



OPEN Climate adaptation policies in Central Asia overlook mental health

Ayat Ullah^{1,2}✉, Michael Jakob³, Miroslava Bavorova¹ & Indra Overland⁴

As climate change intensifies, Central Asian countries face growing public health risks, including underrecognized impacts on mental health. Climate-related stressors such as heatwaves, displacement, and food insecurity are linked to heightened risks of anxiety, depression, and trauma. Yet, the mental health dimensions of climate adaptation remain largely absent from regional policy. This study analyzes adaptation policies of Kazakhstan, Kyrgyzstan, Tajikistan, and Uzbekistan through document scoring, keyword frequency analysis, and semantic network mapping. The results reveal three key patterns: (1) mental health is almost entirely excluded from climate adaptation policy; (2) institutional and financial readiness is uneven; and (3) psychosocial stressors are inconsistently acknowledged. Kazakhstan and Tajikistan are the only countries to reference mental health directly, and only Kazakhstan demonstrates partial integration, notably through its use of gendered vulnerability framing. Kyrgyzstan, while not referencing mental health explicitly, demonstrates the strongest policy coherence in general health and institutional structures, with an interconnected network linking climate, health care, and vulnerability. Uzbekistan shows the weakest integration of general health and institutional structures, and mental health is entirely absent, though localized planning has begun in the Aral Sea region. Across all four countries, mental health is either only symbolically acknowledged or entirely overlooked, highlighting a critical blind spot in regional adaptation policy. This study calls for explicit inclusion of mental health in national adaptation plans, supported by interministerial coordination, gender-sensitive design, and targeted financing to ensure climate-resilient health systems in Central Asia.

Keywords Drylands, Climate change adaptation, Climate resilience, Public health policy, Mental health, Food security

Climate change adaptation has become an essential pillar of public policy as nations confront increasingly severe environmental stressors, including heatwaves, droughts, glacial melt, and biodiversity loss^{1,2}. Adaptation strategies aim to reduce the vulnerability of human and natural systems to the actual or expected impacts of climate change³. In Central Asia, comprising Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, and Uzbekistan, these risks are intensifying as rising temperatures, more frequent extreme weather events, and acute water stress threaten livelihoods and regional stability^{4,5}. Adaptation planning in the region, however, remains uneven and often prioritizes infrastructure and agriculture over social and health-related vulnerabilities.

The intersection of climate change and public health has gained increasing attention globally, particularly with respect to climate-sensitive diseases, malnutrition, and waterborne illnesses⁶. Yet the mental health dimensions of climate change remain largely underexamined in both science and policy⁵. Climate-related stressors such as droughts, floods, displacement, food insecurity, and livelihood disruptions are associated with heightened risks of anxiety, depression, psychological distress, and post-traumatic stress disorder⁷. The World Health Organization (WHO) has recently emphasized the need to integrate mental health into climate adaptation and disaster-risk strategies⁸. Although the broader literature linking climate change and mental health is expanding^{7,9,10}, Central Asia remains critically understudied¹¹. A recent global review by United for Global Mental Health highlights that most national adaptation frameworks worldwide insufficiently address mental health, but it provides only high-level global patterns and does not examine Central Asia in detail¹².

¹Department of Economics and Development, Faculty of Tropical AgriSciences, Czech University of Life Sciences Prague, Kamýcka 129, Suchbátka, 16500 Praha, Czech Republic. ²Research and Training Department, OSCE Academy in Bishkek, Bishkek, Kyrgyz Republic. ³Climate Transition Economics, Gorresstr. 24, 12161 Berlin, Germany. ⁴Norwegian Institute of International Affairs (NUPI), Oslo, Norway. ✉email: a.ullah@osce-academy.net

Existing research highlights major gaps in the region's mental health systems. Mental health services in Central Asian countries are often underfunded, urban-centric, and stigmatized, leaving rural communities, women, and youth particularly vulnerable^{11,13,14}. Systemic weaknesses, including limited integration of mental health into primary care, insufficient service coverage, and constrained human resources, continue to hinder effective mental healthcare^{15,16}. Kazakhstan has developed mental health policies and programs, yet disparities persist between urban and rural areas^{17,18}. Kyrgyzstan and Tajikistan are engaged in ongoing reforms but still face significant infrastructure and workforce shortages^{19–21}. Uzbekistan has recently initiated reforms to expand mental health access and improve service quality, but integration challenges remain²².

These systemic gaps intersect with accelerating climate impacts across Central Asia. The retreat of glaciers in the Tien Shan and Pamir ranges threatens long-term water security and increases short-term flooding risks^{23,24}. Extreme weather events, heatwaves, droughts, and floods, are becoming more frequent and severe, disrupting livelihoods, damaging infrastructure, and creating cascading social vulnerabilities^{25,26}. The ongoing degradation of the Aral Sea exemplifies how climate-exacerbated ecological change can produce both economic hardship and psychosocial strain²⁷. These environmental transformations heighten mental health risks, contributing to anxiety, depression, post-traumatic stress, eco-anxiety, and chronic psychological distress^{7,9}. Communities facing repeated climate shocks, particularly farmers, rural households, youth, and climate-induced migrants, experience increased psychosocial burdens¹⁰. The global report similarly underscores that climate-related psychological risks are rising yet remain weakly reflected in national adaptation planning, reinforcing the need for regional analyses that examine how countries operationalize mental health within adaptation frameworks¹².

Despite mounting evidence of climate-related mental health risks, mental health remains largely absent from national climate adaptation strategies in Central Asia^{5,11}. Adaptation plans tend to prioritize physical infrastructure and disease control, with mental health rarely acknowledged or operationalized. This omission reinforces a conceptual and institutional gap that leaves populations without adequate protection from climate-induced psychological stressors. There is a pressing need for intersectoral approaches that integrate mental health considerations into climate adaptation, strengthen community-based support mechanisms, and enhance institutional readiness across the health and environmental sectors.

This study addresses this gap by examining how national adaptation policies in Kazakhstan, Kyrgyzstan, Tajikistan, and Uzbekistan incorporate mental health considerations. We analyze climate adaptation plans and public health strategies to assess how climate–health linkages are operationalized, evaluate institutional readiness, and identify the degree to which gender-sensitive approaches include mental health. We present a comparative policy analysis, document scoring results, and semantic network mapping to determine how mental health is positioned within regional adaptation frameworks.

Methodology

Data collection

The analysis focuses on Kazakhstan, Kyrgyzstan, Tajikistan, and Uzbekistan due to their shared geographic location in Central Asia and exposure to similar climate risks such as water stress, glacier retreat, and extreme weather events²⁶. These countries also exhibit diverse institutional capacities and adaptation strategies²⁸, offering a comparative perspective on how different national contexts shape policy responses. The analysis was based on core policy documents publicly issued by their governments, including Nationally Determined Contributions (NDCs) and National Adaptation Plans (NAPs). Additional legal and regulatory texts were sourced from the Climate Laws of the World database, which provides access to formally adopted national climate laws and frameworks. The most recent versions of policy documents available on official government platforms and databases were used to ensure the analysis reflects the latest policy developments. This regional document-focused approach differs from the global scan conducted by United for Global Mental Health¹², which provided high-level policy benchmarks but did not include document scoring or semantic network analysis at the country level. All document collection, review, and analysis were conducted by the authors. These criteria for document selection are consistent with methodologies employed in other recent studies focusing on climate policy analysis^{29,30}.

