

Medication-Overuse Headache in the Gulf Cooperation Council: From Fragmented Evidence to Integrated Care Priorities

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Medication-Overuse Headache in the Gulf Cooperation Council: From Fragmented Evidence to Integrated Care Priorities

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Abstract

Objective: To map medication-overuse headache evidence across the Gulf Cooperation Council, clarify methodological variation, identify gaps, and derive priorities for coordinated prevention and care.

Background: Medication-overuse headache is preventable and treatable, yet Gulf evidence remains geographically concentrated and methodologically heterogeneous. Differences in sampling, denominators, diagnostic ascertainment, and care pathways may influence apparent burden.

Methods: We conducted a scoping review of Gulf Cooperation Council evidence from 1 January 2010 through 27 July 2026, followed by separately reported post-registration quality-control and corrective verification through 15 August 2026. The original formal search yielded 412 records in aggregate; source-specific retrieval counts and exact database-specific strings were not retained. Studies were mapped by population, denominator, ascertainment method, and evidence category. Heterogeneity precluded meta-analysis.

Results: The final evidence map comprised 13 unique primary studies (Saudi Arabia, 11; Kuwait, 2) plus one linked Saudi companion report. In Saudi Arabia, observed probable medication-overuse headache was 41/2,316 (1.8%; 95% confidence interval, 1.3%-2.4%), with an age- and sex-adjusted estimate of 2.0%. A Kuwait adult community survey reported source-reported medication-overuse headache of 2.4%, algorithmically ascertained using

the Headache-Attributed Restriction, Disability, Social Handicap and Impaired Participation questionnaire; a Kuwait school study identified probable medication-overuse headache in 5/1,089 students (0.46%). A selected Saudi clinical migraine cohort reported medication-overuse headache in 17.1% of 152 adults with migraine. No eligible primary estimate was included from Bahrain, Oman, Qatar, or the United Arab Emirates. Non-probability questionnaire studies generated higher estimates but are not interpretable as population prevalence.

Conclusion: Gulf Cooperation Council medication-overuse headache burden is measurable but incompletely mapped. Harmonized ascertainment, medication-day recording, and coordinated pharmacy-primary-care-specialist pathways should be prospectively evaluated. These lessons apply beyond the region where fragmented care and multiple acute-medication access points complicate recognition and prevention.

Plain Language Summary

Medication-overuse headache can develop when people with a pre-existing headache disorder use acute headache medicines too frequently, contributing to more frequent or chronic headache and avoidable disability. Across the Gulf Cooperation Council, we found 13 primary studies, almost entirely from Saudi Arabia and Kuwait, with substantial differences in populations and diagnostic methods and no comparable primary estimate from four member states. Recording headache and medication-use days and linking pharmacies, primary care, and specialist services may improve recognition and prevention, but these care pathways require prospective evaluation.

Keywords: medication-overuse headache; migraine; Gulf Cooperation Council; scoping review; headache services; health services research

Abbreviations: **CGRP**, calcitonin gene-related peptide; **CI**, confidence interval; **EAN**, European Academy of Neurology; **GCC**, Gulf Cooperation Council; **HARDSHIP**, Headache-Attributed Restriction, Disability, Social Handicap and Impaired Participation questionnaire; **ICHD**, International Classification of Headache Disorders; **ICHD-II**, International Classification of Headache Disorders, 2nd edition; **ICHD-3**, International Classification of Headache Disorders, 3rd edition; **JB**, Joanna Briggs Institute; **MOH**, medication-overuse headache; **NSAIDs**, nonsteroidal anti-inflammatory drugs; **OSF**, Open Science Framework; **OTC**, over-the-counter; **pMOH**, probable medication-overuse headache; **PRISMA**, Preferred Reporting Items for Systematic Reviews and Meta-Analyses; **PRISMA-ScR**, Preferred Reporting Items for Systematic Reviews and Meta-Analyses Extension for Scoping Reviews; **SSQ-MOH**, Self-Screening Questionnaire for Medication Overuse Headache; **UAE**, United Arab Emirates.

Introduction

Medication-overuse headache (MOH) is a common, preventable, and potentially reversible cause of chronic headache. The International Classification of Headache Disorders, 3rd edition (ICHD-3), defines MOH as headache on at least 15 days per month in a person with a pre-existing headache disorder, developing with regular overuse of acute or symptomatic headache medication for more than 3 months and not better accounted for by another diagnosis ¹. In migraine, repeated acute-medication use may emerge when attacks are frequent, acute response is incomplete, prevention is delayed or insufficient, or care remains episodic rather than longitudinal ^{2,3}.

MOH is associated with disability, impaired quality of life, work or school disruption, and increased healthcare use ^{2,3}. Its population burden is difficult to define because estimates depend on sampling, denominator, and case ascertainment. Specialist-confirmed ICHD-3 MOH, algorithmically derived probable MOH (pMOH), questionnaire proxies, medication-overuse behavior, and awareness measures are related but distinct outcomes. These distinctions determine whether apparent differences reflect epidemiology or measurement.

Previous reviews have described migraine epidemiology, treatment patterns, and unmet needs across Arab, Middle Eastern, and Gulf Cooperation Council (GCC) populations ⁴⁻⁶, but not GCC MOH specifically. The GCC is scientifically informative because geographic and sociocultural commonality coexists with meaningful variation in medication access, pharmacy regulation, financing, public-private pathways, and specialist services ^{5,6}. The six states should therefore be examined as related but nonuniform health systems.

For this review, **fragmented migraine care** means recurrent headache managed through poorly coordinated encounters rather than longitudinal disease management. Patients may obtain acute medication through pharmacies, primary care, emergency departments, private clinics, or specialist services without shared documentation of headache days, medication-use days, treatment response, prevention, reduction advice, or follow-up. Fragmentation is therefore a continuity problem, not simply a shortage of specialists. Cumulative exposure and increasing headache frequency may remain unrecognized, a problem relevant beyond the GCC wherever acute treatment is accessed through multiple providers or sectors.

