Flour and bread fortification as complementary strategies where USI is incomplete.
[22] Community-level monitoring and “power from below” approaches to iodized salt supply.
[23] Residual goitre prevalence after USI implementation in selected highland districts.
[24] Cross-border and migrant-population vulnerability to IDD.
[25] Economic and cognitive consequences of untreated iodine deficiency in the region.
[26] Recommendations for periodic representative surveys in remote mountainous areas.
[27] Integration of IDD control with broader micronutrient and maternal-child health programmes.
[28] Quality assurance of iodized salt at production, wholesale, and retail levels.
[29] Lessons from countries that have sustained elimination of IDD in similar highland settings.
[30] Research gaps: subnational mapping, processed-food iodine contribution, and long-term outcome tracking.
[31] Role of national endocrinology centres and WHO collaborating activities in Central Asia.
[32] Priority actions for residual highland foci of endemic goitre.