Data analysis

Qualitative analysis

Appendix 1 presents the key themes and corresponding keywords used for coding the policy documents. These themes were developed through a combination of literature review on climate adaptation and health and an initial reading of the policy texts, allowing for both theory-driven and inductive insights³¹. They guided a focused and systematic analysis of how adaptation policies in the selected countries address climate-related health vulnerabilities. A structured manual content analysis was performed using a predefined coding matrix aligned with the study's three guiding research questions. While Appendix 1 outlines the initial coding themes and keywords, additional dimensions, such as the “gender–health–stress nexus” and “institutional capacity”, emerged inductively during analysis and were incorporated into the final thematic framework presented in the “[Results and discussion](#)” section following best practices in qualitative content analysis³².

The coding framework comprised thematic categories designed to examine how adaptation policies address climate-related health risks. Each document was systematically reviewed to identify the presence and depth of discussion across key dimensions, including: (1) climate stressors and health framing (e.g., heatwaves, floods, food insecurity); (2) direct or indirect references to mental health (e.g., psychological stress, trauma, anxiety); (3) broader health vulnerabilities; (4) institutional roles and coordination, particularly the involvement of ministries of health; and (5) adaptation finance mechanisms and the existence of monitoring, reporting, and verification (MRV) systems. All documents were manually coded using the predefined thematic framework. The lead author conducted the initial coding, which was then independently reviewed by a second researcher (a senior professor

with expertise in climate policy). Discrepancies and ambiguous excerpts were jointly discussed until consensus was reached, in line with qualitative policy analysis standards^{33,34}. Triangulation across data sources (e.g., NDCs, NAPs) and repeated cross-checks against research hypotheses further enhanced interpretive rigor.

Finally, the distinction between “climate and health link” and “mental health focus” is intentional and central to the study’s hypotheses. The former captures general references to health impacts of climate change, such as heat stress, disease outbreaks, or emergency preparedness, while the latter identifies explicit attention to mental health issues, including psychological stress, trauma, or anxiety. Maintaining this separation allows for a nuanced assessment of the extent and depth of mental health integration in climate adaptation policies, including implications for institutional capacity and gender-sensitive approaches.

Quantitative analysis

To triangulate findings and quantify thematic emphasis, we supplemented manual coding with quantitative keyword frequency analysis. Using R (version 4.3.1), we calculated the percentage of predefined keywords (Appendix 1) appearing in each policy document relative to the total word count, following text-mining methodologies for policy analysis^{35,36}. Documents were preprocessed (tokenization, stop-word removal, and lemmatization) using the tidytext and quanteda packages for R^{37,38}. This mixed-methods approach strengthened validity by identifying disparities in explicit terminology (e.g., higher mental health keyword density in Kazakhstan’s documents) that aligned with manual coding results.

Co-occurrence network analysis

To further examine semantic linkages between mental health and broader policy concepts, we conducted a co-occurrence network analysis of countries’ NDCs using R’s igraph package³⁹. This visualized connections between mental health keywords (e.g., “stress”, “trauma”) and climate-policy terms (e.g., “resilience”).

Comparative scoring and synthesis

The coded data was synthesized into three comparative tables corresponding to the thematic dimensions outlined in the study. Each table aimed to capture the degree to which each country’s adaptation planning acknowledged mental health risks, demonstrated institutional and financial readiness, and incorporated gendered health burdens into risk management and adaptation policies. This comparative approach facilitated a cross-country synthesis, allowing for the identification of patterns, gaps, and degrees of alignment with climate-health goals across the selected countries. A focus on mental health risks in the context of climate change is crucial, as it provides insight into how climate adaptation strategies consider the psychological toll of climate-related disasters⁴⁰. The institutional and financial readiness dimension emphasized the capacity of each country’s adaptation plan to operationalize climate-health linkages, a critical aspect of ensuring successful adaptation outcomes⁴¹.

The synthesis approach employed triangulation across various data sources and document types, enhancing the validity of the findings by cross-checking patterns and inconsistencies. This method is widely supported in qualitative policy research since it provides a more comprehensive understanding of policy effectiveness and areas requiring attention^{33,34}. All coding and synthesis processes were conducted by the authors, ensuring consistency in data interpretation and analysis. The analyses are presented in Tables 1,2,3 each corresponding to one of the study’s three guiding dimensions: mental health integration (Table 1), institutional and financial readiness (Table 2), and gendered health risks (Table 3).

Results and discussion

Quantitative keyword analysis results

To evaluate the extent to which policy documents from the four Central Asian countries engage with climate-health, mental health, and institutional themes, we conducted a keyword frequency analysis. This involved verifying the occurrence of specific terms and calculating their frequency as a percentage of the total text. The results are illustrated in Figure 1, which categorizes the prominence of each theme relative to the full body of text across the national policy documents reviewed.

The analysis reveals that climate-health references are scarce, constituting only 0.1–0.2% of total policy text. This is 10–20 times lower than institutional themes (1–2%), highlighting a stark thematic imbalance. Similar gaps have been observed globally⁴², suggesting systemic neglect of health in climate policy. Among the countries,

Dimension	Kazakhstan	Kyrgyzstan	Tajikistan	Uzbekistan
Climate change as health risk	Yes – multifaceted framing (heat, urban heat islands, disease).	Yes – public health vulnerabilities addressed.	Yes – health is a cross-cutting theme in National Strategy for Accelerated Climate Action (NSACC) 2030.	Yes – health prioritized in Aral Sea region National adaptation plan (NAP).
Mental health in adaptation plans	Not explicit; notes that stressors such as food/water insecurity imply mental health risks.	No – emphasis on mortality/morbidity, but not psychosocial effects.	No – mental health not named, though social stressors acknowledged.	No – health and social services referenced only in general.
Environmental stressors tied to mental health	Explicitly: heatwaves, droughts, floods, food/water insecurity.	Floods, non-communicable diseases, disease mentioned, but no mental health link.	Climate shocks, poverty, gender vulnerability – indirect links.	Aral Sea degradation, water stress, social vulnerability.
Gender–health–stress nexus	Strong – dual caregiving/farming burden on women.	Not detailed – general approach.	Gender-sensitive indicators present in adaptation frameworks.	Gender included in social service planning.

Table 1. Integration of mental health and climate-health linkages in adaptation planning.

Dimension	Kazakhstan	Kyrgyzstan	Tajikistan	Uzbekistan
Integration of health in adaptation	Strong – Ministry of Health involved; Environmental Code includes health safeguards.	Strong – non-communicable diseases includes health infrastructure targets.	Strong – NSACC and Medium-Term Development Program (MDP) integrate health, with gender indicators.	Moderate – Ministry part of UNDP-GCF coordination.
Capacity of mental health services	Not detailed – strain implied via exposure to climate stressors.	Not specified – supported indirectly via system strengthening.	Not detailed – captured in broader social protection strategies.	Not addressed.
Institutional barriers	Implementation gaps remain despite strong legal frameworks.	Developing capacity; external support critical.	Weak coordination, low technical/institutional capacity.	Capacity/coordination gaps; early-stage policy development.
Funding for climate-health nexus	Public health included in policy; monitoring of water, housing, food.	\$141M+ in adaptation funding; sustainable health strategy in progress.	Requires \$1B+ annually for mitigation/adaptation by 2030; United Nations Development Programme (UNDP)/Pilot Program for Climate Resilience (PPCR) support.	Health included via GCF/UNDP projects, but no focus on mental health.