Current GCC MOH evidence is concentrated in Saudi Arabia and Kuwait. Saudi Arabia contributes national pMOH data plus regional questionnaire, awareness, medication-use, and clinical-cohort studies; Kuwait contributes adult community and school-based evidence using the Headache-Attributed Restriction, Disability, Social Handicap and Impaired Participation (HARDSHIP) questionnaire. Comparable primary MOH/pMOH estimates were not included from Bahrain, Oman, Qatar, or the United Arab Emirates. These gaps indicate absent comparable measurement, not absence of disease. The novelty of this review lies in resolving the architecture of that evidence rather than merely listing studies. We distinguish unique studies from linked reports, display denominators, separate population signals from questionnaire proxies, clinical cohorts, and awareness/medication-use evidence, and examine how ascertainment changes interpretation. Empirical findings are also separated from author-developed implementation recommendations, allowing the GCC evidence gaps to inform a testable model for screening, referral, prevention, and longitudinal monitoring.

Objectives

The primary objective was to map GCC evidence on MOH, pMOH, medication-overuse behavior, analgesic overuse, awareness, and relevant medication-use patterns. Secondary objectives were to characterize geographic coverage and denominators; distinguish population, questionnaire-derived, and clinical evidence; evaluate ascertainment and study quality using design-appropriate Joanna Briggs Institute (JBI) tools; identify country and service gaps; and develop a clearly delimited framework for prevention, referral, monitoring, and future GCC research.

Methods

Study Design and Reporting Framework

This scoping review was reported according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses Extension for Scoping Reviews (PRISMA-ScR), with relevant PRISMA 2020 principles ^{7,8}. A scoping approach was appropriate because the regional literature includes

population surveys, questionnaire proxies, awareness/medication-use studies, and clinical migraine cohorts with heterogeneous populations, denominators, and ascertainment. We therefore mapped evidence and gaps rather than calculate a pooled GCC prevalence.

Protocol Registration

The review was registered retrospectively on the Open Science Framework (OSF; <https://osf.io/b79js>); this was not prospective preregistration. Post-registration quality-control and corrective verification are therefore reported separately from the original search.

Eligibility Criteria

Eligibility used the Population-Concept-Context framework. Populations were from Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, or the United Arab Emirates and could include community, student, pharmacy/primary-care, emergency, neurology, or defined headache/migraine samples. Eligible concepts included MOH/pMOH, medication or analgesic overuse, relevant awareness, and medication-use patterns. Eligible designs were original observational or health-services studies with extractable relevant data. Linked reports from the same dataset were classified separately. Editorials, opinion pieces, non-GCC studies, and records without extractable relevant data were excluded from the core map; international guidance and non-GCC studies informed context only.

Information Sources and Original Formal Search

The original formal search covered PubMed/MEDLINE, Scopus, Web of Science, Embase, the Cochrane Library, Google Scholar, selected regional journals, and GCC guideline sources from 1 January 2010 to 26 April 2026, updated to 27 July 2026. The recorded aggregate yield was 412 records. Source-specific retrieval counts, exact database-specific Boolean strings, and a reconstructable deduplicated record-level library were not retained and were not recreated retrospectively. The aggregate yield is therefore the historical denominator; later verification is reported separately. No formal language restriction was applied. During the original workflow, duplicates were identified using title, author, year, journal, and DOI where available,

with manual checking of suspected duplicates. This distinction between what was historically recorded and what could later be reproduced was maintained throughout the final report rather than filling missing methodological details by inference.

Post-Registration Quality-Control and Corrective Evidence Update

Post-registration quality-control through 9 August 2026 used focused PubMed/MEDLINE searching, publisher-site review, targeted author/title verification, and citation checking, identifying four additional Saudi primary studies and one linked Saudi companion report. Country-specific corrective verification through 15 August 2026 reran the documented PubMed strategy with explicit checks for Kuwait, Bahrain, Oman, Qatar, and the United Arab Emirates, supplemented by publisher and citation verification; two eligible Kuwait primary studies were identified. The 2026 Dubai HARSHIP study remained contextual because its published report contained no extractable MOH/pMOH estimate. These activities were focused verification, not reconstruction of the original 412-record search, and their provenance was kept separate from the historical denominator. The exact corrective strategy and update log are in Supplementary Table S1.

Selection of Sources

Original title/abstract screening was performed primarily by the first reviewer, with secondary checking of potentially eligible records, full-text exclusions, and final inclusion decisions; it was not complete independent duplicate screening. Because the original record library was unavailable, dual re-screening of the historical yield and a retrospective kappa were not reconstructed. During the post-registration stages, candidate reports were assessed against the same pre-specified eligibility criteria, and linked publications from the same dataset were reconciled before final counting. One review author (Abu-Baker Almadani) co-authored the contextual 2026 UAE paper; its classification and extraction were independently verified by the other author-reviewers without his adjudication.

Data Charting

Charted variables included study, country/setting, sampling frame, sample size, ascertainment, diagnostic basis, denominator, MOH-relevant outcome, evidence category, burden findings, and limitations. Whole-sample, headache-subgroup, and clinical-migraine denominators were kept distinct because apparently similar percentages can represent fundamentally different source populations. HARDSHIP classifications were treated as algorithmic survey ascertainment rather than specialist-confirmed diagnoses; observed and age/sex-adjusted estimates were recorded separately where both were available. Medication-overuse thresholds were interpreted according to the source algorithm or clinical framework rather than assumed to be identical across all studies. Unreported numerators or confidence intervals were not inferred from percentages alone.

Critical Appraisal

Design-appropriate Joanna Briggs Institute (JBI) tools were applied^{9,10}: prevalence domains for prevalence/pMOH studies and analytical cross-sectional domains where appropriate for awareness, medication-use, association, and clinical-cohort studies. Item judgments were Yes, No, Unclear, or Not applicable. Narrative confidence qualified interpretation but was neither a numerical score nor an inclusion criterion (Supplementary Table S2).

Linked-Report Reconciliation

Reports were checked for dataset overlap. The 2024 Saudi burden publication arose from the same population dataset as the 2020 prevalence study and was classified as a linked companion report, contributing burden data but not an additional unique study.

Independent Verification of the Final Evidence Corpus

Before submission, a second author-reviewer independently verified the locked corpus, geographic distribution, key numerical extractions and denominators, observed versus adjusted estimates, ascertainment categories, unique-primary versus linked-report classification, and Dubai contextual classification. This final-corpus verification was designed to strengthen extraction accuracy and internal consistency after the corrective update.