Table 2. Public health capacity, institutional structures, and climate-health policy implementation.

Country	Disaster risks	Key adaptation actions	Relevant frameworks & strategies	MRV
Kazakhstan	Heatwaves, droughts, floods, extreme temperatures	Ecosystem-based adaptation, health infrastructure resilience, gender-sensitive planning	Environmental Code (2021), Strategy 2050, Green Economy Concept	MRV via 5-year cycles and NDC roadmap
Kyrgyzstan	Floods, landslides, energy crises	Health risk forecasting, urban health resilience, climate-sensitive health data	Climate Investment Program, NDC, disaster risk reduction programs	MRV reforms underway; Climate Coordination Council oversees
Tajikistan	Floods, landslides, droughts, water-related disasters	Risk-informed public health, inclusive planning, disaster-resilient health systems	NSACC 2030, DRR Strategy, GCF-UNDP NAP support	MRV phased 2020–2030; coordinated with Regional Environmental Centre for Central Asia (CAREC) and Saving the Aral Sea (IFAS)
Uzbekistan	Aral Sea disaster, desertification, water scarcity	Early warning systems, water/health infrastructure, social engagement	Aral Sea Disaster Strategy, Sectoral Adaptation Plans	MRV under early development; institutional reforms ongoing

Table 3. Disaster risks, adaptation measures, and national frameworks with health focus.

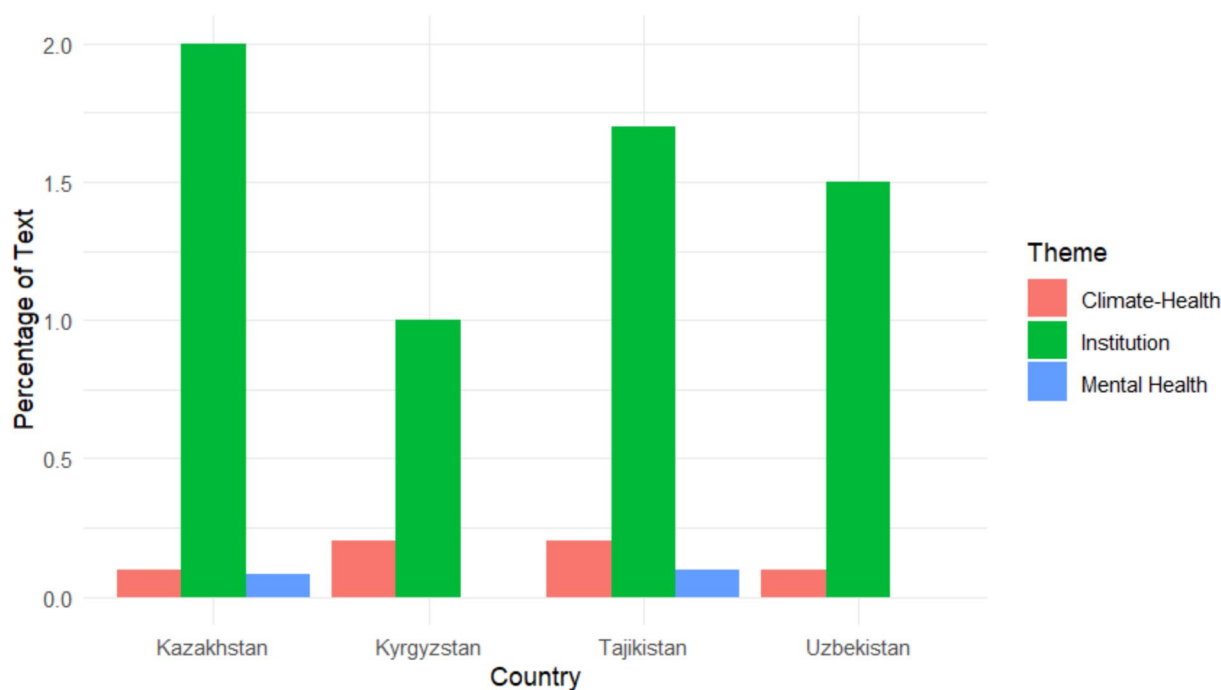


Fig. 1. Share of policy text dedicated to climate-health, mental health, and institutional themes across Central Asian countries.

Tajikistan and Kyrgyzstan registered the highest proportion at 0.2%, while Kazakhstan and Uzbekistan each recorded 0.1%. Mental health terminology was even less frequent, with only Kazakhstan and Tajikistan including such references (0.1% each), and none found in the documents from Kyrgyzstan or Uzbekistan. This minimal presence of mental health content reflects a broader global pattern in which climate policy often neglects psychosocial impacts, as highlighted in previous studies^{42,43}.

Quantitatively, broad governance-related terms (e.g., ‘climate strategy’, ‘adaptation policy’) appeared in 1–2% of text (Kazakhstan: 2%; Tajikistan: 1.7%; Uzbekistan: 1.5%; Kyrgyzstan: 1%), compared to 0–0.1% for mental health terminology. While these institutional terms are inherently more frequent due to their foundational role in policy documents, the order-of-magnitude difference suggests mental health receives minimal explicit attention. This pattern holds even in countries showing moderate climate-health engagement (Table 1), where institutional capacity receives textual priority over psychosocial dimensions (Tables 1,2,3).

A closer look at Kazakhstan and Tajikistan, the two countries that included mental health terminology, reveals important differences in how the issue is framed. In Kazakhstan, the references were limited and isolated, while in Tajikistan they were more closely linked to broader discussions of social vulnerability. This framing aligns with vulnerability discourses commonly observed in low-income countries, where adaptation policies tend to emphasize exposure and sensitivity over actionable interventions^{44,45}.

Two broader patterns emerge from the analysis. First, mental health remains an underdeveloped aspect of climate adaptation policy across all four countries, regardless of their overall climate-health engagement. Second, institutional and governance themes dominate the textual landscape of adaptation policies, accounting for 1–2% of content, in stark contrast to 0.1–0.2% allocated to climate-health and 0–0.1% focused on mental health. This is consistent with the findings of the existing research on other countries and regions, which has shown that national adaptation plans often prioritize infrastructure, planning systems, and administrative mechanisms over the mental and social dimensions of vulnerability^{46,47}.

Further analysis of how mental health is discussed in relation to specific climate stressors, such as floods, droughts, or extreme weather, underscores this disconnect. References to mental health linked explicitly to such events (e.g., “floods AND trauma”) were exceedingly rare. Kazakhstan included only 0.02% of such content, and the other countries made no mention at all. By contrast, standalone mental health terminology appeared slightly more often: 0.08% in Kazakhstan and 0.1% in Tajikistan. This suggests that, even when mental health is acknowledged, it is seldom contextualized within the lived realities of climate-related disasters. This is especially concerning given the well-documented mental health consequences of such events, which can include post-traumatic stress disorder (PTSD), anxiety, and depression^{48,49}. The results point to a need for greater integration of psychological and psychosocial dimensions into national adaptation strategies, particularly in climate-vulnerable regions. These quantitative gaps mirror broader structural challenges in Central Asia, where both climate adaptation systems and mental health care infrastructure face underfunding and institutional fragmentation⁵.

These quantitative findings reveal that mental health receives minimal explicit attention (0–0.1% of text) compared to broader governance themes (1–2%) in Central Asian policies. While this disparity may reflect structural differences in term scope (e.g., climate strategy’ vs. mental health’), the near absence of psychosocial terminology aligns with documented gaps in climate adaptation frameworks globally^{42,43}. To explore why mental health remains marginal regionally, we next analyze institutional capacity and policy implementation.

Qualitative analysis

These qualitative findings corroborate our quantitative analysis in the section “Quantitative keyword analysis results”, showing that, while some countries (particularly Kazakhstan) have begun developing institutional frameworks for climate-health governance, mental health considerations remain notably absent or weakly integrated. The results from Table 1 highlight how adaptation frameworks in the four Central Asian countries vary in their treatment of climate change as a public health threat, particularly in relation to mental health.

Kazakhstan stands out for its relatively advanced framing of general health as a multifaceted climate risk; however, explicit mental health considerations are minimal, highlighting a blind spot in policy integration. It explicitly addresses environmental stressors such as heatwaves, droughts, and food insecurity, all of which are known to contribute to mental distress. While Kazakhstan’s adaptation plans do not name “mental health” directly, they imply recognition of significant psychosocial risks from compounding stressors, especially in urban and gendered contexts. This finding aligns with a recent World Bank report, which notes that Kazakhstan references general public health threats posed by climate risks yet has no targeted strategies in place to address climate-induced psychological stress⁵⁰. It is important to note, however, that even in Kazakhstan, where climate-health linkages are most developed, the adaptation strategy remains limited in scope and often lacks explicit mental health programming, reflecting a broader institutional neglect of psychosocial well-being in both climate and health agendas.

Tajikistan also adopts a cross-sectoral approach in its National Strategy for Adaptation to Climate Change (NSACC 2030), identifying climate shocks, poverty, and gender vulnerability. However, it fails to specify mental health outcomes, instead treating them as part of broader social vulnerability. Tajikistan, which faces frequent natural disasters, mentions health resilience in its climate action plans but omits the mental toll of recurring floods and displacement⁵¹. These results suggest that, while both Kazakhstan and Tajikistan acknowledge climate change as a public health risk, Kazakhstan’s policies primarily address general health, with only implicit links to mental health and gendered burdens; Tajikistan’s approach similarly lacks explicit psychosocial specificity.

By contrast, Kyrgyzstan and Uzbekistan lack direct acknowledgment of mental health, and their observed policy coherence and adaptation actions refer only to general health and institutional structures. Uzbekistan emphasizes the health impacts in the Aral Sea region but limits its focus to general health services and physical disease burden. Similarly, Kyrgyzstan addresses public health vulnerabilities and non-communicable diseases

but does not connect these to psychological stressors from climate disasters. Kyrgyzstan's adaptation priorities focus on infectious diseases and maternal health, with limited attention to mental or emotional well-being¹⁷.

The lack of mental health integration across national frameworks reflects a broader regional trend where psychosocial consequences of climate events are marginalized in health planning. Gender-health linkages are most developed in Kazakhstan, where the dual caregiving and farming burden on women is recognized. Tajikistan includes gender-sensitive indicators, but with less specificity, while Uzbekistan and Kyrgyzstan adopt fragmented approaches. These gaps are potentially important given evidence linking gender roles with elevated mental health vulnerabilities during climate disasters^{17,51}. Critically, this disconnect persists despite WHO reports explicitly linking climate change to psychosocial risks⁸. Even in Kazakhstan and Tajikistan—where climate-health governance is relatively advanced—mental health remains marginal in adaptation planning, highlighting a systemic failure to translate global evidence into national policy.

We reviewed supporting reports and assessments to determine the state of policy implementation. Kazakhstan and Kyrgyzstan show relatively advanced implementation through NAPs and health-sector integration, supported by national ministries and international partners (e.g., World Bank, UNDP)^{50,52}. In contrast, Tajikistan and Uzbekistan are still building foundational capacity, with most climate-health interventions dependent on international technical and financial assistance^{53,54}. These disparities highlight the importance of institutional readiness in translating policy into practice.

The institutional architecture for climate-health governance in Central Asia is fragmented. In particular, mental health services are underdeveloped. In Kazakhstan, while health and environment ministries coordinate on climate-related disease surveillance, mental health is not part of their joint agenda¹⁷. Kyrgyzstan has launched health sector reforms under its Climate Adaptation Strategy, but mental health remains an unfunded and understaffed component⁵⁵. In Tajikistan, chronic underfunding of the health sector limits the state's ability to expand mental health infrastructure, especially in rural areas where climate vulnerability is highest⁵⁶. Cross-sectoral coordination, technical training, and budget allocations in all four countries prioritize physical health systems, leaving a gap in psychosocial preparedness and recovery. This suggests that, rather than focusing only on the absence of climate-mental health integration, it is equally critical to highlight the general institutional neglect of mental health, which constrains any potential climate-related mental health programming from the outset.

Climate-related disaster risks such as floods, droughts, and extreme heat are escalating across Central Asia, yet few countries have embedded mental health support in their disaster risk reduction frameworks. In Kazakhstan, emergency response plans include shelter, food, and basic healthcare but overlook trauma counseling and post-disaster psychological services⁵⁰. Tajikistan's adaptation framework includes early warning systems and infrastructure reinforcement, but not emotional support for displaced or traumatized populations⁵¹. In Kyrgyzstan, disaster risk governance acknowledges community vulnerability but lacks any reference to mental health outcomes¹⁷.

As extreme events increase in frequency, national frameworks must evolve to recognize and address the long-term mental health impacts on affected communities. Cyclones Idai (2019), Kenneth (2019), Gombe (2022), and Chido (2024) damaged dozens of facilities and triggered psychological distress in Mozambique. Médecins Sans Frontières delivered over 100 psychological consultations post-Chido⁵⁷. However, mental health and psychosocial support remain peripheral in national emergency planning, while over 150 health facilities across all districts offer services, Mozambique still faces a severe shortage of trained mental health workers, and lacks coordinated policies and cross-sector structures to guide psychosocial response⁵⁸. This calls for a more foundational policy shift, rather than merely an additive fix within existing frameworks.

Table 2 assesses how well-positioned the four countries are to operationalize climate-health linkages through their public health systems, including institutional coordination and financial mobilization.

Kazakhstan exhibits relatively strong institutional integration, with the Ministry of Health involved in adaptation planning and the Environmental Code including health safeguards. However, these frameworks focus on general health; mental health capacity remains underdeveloped, and any potential psychosocial benefits are indirect and unplanned. Kazakhstan's institutional strength is further evidenced by integration of mental health into primary care, with reforms to reduce stigma and enhance legal protections¹⁵. These efforts have improved access and contributed to reduced suicide rates among vulnerable groups. Additionally, cross-ministerial coordination between health and environment ministries supports disease surveillance but still falls short of explicitly including mental health in the agenda¹⁸.

Kyrgyzstan similarly shows promise through strong health infrastructure targets in its NDC and access to significant adaptation finance (over \$141 million). These investments aim to build sustainable health systems, though mental health is not a specific priority. Rural-urban disparities persist in access to mental health care, and adolescent mental health is increasingly a concern²¹. Much like Kazakhstan, Kyrgyzstan's policy follow-through is limited by persistent under-resourcing and governance limitations. The lack of inclusion of mental health in policy and funding decisions may reflect not only neglect of climate-related psychological risks, but also a broader systemic disregard for mental health services⁵¹.