Consensus followed independent review, but this process did not constitute retrospective re-screening of the original 412-record yield and is not presented as such.

Synthesis and Evidence-to-Recommendation Boundary

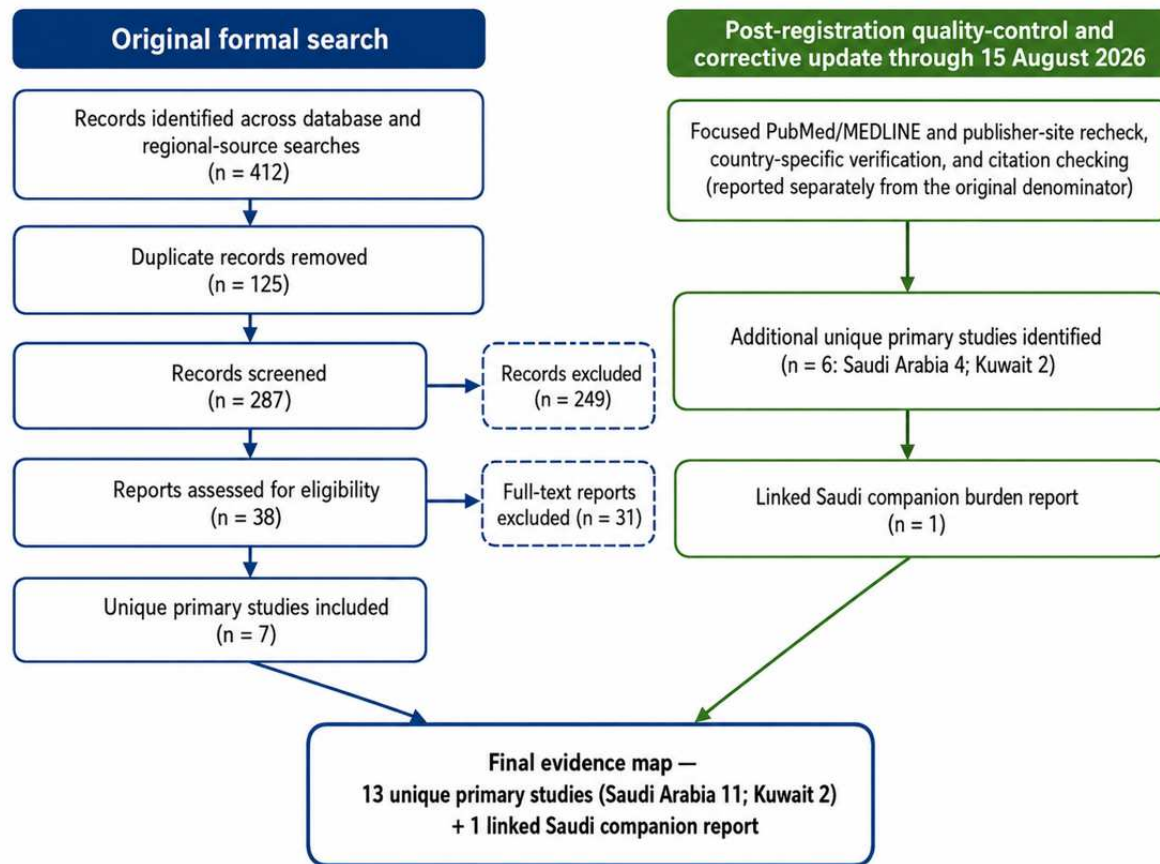
Meta-analysis was not undertaken because populations, ages, sampling frames, denominators, diagnostic methods, and evidence categories differed materially. Results are presented as a narrative evidence map. Empirical findings were separated from author-developed recommendations on screening, pharmacy/primary-care roles, referral, monitoring, minimum datasets, and service organization. These proposals integrate mapped gaps with established headache-service principles and contextual guidance but have not undergone GCC consensus or prospective validation.

Results

Study Selection and Geographic Scope

The original search identified 412 records; after 125 duplicates were removed, 287 were screened, 38 full texts assessed, and seven unique primary studies included. Separately reported post-registration quality-control and corrective verification through 15 August 2026 identified six additional unique studies (Saudi Arabia 4; Kuwait 2) and one linked Saudi companion report. The final map therefore comprised 13 unique primary studies (Saudi Arabia 11; Kuwait 2) plus one linked report. No eligible primary MOH/pMOH estimate was included from Bahrain, Oman, Qatar, or the United Arab Emirates; this does not imply absence of disease.

Figure 1. Study-selection summary with post-registration quality-control and corrective evidence update



The left branch preserves the recorded original formal-search flow. The right branch presents post-registration quality-control and focused corrective verification as a separate evidence-identification stage rather than a reconstructed multi-database rerun. Six additional unique primary studies (Saudi Arabia 4; Kuwait 2) and one linked Saudi companion report were incorporated, producing a final evidence map of 13 unique primary studies (Saudi Arabia 11; Kuwait 2) plus one linked report. The corrective branch is not merged into the original 412-record denominator.

Characteristics, Case Ascertainment, and Denominators

The evidence base included population surveys, regional questionnaire studies, awareness/medication-use studies, a university-student sample, a clinical migraine cohort, and pediatric school-based evidence. Ascertainment ranged from HARSHIP algorithms to self-report scoring,

behavior/awareness measures without MOH diagnosis, and clinical assessment in adults with migraine. Population, denominator, age, and diagnostic method were therefore central to interpretation (Table 1).