In contrast, Tajikistan and Uzbekistan face considerable institutional and financial constraints. Despite incorporating health and gender into national strategies, Tajikistan lacks technical capacity and suffers from weak institutional coordination. Its annual requirement of \$1 billion for climate action by 2030 – much of it reliant on international support (e.g., UNDP) – signals major implementation gaps. Chronic underfunding of the health sector further restricts its ability to expand mental health infrastructure, particularly in rural areas where climate vulnerability is highest²⁰. A UNICEF rapid assessment revealed weak coordination between health, education, and social protection services, despite some school-based psychosocial support initiatives¹⁹.

Uzbekistan is at an earlier stage of adaptation planning. Although health is referenced in coordination with GCF-UNDP projects, mental health is entirely omitted, and policy implementation suffers from capacity and

coordination barriers. The country continues to rely on a centralized psychiatric care model, with minimal integration into primary healthcare. While reforms are underway, implementation remains limited¹⁶.

To provide more nuanced insights, we utilized proxies such as the World Governance Indicators (WGI), which offer valuable data on governance quality across dimensions such as government effectiveness, regulatory quality, and corruption control⁵⁹. These indicators help assess the overall institutional environment in each country. Additionally, we considered health system quality proxies, including World Health Organization (WHO) assessments and health sector rankings, to gauge the capacity and readiness of national health systems to implement climate adaptation strategies. These proxies suggest that, while Kazakhstan and Kyrgyzstan show relatively stronger institutional performance, Tajikistan and Uzbekistan are still grappling with significant governance challenges that affect policy implementation in the climate-health nexus.

Assessing the financial requirements for addressing the climate-mental health nexus in Central Asia necessitates an understanding of both current expenditures and projected needs. The World Health Organization (WHO) estimates that common mental disorders such as depression and anxiety cost the global economy approximately US\$1 trillion annually due to lost productivity. This figure is anticipated to rise as climate change exacerbates mental health challenges, especially in vulnerable regions⁶⁰. Despite the growing burden, mental health remains underfunded globally, with governments allocating less than 2% of their health budgets to mental health services. In low- and middle-income countries, including those in Central Asia, this percentage is often even lower. Furthermore, less than 0.5% of international climate adaptation financing is directed toward health, with an even smaller fraction allocated to mental health and psychosocial support⁸.

While exact estimates for Central Asia are limited, studies have shown that natural disasters and climate-related stressors can lead to substantial increases in mental health burdens⁴². Globally, mental health conditions are already responsible for economic losses exceeding US\$2.5 trillion annually⁶¹, and returns on investment in mental health care can be as high as 4 to 1⁶², highlighting the economic imperative for proactive intervention.

While climate adaptation policies in Central Asia increasingly recognize public health risks, the capacity of national mental health systems remains uneven, which limits the translation of policy into practice. These disparities underscore the urgent need to integrate mental health more explicitly into adaptation planning, backed by dedicated financing, institutional support, and cross-sectoral governance structures. Without addressing these systemic gaps, the psychosocial impacts of climate change will remain inadequately managed, undermining both public health outcomes and climate resilience in the region.

Table 3 compares national adaptation actions and frameworks to determine how disaster risks are translated into health-focused responses, particularly around resilience, gender, and public health systems. The analysis reveals that Kazakhstan demonstrates strong planning alignment; its Strategy 2050 and Green Economy Concept include gender-sensitive and health-infrastructure components. The country uses a structured monitoring, reporting, and verification (MRV) system linked to its NDC roadmap, enabling regular policy reviews and adjustments. This institutional sophistication positions Kazakhstan well for adaptive learning and policy feedback loops, key elements for health system resilience. However, emergency response plans in Kazakhstan, while including shelter, food, and basic healthcare, overlook trauma counseling and post-disaster psychological services^{50,63}. This omission highlights a worldwide trend: even well-developed adaptation architectures may fail to fully integrate mental health into disaster responses.

Kyrgyzstan is similarly advancing its adaptation governance. It is building MRV reforms and promoting health risk forecasting and climate-sensitive urban planning. Its disaster risk reduction (DRR) programs include health components, indicating growing cross-sectoral awareness. However, mental health remains absent from these frameworks⁸. Although disaster risk governance acknowledges community vulnerability, it still lacks explicit reference to psychosocial outcomes. This gap suggests that while Kyrgyzstan's planning trajectory is promising, the lack of mental health integration could undermine the country's capacity to ensure holistic resilience.

Tajikistan incorporates inclusive, risk-informed public health strategies into its adaptation policies (e.g., NSACC 2030), supported by international programs such as the GCF-UNDP. Its MRV process, which runs from 2020 to 2030, is still developing and heavily reliant on regional partnerships (e.g., CAREC, IFAS). These external collaborations are essential, given the country's limited domestic capacity. Despite early warning systems and infrastructure reinforcement, however, the framework does not provide emotional or psychological support for displaced or traumatized populations⁵¹. Tajikistan's case illustrates the disconnect between policy ambition and implementation constraints, especially in addressing the hidden burdens of disaster-related mental trauma.

Uzbekistan, by contrast, remains at a nascent stage. Its adaptation focus is primarily on environmental disasters in the Aral Sea region, with attention to water scarcity and desertification. While early warning systems and infrastructure improvements are underway, health is not central to the adaptation discourse, and MRV systems are only in initial development stages.

The absence of health-focused resilience in Uzbekistan, including mental health, reinforces the pattern seen across the region, where physical infrastructure dominates adaptation responses, and psychosocial dimensions are neglected. In fact, it may be premature to assume robust climate adaptation strategies exist across Central Asia; for some countries, both adaptation and mental health are underdeveloped policy areas, making their intersection even more marginal.

The findings suggest that Kazakhstan and Kyrgyzstan have more advanced frameworks in general health and gender-sensitive adaptation actions, with evolving monitoring systems. However, mental health integration remains minimal, highlighting a critical blind spot even within otherwise advanced frameworks. Meanwhile, Tajikistan and Uzbekistan remain at an early-stage in aligning disaster risks with health-focused resilience and mental health planning, and are further constrained by institutional, technical, and financial challenges. The overall regional context thus points to a dual challenge: the underdevelopment of both climate adaptation governance and mental health systems, which complicates efforts to integrate them meaningfully.

Thematic co-occurrence in climate adaptation policies

Thematic network analysis (Figure 2) complements the broader findings by visualizing patterns of keyword co-occurrence related to climate, health, and mental health within policy texts, offering a comparative view of symbolic versus substantive integration across four Central Asian countries. The figure presents keyword network diagrams derived from each country’s Nationally Determined Contribution (NDC), focusing on how terms associated with climate, health (particularly mental health), and policy appear in relation to one another. Each network is constructed from a single NDC document per country and thus provides a snapshot—rather than a comprehensive representation—of national policy framing. Nodes in each diagram represent individual keywords, color-coded by theme: mental health (red), climate/health (blue), and policy (green). The connections (edges) between nodes represent co-occurrence, defined as two keywords appearing within a 10-word range of each other in the text. The thickness of the edge corresponds to the frequency of such co-occurrences—this is referred to here as “connection strength.” Node size reflects how frequently each keyword appears in the document overall, indicating its relative salience.

Networks do uncover notable trends. In Kazakhstan’s NDC, the network shows moderate linkage among policy and climate terms—such as “implementation,” “adaptation,” and “strategy”—which cluster around institutional planning and coordination. However, mental health terms appear minimally, with “stress” emerging as a marginal and weakly connected node, signaling limited policy engagement with psychosocial dimensions of climate risk. The Kyrgyz Republic presents the densest and most interconnected network for general health and institutional terms, but mental health-related terms remain limited, indicating that the framing is still largely incomplete with respect to psychosocial dimensions. Tajikistan’s network is centered on “adaptation,” “framework,” and “resilience,” suggesting strong policy structuring around climate adaptation. Terms related to vulnerability and disaster are moderately connected, yet health—particularly mental health—remains weakly represented. Although “stress” and “support” are present, their peripheral positions reflect a gap between acknowledgment of climate impacts and concrete health planning. Uzbekistan’s NDC reveals the sparsest network, with weak connectivity between core policy terms and few meaningful links to health or climate vulnerability. Keywords such as “implementation,” “strategy,” and “plan” dominate, while mental health is largely absent. The limited thematic diversity and weak node interlinkages suggest a siloed approach, with minimal attention to cross-sectoral integration.

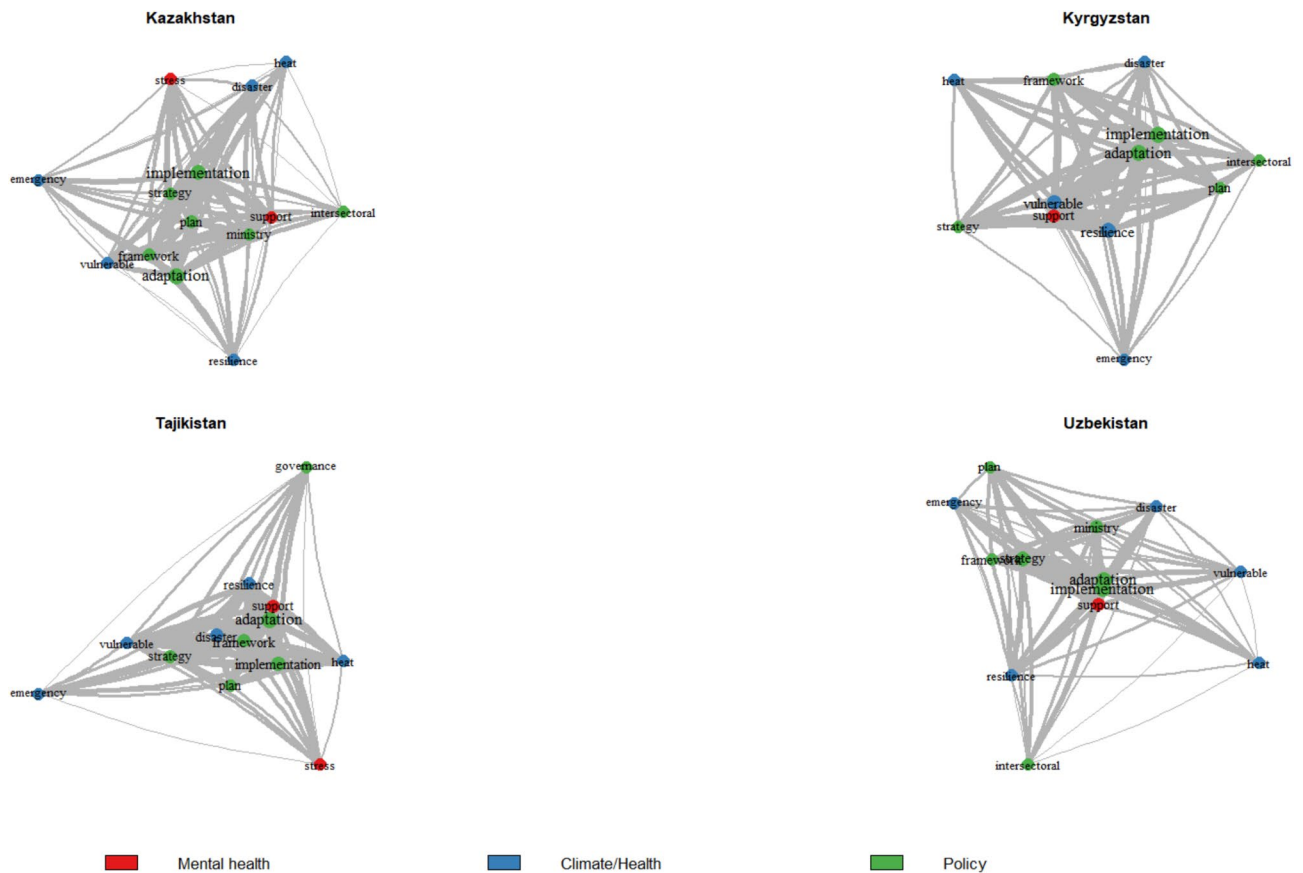


Fig. 2. Co-occurrence of mental health and climate-health themes in policy documents.

These patterns reveal a broader regional trend: health and vulnerability are partially recognized in climate adaptation, but mental health is consistently weak or entirely absent, underscoring its symbolic rather than substantive presence across Central Asia. The lack of strong connections between mental health terms and implementation-oriented concepts (e.g., strategy, support, framework) underscores its symbolic rather than substantive presence. This aligns with global assessments showing that while mental health is increasingly acknowledged as climate-relevant, it remains poorly integrated into institutional frameworks^{42,47,48}. Strengthening the inclusion of psychosocial risks in climate adaptation will require both more detailed policy articulation and improved cross-sectoral planning mechanisms.

Our analyses show that the minimal recognition of climate-related mental health risks across Kazakhstan, Kyrgyzstan, Tajikistan, and Uzbekistan can lead to substantial distortions in how adaptation priorities are framed and resourced, influencing not only health-specific interventions but also broader institutional dimensions such as governance, financing, and vulnerability planning. This underscores the need to improve the representation of psychosocial impacts and their socioeconomic determinants in national adaptation frameworks, as the current omission risks generating policy bias, here manifesting as an implicit assumption of a uniformly resilient population. It may be even more important to differentiate among the drivers of psychosocial vulnerability, such as poverty, gendered caregiving roles, service accessibility, and exposure to climate extremes, rather than treating mental health as a secondary or implicit outcome of general adaptation measures. Our approach enables the systematic identification of gaps in how countries integrate mental health within climate governance architectures and thereby provides a tool for reducing policy aggregation bias in national and regional adaptation assessments. In this study, we treated institutional capacity as a complex driver of climate–health integration (for example, coordination mechanisms, financing readiness, and legal mandates), which shapes whether mental health is acknowledged or omitted. This approach could be further refined by explicitly modelling changes in these drivers, rather than relying solely on exogenous document patterns, to understand how institutional evolution may influence future integration of psychosocial dimensions. This is an important step toward strengthening adaptation planning so that it more effectively supports vulnerable communities facing climate-induced psychological risks.