Table 1. Characteristics, case ascertainment, denominators, and evidence categories of included unique GCC studies

Study	Setting / sample	MOH definition / case ascertainment	Denominator	MOH-relevant estimate or outcome	Evidence category / principal limitation
Al Jumah et al., 2020 ¹¹	Nationwide Saudi Arabia; all 13 regions; random-digit-dial survey; n=2,316 adults aged 18-65	Culturally adapted HARDSHIP questionnaire; diagnostic enquiry based on ICHD-II; algorithmic pMOH classification rather than specialist-confirmed MOH	All analyzed respondents (n=2,316); age/sex adjustment reported separately	Observed pMOH 41/2,316 = 1.8% (95% CI, 1.3%-2.4%); age/sex-adjusted 1-year estimate 2.0%	Population signal. National coverage and standardized survey method; probable algorithmic diagnosis rather than specialist-confirmed ICHD-3 MOH
Alharbi et al., 2021 ¹²	Riyadh; cross-sectional awareness survey; n=323	Awareness of paracetamol-overuse headache; no formal MOH diagnosis	All participants	118 (36.5%) reported chronic headache; 228 used paracetamol for headache (reported by authors as 71.3%); 87.6% failed to recognize chronic headache as a potential effect of overuse	Awareness/medication-use evidence. Convenience survey; not epidemiological MOH ascertainment
Almuqairsha et al., 2022 ¹³	Qassim; social-media cross-sectional survey; n=499; 451 reported lifetime headache	Questionnaire scoring based on ICHD-3 concepts; self-report proxy	Headache subgroup (n=451) for MOH estimate; all 499 for awareness	18/451 (4.0%) met questionnaire threshold; 90/499 (18%) recognized chronic headache as a medication adverse effect	Questionnaire-derived proxy. Non-probability online sampling; no clinical confirmation
Alshareef, 2022 ¹⁴	Makkah/western Saudi Arabia; voluntary-response survey; 1,177 respondents; 459 with headache	OTC analgesic use and headache characteristics; no formal MOH diagnosis	Participants with headache (n=459)	56% used OTC analgesics; prolonged use was associated with frequent headache, migraine-type phenotype, chronic disease, work status, smoking, preventive-treatment use, and emergency attendance	Awareness/medication-use evidence. Voluntary sampling; behavior outcome rather than MOH prevalence
Alharbi et al., 2023 ¹⁵	Makkah; cross-sectional survey; n=715; 669 reported lifetime headache	Questionnaire-derived scoring system; self-report proxy	Lifetime-headache subgroup for MOH estimate; all participants for awareness	MOH-related estimate 4.5% among lifetime-headache sufferers; awareness 18.7% of all respondents	Questionnaire-derived proxy. Nonclinical ascertainment; denominator differs from population studies
Mohamed et al., 2023 ¹⁶	Jazan University health-college students; results section n=614	Semi-structured questionnaire; daily pill use used as medication-overuse proxy rather than ICHD-defined MOH	Student sample	64.3% reported at least one pill daily for headache; paracetamol 78.2%; quality-of-life associations reported	Awareness/medication-use evidence. Student population; internal sample-size inconsistency between methods (n=420) and results (n=614)
Alshareef et al., 2025 ¹⁷	Jeddah; descriptive cross-sectional survey; n=449	Awareness of medication adverse effects and medication patterns; no formal MOH diagnosis	All participants	Paracetamol 62.8%; Solpadeine 10.2%; NSAIDs 6.9%; 54.3% unaware of headache-medication adverse effects	Awareness/medication-use evidence. Female-predominant sample; no diagnostic confirmation
Alnaim and Alhmeid, 2025 ¹⁸	Eastern Province; online cross-sectional survey; n=499	Knowledge and awareness questionnaire; no formal MOH diagnosis	All participants	MOH awareness 23.8%; 42.5% had healthcare training	Awareness/medication-use evidence. Online selection; no prevalence diagnosis
Alesefir et al., 2026 ¹⁹	Hail; cross-sectional survey; n=380	Awareness and medication-use behavior; no specialist MOH diagnosis	All participants	Approximately 70% demonstrated good awareness; paracetamol used by approximately 79%; preventive medication by approximately 17%	Awareness/medication-use evidence. Local cross-sectional sample

Study	Setting / sample	MOH definition / case ascertainment	Denominator	MOH-relevant estimate or outcome	Evidence category / principal limitation
Albeshri et al., 2026 ²⁰	Western Saudi Arabia; online cross-sectional survey; n=518; 490 reported headache history	Questionnaire-derived MOH estimate and awareness	Headache-history subgroup for MOH estimate; all participants for awareness	Estimated MOH 2.4% ; awareness 109/518 (reported by authors as 20.8%); paracetamol 69.1% among medication-use responses	Questionnaire-derived proxy. Online/social-media sampling, female predominance, no specialist confirmation
Alwhaibi et al., 2026 ²¹	Saudi clinical migraine cohort; n=152 adults with migraine	MOH assessment using ICHD-3-compatible criteria	Defined clinical migraine cohort	17.1% met MOH criteria; MOH associated with worse migraine-specific quality of life	Clinical cohort. High direct clinical relevance but not population-based
Al-Hashel et al., 2017 ²²	Kuwait; community-based adults aged 18-65; systematic random sampling; n=15,523	HARDSHIP questionnaire; algorithmic population-survey diagnosis; source reported outcome as MOH	All analyzed respondents	Source-reported MOH 2.4%	Population signal. Very large community sample; algorithmic survey ascertainment rather than specialist-confirmed ICHD-3 MOH
Shuaibi et al., 2021 ²³	Kuwait; randomly selected primary and middle schools in two governorates; n=1,089 students	Child/adolescent HARDSHIP questionnaire; pMOH among participants with headache on ≥ 15 days/month and frequent acute-medication use	All participating students	pMOH 5/1,089 = 0.46% (95% CI, 0.16%-1.10%)	Population signal-pediatric. Randomized school sampling and 73.4% participation; limited to two governorates

Abbreviations: CI, confidence interval; GCC, Gulf Cooperation Council; HARDSHIP, Headache-Attributed Restriction, Disability, Social Handicap and Impaired Participation questionnaire; ICHD, International Classification of Headache Disorders; ICHD-3, International Classification of Headache Disorders, 3rd edition; MOH, medication-overuse headache; NSAIDs, nonsteroidal anti-inflammatory drugs; OTC, over-the-counter; pMOH, probable medication-overuse headache.

Note: Evidence categories indicate the type and interpretive role of the evidence and should not be regarded as a hierarchy of clinical importance. Linked publications arising from the same underlying dataset are not counted as additional unique studies. Source-reported percentages are retained where arithmetic or rounding in the original publication is internally inconsistent. The Kuwait adult estimate of 2.4% is reported using the source terminology “MOH,” but was algorithmically ascertained using HARDSHIP and should not be interpreted as equivalent to specialist-confirmed ICHD-3 MOH. Population-based, questionnaire-derived, and clinical-cohort estimates are therefore not directly interchangeable.