Data availability

The study analyzes English-language versions of Nationally Determined Contributions (NDCs) obtained from official government sources. While the original documents are available through national climate policy portals, the exact versions used in this analysis (including verified English translations) have been permanently archived and are accessible via: UNFCCC NDC Registry (<https://unfccc.int/NDCREG>) 1. Uzbekistan NDC (2021). [File: https://unfccc.int/sites/default/files/NDC/2022-06/Uzbekistan_Updated%20NDC_2021_EN.pdf] 2. Tajikistan NDC (2021) [File: <https://unfccc.int/documents/497629>] 3. Kyrgyzstan NDC (2021) [File: <https://unfccc.int/documents/497629>] 4. Kazakhstan NDC (2023) [File: <https://unfccc.int/NDCREG>].

Appendix 1

See in Table 4.

Theme	Keywords
Mental health focus	“mental health”, “psychosocial”, “psychological support”, “depression”, “trauma”, “anxiety”, “health stress”
Climate and health link	“climate-related health”, “climate change and health”, “heat stress”, “natural disaster”, “resilience”, “emergency preparedness”, “vulnerable populations”
Policy/institutional structure	“adaptation policy”, “national adaptation plan”, “climate strategy”, “institutional framework”, “implementation”, “intersectoral”, “governance”, “public health ministry”

Table 4. Key themes and keywords.

Received: 21 June 2025; Accepted: 2 January 2026

Published online: 25 January 2026

References

- Kattel, G. R. Climate warming in the Himalayas threatens biodiversity, ecosystem functioning and ecosystem services in the 21st century: Is there a better solution?. *Biodivers. Conserv.* **31**(8), 2017–2044 (2022).
- Ullah, A., Bavorova, M., Shah, A. A. & Kandel, G. P. Climate change and rural livelihoods: The potential of extension programs for sustainable development. *Sustain. Dev.* **32**(5), 4992–5004 (2024).
- Ullah, A. & Bavorova, M. Adaptive capacity and climate resilience of mountain pastoralist communities under extreme weather stress. *Environ. Sci. Polic.* **171**, 104153 (2025).
- Reyer, C. P., Otto, I. M., Adams, S., Albrecht, T., Baarsch, F., Carlsburg, M., ... & Stagl, J. Climate change impacts in Central Asia and their implications for development. *Reg. Environ. Chang.* **17**, 1639–1650 (2017).
- Hook, K. & Bogdanov, S. Mental health care in Eastern Europe and Central Asia: An analysis of needs and a call for greater investment. *Lancet Reg. Health-Eur.* **10**, 100182 (2021).
- Maci, S. M., & Abbiati, S. Climate change as a threat to global health. The Perspective of the WHO. In *Critical Approaches to Polycrisis: Discourses of Conflict, Migration, Risk, and Climate* (pp. 177–208). (Cham, Springer Nature Switzerland, 2025).
- Basistha, B., Paul, F. A., Bhuyan, K., Prasad, J. S. R. & Ali, A. Climate change and mental health in India: A narrative review of vulnerabilities, impacts, and resilience pathways. *Front. Pub. Health* **13**, 1686876 (2025).

8. World Health Organization *Mental health and climate change: Policy brief* <https://www.researchgate.net/publication/362776434> (2022).
9. Palinkas, L. A. & Wong, M. Global climate change and mental health. *Curr. Opin. Psychol.* **32**, 12–16 (2020).
10. Amin, S. Climate-related psychological distress: Exploring the global nexus of climate change and mental health. *Sustain. Develop.* **6456–6474** (2025).
11. Winkler, P. et al. A blind spot on the global mental health map: A scoping review of 25 years' development of mental health care for people with severe mental illnesses in central and eastern Europe. *Lancet Psychiatr.* **4**(8), 634–642 (2017).
12. United for Global Mental Health. Integrating mental health into climate change adaptation policies. UnitedGMH & Climate Cares. <https://unitedgmh.org/app/uploads/2025/07/Integrating-Mental-Health-into-Climate-Change-Adaptation-Policies.pdf> (2025).
13. Rechel, B., Richardson, E. & McKee, M. Trends in health systems in the former Soviet countries: Bernd Rechel. *Eur. J. Pub. Health* **24**(suppl_2), ckul62-088 (2014).
14. Aliev, A. A. et al. Widespread collapse, glimpses of revival: A scoping review of mental health policy and service development in Central Asia. *Soc. Psychiatry. Psychiatr. Epidemiol.* **56**(1329), 1340 (2021).
15. WHO Europe. It can be done – combating stigma and discrimination for better mental health services in Kazakhstan. Retrieved May 8, 2025, from <https://www.who.int/europe/news/item/10-10-2022-it-can-be-done---combating-stigma-and-discrimination-for-better-mental-health-services-in-kazakhstan> (2022).
16. Smekhov, E. Review of current status and ongoing reforms of the mental health system in Uzbekistan. *BJPsych. Int.* <https://doi.org/10.1192/bji.2024.27> (2024).
17. World Health Organization. Roadmap for Health and Well-being in Central Asia. WHO Regional Office for Europe. <https://iris.who.int/bitstream/handle/10665/364330/WHO-EURO-2022-5905-45670-65601-eng.pdf?isAllowed=y&sequence=1> (2022).
18. World Health Organization. Regional office for Europe. Health systems in action: Insights – Kazakhstan <https://iris.who.int/bitstream/handle/10665/380239/9789289059787-eng.pdf?sequence=1> (2022c).
19. UNICEF. Rapid assessment of the systems' response to adolescent mental health in Tajikistan. UNICEF Tajikistan. Retrieved May 8, 2025, from <https://www.unicef.org/tajikistan/reports/rapid-assessment-systems-response-adolescent-mental-health-tajikistan> (2022).
20. UNICEF Tajikistan. Tajikistan country office annual report 2023. <https://www.unicef.org/media/152066/file/Tajikistan-2023-COA-R.pdf> (2023).
21. United Nations in Kyrgyzstan. Mental disorders affect 11% of the population in Kyrgyzstan. Retrieved May 8, 2025, from <https://kyrgyzstan.un.org/en/283239-mental-disorders-affect-11-population-kyrgyzstan> (2023).
22. Aliev, A. A. & Salisbury, T. T. Recommendations for mental health reforms in Uzbekistan: A policy report. *Cent. Asian J. Global Health* **9**(1), e513 (2020).
23. Takeuchi, N. et al. The disappearance of glaciers in the Tien Shan Mountains in Central Asia at the end of the Pleistocene Quat. *Sci. Rev.* **103**, 26–33 (2014).
24. Pohl, E., Gloaguen, R., Andermann, C. & Knoche, M. Glacier melt buffers river runoff in the Pamir Mountains. *Water Resour. Res.* **53**(3), 2467–2489 (2017).
25. Ullah, A. Forest landscape restoration and its impact on social cohesion, ecosystems, and rural livelihoods: Lessons learned from Pakistan. *Reg. Environ. Chang.* **24**(1), 26 (2024).
26. Fallah, B., Didovets, I., Rostami, M. & Hamidi, M. Climate change impacts on Central Asia: Trends, extremes and future projections. *Int. J. Climatol.* **44**(10), 3191–3213 (2024).
27. Loodin, N. Aral Sea: An environmental disaster in twentieth century in Central Asia. *Model. Earth Syst. Environ.* **6**(4), 2495–2503 (2020).
28. Liu, W., Liu, L. & Gao, J. Adapting to climate change: Gaps and strategies for Central Asia. *Mitig. Adapt. Strateg. Global Chang.* **25**, 1439–1459 (2020).
29. Kovaleva, M., Leal Filho, W., Borgemeister, C. & Komagaeva, J. Central Asia: Exploring insights on gender considerations in climate change. *Sustainability* **15**(16), 12667 (2023).
30. Shimwela, N. & Katera, L. Strengthening Link between National Adaptation Plans (NAPs), Sector policies and national development plans: Implications for climate change governance. *Environ. Manag.* 1–14 (2025).
31. Turner, G., deDonato, F., Kovats, S., Hoeben, A. & Nordeng, Z. Implementation of adaptation to climate change in public health in Europe: Qualitative thematic analysis. *Lancet* **400** S81 (2022).
32. Hsieh, H. F. & Shannon, S. E. Three approaches to qualitative content analysis. *Qual. Health Res.* **15**(9), 1277–1288 (2005).
33. Walther, J. et al. Qualitative research quality: A collaborative inquiry across multiple methodological perspectives. *J. Eng. Educat.* **106**(3), 398–430 (2017).
34. Castañer, X. & Oliveira, N. Collaboration, coordination, and cooperation among organizations: Establishing the distinctive meanings of these terms through a systematic literature review. *J. Manag.* **46**(6), 965–1001 (2020).
35. Wiedemann, G. *Text mining for qualitative data analysis in the social sciences.* (Springer Vs 2016).
36. Welbers, K., Van Atteveldt, W. & Benoit, K. Text analysis in R. *Commun. Method. Meas.* **11**(4), 245–265 (2017).
37. Silge, J. & Robinson, D. tidytext: Text mining and analysis using tidy data principles in R. *J. Open Sour. Softw.* **1**(3), 37 (2016).
38. Benoit, K. et al. quantda: An R package for the quantitative analysis of textual data. *J. Open Sourc. Softw.* **3**(30), 774–774 (2018).
39. Csardi, G. & Nepusz, T. The igraph software. *Complex. Syst.* **1695**, 1–9 (2006).
40. Romanello, M., Di Napoli, C., Drummond, P., Green, C., Kennard, H., Lampard, P. & Costello, A. The 2022 report of the Lancet Countdown on health and climate change: health at the mercy of fossil fuels. *Lancet* **400** 10363 1619–1654 (2022).
41. Quinn, C., Quintana, A., Blaine, T., Chandra, A., Epanchin, P., Pitter, S. & Balbus, J. Linking science and action to improve public health capacity for climate preparedness in lower-and middle-income countries. *Clim. Polic.* **22**(9–10), 1146–1154 (2022).
42. Charlson, F. et al. Climate change and mental health: A scoping review. *Int. J. Environ. Res. Pub. Health* **18**(9), 4486 (2021).
43. Middleton, J. It's so hard to put tangible figures to it: Examining climate change impacts on Inuit mental health in Nunatsiavut, Labrador (Doctoral dissertation, University of Guelph) (2020).
44. Schipper, E. L. F. Climate change adaptation and development: Exploring the linkages. Tyndall centre for climate change research working paper **107** 13 (2007).
45. Eriksen, S. H. & O'Brien, K. Vulnerability, poverty and the need for sustainable adaptation measures. *Clim. Polic.* **7**(4), 337–352 (2007).
46. Berry, H. L., Waite, T. D., Dear, K. B., Capon, A. G. & Murray, V. The case for systems thinking about climate change and mental health. *Nat. Clim. Chang.* **8**(4), 282–290 (2018).
47. Cianconi, P., Betrò, S. & Janiri, L. The impact of climate change on mental health: A systematic descriptive review. *Front. Psychiatry.* **11**, 490206 (2020).
48. Hayes, K., Blashki, G., Wiseman, J., Burke, S. & Reifels, L. Climate change and mental health: Risks, impacts and priority actions. *Int. J. Mental. Health Syst.* **12**, 1–12 (2018).
49. Vins, H., Bell, J., Saha, S. & Hess, J. J. The mental health outcomes of drought: A systematic review and causal process diagram. *Int. J. Environ. Res. Pub. Health* **12**(10), 13251–13275 (2015).
50. World Bank. Kazakhstan country climate and development report. World Bank. Retrieved May 8, 2025, from <https://www.worldbank.org/en/country/kazakhstan> (2024).
51. Legro, S. Climate change and health in Central Asia: A literature review (2024).

52. United Nations Development Programme. Kyrgyzstan national adaptation plan and health sector engagement. UNDP. Retrieved May 8, 2025, from <https://www.undp.org/kyrgyzstan> (2024).
53. World Bank. Tajikistan country climate and development report. World Bank. Retrieved May 8, 2025, from <https://www.worldbank.org/en/country/tajikistan> (2023).
54. World Bank. Uzbekistan climate resilience report. World Bank. Retrieved May 8, 2025, from <https://www.worldbank.org/en/country/uzbekistan> (2023).
55. United Nations Development Programme (UNDP). UNDP Kyrgyzstan annual report 2023. https://www.undp.org/sites/g/files/zs/kgke326/files/2024-04/en_27_02_2024_undp_kyrgyzstan_annual_report_2023.pdf (2024).
56. UNICEF. Tajikistan country office annual report 2023. <https://www.unicef.org/media/152066/file/Tajikistan-2023-COAR.pdf> (2024).
57. Médecins Sans Frontières. Emergency response in Mozambique following Cyclone Chido. <https://www.msf.org/mozambique?utm> (2024).
58. UNICEF. Mental health and psychosocial support in brief. UNICEF Mozambique. Retrieved from <https://www.unicef.org/mozambique/en/mental-health-psycho-social-support-brief-0> (2024).
59. World Bank. Worldwide governance indicators. World Bank. Retrieved from <https://info.worldbank.org/governance/wgi/> (2020).
60. Corvalan, C. et al. Mental health and the global climate crisis. *Epidemiol. Psych. Sci.* **31**, e86 (2022).
61. Patel, V., Saxena, S., Lund, C., Thornicroft, G., Baingana, F., Bolton, P. & Unützer, J. The Lancet Commission on global mental health and sustainable development. *Lancet* **392**(10157), 1553–1598 (2018).
62. Chisholm, D. et al. Scaling-up treatment of depression and anxiety: A global return on investment analysis. *Lancet Psych.* **3**(5), 415–424 (2016).
63. Government of the Republic of Kazakhstan. Strategy Kazakhstan 2050: A new political course of the established state. <https://policy.asiapacificenergy.org/sites/default/files/Presidential%20Address%20%27Strategy%20Kazakhstan-2050%27%20%28EN%29.pdf> (2012).

Acknowledgements

Acknowledgements: The authors thank the Norwegian Institute of International Affairs (NUPI) for supporting the article processing charges for this publication.

Author contributions

A.U.: Conceptualization, writing of original draft, data analysis M.J.: Review and editing, supervision M.B.: Review and editing I.O.: Supervision.

Declarations

Competing interests

The authors declare no competing interests.

Additional information

Correspondence and requests for materials should be addressed to A.U.

Reprints and permissions information is available at www.nature.com/reprints.

Publisher's note Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

Open Access This article is licensed under a Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International License, which permits any non-commercial use, sharing, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if you modified the licensed material. You do not have permission under this licence to share adapted material derived from this article or parts of it. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit <http://creativecommons.org/licenses/by-nc-nd/4.0/>.

© The Author(s) 2026