Population Signals

The strongest adult population signals came from Saudi Arabia and Kuwait. In the Saudi national study, 41/2,316 adults had algorithmic pMOH: observed 1.8% (95% CI, 1.3%-2.4%), with an age/sex-adjusted estimate of 2.0% ¹¹. The Kuwait community survey (n=15,523) reported MOH prevalence of 2.4% ²². We retain this as **source-reported MOH, algorithmically ascertained using HARDSHIP**, closer in diagnostic certainty to survey-derived probable MOH than specialist-confirmed ICHD-3 MOH. The most appropriate descriptive comparison is Saudi observed 1.8% versus Kuwait source-reported 2.4%, with Saudi adjusted 2.0% reported separately.

In Kuwait schoolchildren, pMOH occurred in 5/1,089 (0.46%; 95% CI, 0.16%-1.10%) ²³; this pediatric estimate is not directly comparable with adult population estimates.

Questionnaire-Derived Proxies, Medication-Use Evidence, and Clinical Cohorts

Saudi non-probability questionnaire studies generated MOH-related estimates of approximately 2.4%-4.5% ^{13,15,20}, but differing self-report samples, denominators, and definitions make these **questionnaire-derived proxies rather than population prevalence estimates**.

Other studies contributed awareness or medication-use evidence without establishing MOH prevalence ^{12,14,17-19}. Mohamed et al. ¹⁶ used daily pill consumption as a proxy in Jazan health-college students; its methods/results sample-size inconsistency limits confidence.

In a selected Saudi clinical cohort, 17.1% of 152 adults with migraine met MOH criteria ²¹; this clinically relevant estimate is not community prevalence.

Evidence Map and International Context

The 2024 Saudi burden publication arose from the 2020 national dataset and was classified as a linked companion report, not a new unique study ²⁴.

The 2026 Dubai HARSHIP publication was contextual only because it reported no extractable MOH/pMOH estimate ²⁶.

The Saudi HARSHIP dataset also contributed to a 2025 individual-participant meta-analysis reporting adjusted pMOH prevalence of 4.1% across 17 countries ²⁵; the Saudi estimate is therefore a component, not an independent comparator. Heterogeneity in population, denominator, age, sampling, and ascertainment precluded a justified pooled GCC prevalence.

Table 2 summarizes the resulting evidence domains, their appropriate interpretation, and the principal remaining research gaps.

Table 2. GCC medication-overuse headache evidence map, interpretation, and remaining research gaps

Evidence domain	What the GCC evidence shows	Appropriate interpretation	Principal remaining gap
Geographic coverage	13 unique primary studies: Saudi Arabia 11 and Kuwait 2; one linked Saudi report; no eligible primary MOH/pMOH estimate included from Bahrain, Oman, Qatar, or UAE	Regional evidence exists but remains strongly Saudi-dominant; absence of an included estimate is not evidence of absence of disease	Comparable studies in the four evidence-sparse GCC states
Adult population signal	Saudi observed pMOH $41/2,316 = 1.8\%$ (95% CI, 1.3%-2.4%); adjusted estimate 2.0% ¹¹ . Kuwait source-reported algorithmic MOH 2.4% ²²	Saudi observed 1.8% and Kuwait source-reported 2.4% provide the most useful descriptive comparison; the Saudi adjusted 2.0% should be reported separately	Contemporary harmonized studies using transparent ICHD-3-compatible ascertainment and comparable denominators
Pediatric population signal	Kuwait school-based pMOH $5/1,089 = 0.46\%$ (95% CI, 0.16%-1.10%) ²³	Demonstrates measurable medication-overuse risk before adulthood but is not directly comparable with adult estimates	Broader pediatric/adolescent GCC epidemiology and longitudinal follow-up
Questionnaire-derived proxies	Selected Saudi online and regional surveys generated MOH-related estimates of approximately 2.4%-4.5% ^{13,15,20}	Useful signals within sampled populations but not interpretable as population prevalence because of non-probability sampling, differing denominators, and proxy ascertainment	Probability-based sampling, explicit denominators, and clinical/algorithmic validation
Clinical cohort	MOH in 17.1% of 152 Saudi adults with migraine ²¹	Clinically relevant selected denominator; expected to differ from general-population estimates	Larger multicenter cohorts and prospective treatment/outcome studies

Evidence domain	What the GCC evidence shows	Appropriate interpretation	Principal remaining gap
Awareness and medication use	Variable awareness; paracetamol frequently reported; analgesic-use and student medication-use studies identified potentially relevant behavior ^{12,14,16-19}	Awareness and medication exposure may identify prevention opportunities but do not establish MOH prevalence	Studies linking medication knowledge and behavior to prospective MOH outcomes
Combination analgesics	Solpadeine use reported by 10.2% in one Saudi survey ¹⁷	Highlights the need to identify overlapping ingredients and medication days; does not establish country-specific regulatory availability or MOH prevalence	Pharmacy-based medication reconciliation and prospective exposure studies
Burden	Linked Saudi national report documented mean 19.7 headache days/month and substantial participation loss among people with pMOH ²⁴	Demonstrates substantial burden without constituting a second unique prevalence study	GCC-specific longitudinal burden and cost-of-illness studies
Population representativeness	Some population evidence is based on national/citizen-focused sampling frames	Findings may not represent the entire resident population; direction of any difference cannot be assumed	Resident-inclusive sampling where ethically and methodologically appropriate
Health-system pathways	Existing GCC studies did not directly test care fragmentation; the 2026 UAE study provides contextual headache evidence but no extractable MOH/pMOH estimate ²⁶	Fragmented care is a plausible explanatory and implementation framework, not an established causal determinant	Mixed-methods pathway research and prospective implementation trials

Abbreviations: GCC, Gulf Cooperation Council; ICHD-3, International Classification of Headache Disorders, 3rd edition; MOH, medication-overuse headache; pMOH, probable medication-overuse headache; UAE, United Arab Emirates.

Note: Population signals, questionnaire-derived proxies, clinical-cohort evidence, and awareness/medication-use evidence are methodologically distinct and should not be pooled. No pooled GCC prevalence was calculated. The Saudi observed pMOH estimate of 1.8% and the Kuwait source-reported algorithmic MOH estimate of 2.4% provide the most appropriate descriptive adult population comparison; the Saudi age- and sex-adjusted estimate of 2.0% is reported separately. The 2026 UAE HARDSHIP publication is included as contextual headache evidence only because the published report provides no extractable MOH or pMOH estimate. Absence of an eligible estimate from a country should not be interpreted as absence of disease.

Discussion

Principal Findings

This review identifies a measurable but incompletely characterized medication-overuse headache (MOH) burden across the Gulf Cooperation Council (GCC): 13 unique primary studies (Saudi Arabia 11; Kuwait 2) plus one linked Saudi burden report. More important than the count is the heterogeneity among population HARDSHIP surveys, questionnaire proxies, medication-use/awareness studies, and a selected clinical migraine cohort; these cannot be combined into one regional prevalence estimate.

The strongest adult signals are Saudi observed pMOH 1.8% (41/2,316; 95% CI, 1.3%-2.4%; adjusted 2.0%)¹¹ and Kuwait source-reported HARDSHIP-algorithmic MOH 2.4%²². The most appropriate descriptive comparison is observed 1.8% versus source-reported 2.4%, recognizing nonidentical diagnostic labeling. Kuwait school pMOH was 0.46%²³. In contrast, MOH in 17.1% of 152 Saudi adults with migraine²¹ reflects a selected clinical denominator, while higher non-probability questionnaire estimates are not population prevalence.

No eligible primary MOH/pMOH estimate was included from Bahrain, Oman, Qatar, or the United Arab Emirates (UAE). This indicates absent comparable measurement, not absent disease; future work should improve geographic coverage and comparability rather than manufacture a pooled estimate.

Limits of Inference and Diagnostic Uncertainty

Case ascertainment is central to interpretation. HARDSHIP studies use structured survey algorithms rather than specialist diagnosis; the Saudi national survey reflects an earlier ICHD era¹¹, while Kuwait adult and pediatric studies used HARDSHIP population classifications^{22,23}. These differ from contemporary ICHD-3 clinical diagnosis and Saudi self-report scoring systems^{13,15,20}.

ICHD-II-era or related HARDSHIP classifications, questionnaire proxies, and contemporary ICHD-3 diagnoses are not automatically interchangeable because criteria, medication thresholds, clinical confirmation, and temporality differ. Earlier diagnostic eras also differed in how persistence or improvement after medication withdrawal contributed to classification, whereas contemporary ICHD-3 diagnosis does not require retrospective proof of improvement after withdrawal. The quantitative effect of these changes cannot be estimated from the present corpus, but they reinforce the need to display ascertainment method, diagnostic era, and denominator alongside every estimate rather than treating a common MOH label as proof of equivalence.

JB I appraisal similarly favored probability-oriented sampling and standardized HARDSHIP methods for epidemiological inference, while clinically assessed migraine cohorts offered greater diagnostic relevance but narrower generalizability. Appraisal qualified interpretation rather than inclusion.

GCC Geographic and Population Representativeness

Saudi Arabia supplies most GCC evidence, with Kuwait providing the only other included adult and pediatric population signals. These findings should not be extrapolated numerically to other GCC states, where medication access, financing, pharmacy practice, public-private pathways, and specialist services may alter exposure, recognition, and management ^{5,6}.

Citizen- or national-focused sampling may not represent entire resident populations in GCC states with substantial non-national communities. Existing evidence does not establish a higher or lower MOH burden among non-national residents, so national estimates should not be assumed conservative. Future studies should consider resident-inclusive frames where appropriate and report eligibility and denominator composition transparently.

The 2026 Dubai HARDSHIP study provides important contextual evidence that large-scale population headache epidemiology is feasible in the UAE, but its published report contains no extractable MOH or pMOH estimate ²⁶.

It therefore cannot fill the UAE-specific MOH evidence gap in the present review.

Geographic gaps should also be distinguished from differences in evidence certainty. Saudi Arabia currently has both a national population signal and multiple regional studies, whereas Kuwait contributes two population-based signals from different age groups. The remaining four states lack included primary MOH/pMOH estimates, but

this does not mean that future studies should simply replicate one Saudi or Kuwaiti design. National studies should be adapted to local sampling frames, language, healthcare organization, and resident composition while preserving a harmonized core of case ascertainment and denominator reporting. This balance between comparability and local validity is essential if future GCC data are to support meaningful cross-country interpretation.

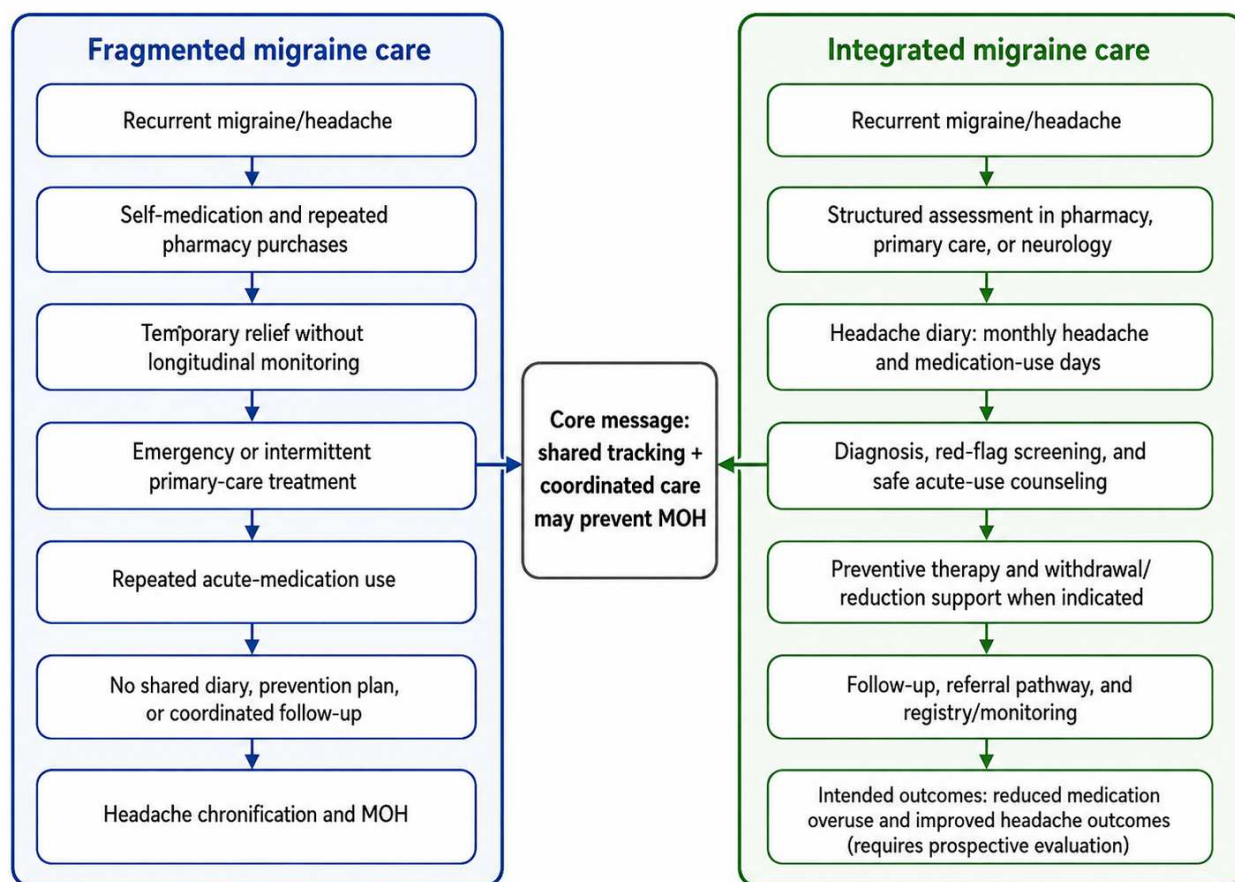
International Interpretation and Fragmented Care

The GCC evidence illustrates a broader headache-medicine problem: MOH recognition depends on how exposure is measured and care organized. When acute treatment is obtained across pharmacies, primary care, emergency services, private clinics, and specialists without longitudinal medication-day records, cumulative exposure can remain invisible. This is relevant in many mixed public-private systems where no single clinician or record captures the patient's total monthly use across medication classes. Thus, the regional setting functions as a health-services case study rather than simply a geographic description.

Fragmented migraine care is therefore a continuity problem rather than simply a shortage of neurologists. Separate encounters may fail to reveal rising headache days, repeated purchases, unsuccessful acute treatment, or absent prevention. Because regional studies did not measure fragmentation causally, it remains an explanatory and implementation framework, not an empirical conclusion.

Integrated care would make monthly headache days, acute-medication days by class, disability, prevention status, reduction advice, and follow-up visible across settings. The aim is not to transfer specialist tasks indiscriminately, but to ensure that the same minimum information follows the patient. Pharmacies and primary care could identify risk and reinforce safe-use counseling; emergency services could trigger structured follow-up; and headache specialists could confirm complex diagnoses, manage dependence or difficult withdrawal, and optimize prevention. These principles extend beyond the GCC.

Figure 2. Fragmented versus integrated migraine-care pathway in GCC practice



Author-developed conceptual model; intended outcomes require prospective evaluation.

Author-developed conceptual comparison of fragmented and integrated migraine-care pathways. The figure does not depict observed patient-level data or measured regional treatment effects. The integrated pathway represents a testable care model in which shared tracking, coordinated assessment, preventive-treatment optimization, individualized withdrawal or reduction support, referral, and longitudinal follow-up are intended to reduce medication overuse and improve headache control; these outcomes require prospective evaluation.

Community Pharmacists, Primary Care, and Screening

Community pharmacists and primary-care clinicians often encounter patients before specialist assessment. International evidence supports trained pharmacists in education, medication reconciliation, recognition of excessive use, and referral within structured services ²⁷; a pharmacy pilot suggests feasibility while identifying time, training, and funding barriers ²⁸. Their practical value is greatest when repeated purchase or repeated acute-

treatment encounters prompt documentation of medication-use days and a clear referral threshold rather than isolated counseling. These data support testing care processes, not claiming prevention of incident MOH.

Brief screening can begin with monthly headache days and monthly acute-medication days. The two-item core of the Self-Screening Questionnaire for Medication Overuse Headache performed promisingly in a tertiary clinic ²⁹, but GCC use requires Arabic adaptation and external validation.

Box 1. Clinical Clues That Should Prompt Screening for Medication-Overuse Headache

- **Headache on ≥ 15 days/month**, particularly when frequency is progressively increasing.
- **Regular acute-medication use for >3 months** at or near MOH-relevant thresholds: triptans, opioids, combination analgesics, or ergot derivatives on ≥ 10 days/month; simple analgesics or NSAIDs on ≥ 15 days/month.
- **Increasing medication-use days**, dose escalation, or rotation/combination of several acute-medication classes.
- **Repeated self-medication**, frequent pharmacy purchases, or recurrent urgent, emergency, or primary-care visits for short-lived symptomatic relief without coordinated follow-up.
- **Frequent or chronic migraine with continued reliance on acute medication**, especially when preventive therapy is absent, ineffective, poorly tolerated, or inadequately adhered to.
- **Difficulty reducing acute medication**, rapid return to frequent use after attempted reduction, or dependence concerns, particularly with opioid- or combination-containing products.

Clinical note: These features are recognition triggers rather than independent diagnostic criteria. Diagnosis requires assessment of the underlying headache disorder, headache frequency, medication class, medication-use days, duration of overuse, and the full ICHD-3 criteria. Medication-specific thresholds are summarized in Table 3.

Combination analgesics warrant medication reconciliation. Solpadeine use was reported by 10.2% in one Saudi survey ¹⁷. Such products may contain paracetamol, caffeine, codeine, or other ingredients patients may not recognize, and they carry a lower MOH-use threshold than simple analgesics ¹⁻³. Pharmacists can identify overlapping ingredients and medication-use days; this review did not evaluate country-specific codeine regulation.

Management Implications

MOH management should address both overuse and the underlying headache disorder through education, medication-day documentation, prevention, individualized withdrawal/restriction, diaries, and follow-up ^{30,31}. No single rigid sequence fits every patient.

European guidance emphasizes education, then withdrawal and effective prevention when needed; medication class and dependence influence tapering ³¹. Randomized trials support individualized care: withdrawal plus prevention performed favorably in Carlsen et al. ³³, whereas the pragmatic MOTS trial found prevention without mandatory discontinuation noninferior to a switching/limitation strategy ³². These apparently different approaches are clinically reconcilable: both require recognition of overuse, treatment of the underlying headache disorder, and longitudinal reassessment rather than an inflexible detoxification-only pathway. Regional reviews and Saudi/UAE guidance add context ³⁴⁻³⁸.

For chronic migraine with medication overuse, calcitonin gene-related peptide (CGRP)-targeting monoclonal antibodies can reduce migraine and acute-medication use and facilitate transition to non-overuse in selected patients ³⁹⁻⁴². OnabotulinumtoxinA and atogepant are additional preventive options ^{43,44}, embedded within education, medication-day monitoring, individualized reduction/withdrawal, and reassessment.

Medication-use **days**, not tablet counts alone, should be the routine exposure unit because patients may take multiple doses or rotate classes; class remains important because MOH thresholds differ.

Table 3. Acute headache-medication use thresholds relevant to medication-overuse headache

Medication class	MOH-relevant use threshold	Practical interpretation
Paracetamol / acetaminophen	≥15 days/month for >3 months ^{1,31,36}	Record medication-use days rather than tablet counts; repeated use on most days may contribute to chronification
Aspirin	≥15 days/month for >3 months ^{1,31,36}	Interpret together with gastrointestinal, bleeding, age, and comorbidity considerations
NSAIDs	≥15 days/month for >3 months ^{1,31,36}	Frequent use may contribute to MOH and also carries gastrointestinal, renal, and cardiovascular considerations
Triptans	≥10 days/month for >3 months ^{1,31,36}	Lower MOH threshold than simple analgesics; frequent use may indicate insufficient preventive control
Ergot derivatives	≥10 days/month for >3 months ^{1,31,36}	Relevant where these medications are used
Opioid-containing analgesics	≥10 days/month for >3 months ^{1-3,31,36}	Dependence and withdrawal complexity may require gradual reduction and specialist supervision
Combination analgesics, including caffeine- or codeine-containing products	≥10 days/month for >3 months ^{1-3,31,36}	Patients may not recognize overlapping ingredients or opioid content; reconciliation should identify medication days by product and class
Multiple acute-medication classes without one dominant class	Combined use on ≥10 days/month for >3 months ^{1,31,36}	Relevant when patients rotate or combine acute medications and total medication-day exposure reaches the threshold

Abbreviations: ICHD-3, International Classification of Headache Disorders, 3rd edition; MOH, medication-overuse headache; NSAIDs, nonsteroidal anti-inflammatory drugs.

Note: Medication-use thresholds should be interpreted within the full ICHD-3 diagnostic framework and refer to regular use for more than 3 months. Medication-use days, rather than tablet counts, are the clinically relevant exposure measure. Thresholds differ by medication class and do not replace assessment of the underlying headache disorder, secondary-headache red flags, medication dependence, contraindications, preventive-treatment eligibility, or the need for specialist referral. For patients using several acute-medication classes without one individually meeting its class-specific threshold, combined use may still satisfy the multiple-drug-class overuse criterion.

Burden and Economic Implications

The linked Saudi burden report found a mean 19.7 headache days/month and substantial participation loss among participants with pMOH ²⁴. Because it derives from the 2020 national dataset, it complements rather than enlarges the unique-study count.

International evidence links headache and frequent acute-medication use with work loss, healthcare utilization, and costs ^{45,46}, but GCC-specific MOH cost studies are lacking. Economic benefits of proposed pathways therefore remain testable hypotheses.

Burden should also be evaluated beyond direct healthcare expenditure. Headache-related participation loss, school or work impairment, emergency attendance, repeated acute-medication purchases, and delayed preventive treatment may capture consequences that are especially relevant to service planning. Prospective GCC studies should therefore pair clinical outcomes with standardized disability and utilization measures rather than infer economic value from prevalence alone.

GCC Implementation Framework

Table 4 presents an author-developed GCC adaptation informed by structured headache-service principles, international guidance, pharmacist/screening literature, and mapped gaps. Its contribution is to translate the evidence map into measurable implementation domains - screening, pharmacy and primary-care roles, structured management, a minimum dataset, and system support - while preserving the distinction between established headache-care principles and untested regional adaptation. It is neither a GCC guideline nor formally endorsed or prospectively validated; it is a locally adaptable structure for testing.

The framework centers on headache- and medication-day documentation, complementary pharmacy/primary-care/specialist roles, education, individualized reduction, preventive optimization, diary use, and follow-up. A shared minimum dataset supports evaluation across pilots (Supplementary Table S3), with system supports such as bilingual materials, training, referral criteria, and electronic prompts.

Bahrain is one feasible pilot setting because primary MOH epidemiology remains unmapped and a clinic-pharmacy pathway could be prospectively evaluated; this is an implementation proposition, not evidence of distinctive burden. Other GCC states could adapt the framework locally, with process and clinical outcomes measured before wider adoption.

Table 4. Expert-informed GCC implementation framework for medication-overuse headache prevention and care

Framework domain	Practical recommendation	Evidence boundary	Suggested evaluation metric
Universal screening and documentation	Ask monthly headache days and monthly acute-medication days; record medication-use days by class	Informed by ICHD-3 thresholds, screening evidence, and mapped documentation gaps; requires local implementation testing ^{1,29,36}	Proportion of recurrent-headache encounters with both variables documented
Community-pharmacy role	Identify frequent purchasers; reconcile products and overlapping ingredients; counsel on medication-use limits; encourage diaries; refer suspected MOH, dependence concerns, or red flags	Supported by international structured-headache-service/pharmacist position evidence and feasibility data; GCC-specific clinical-outcome evidence remains limited ^{27,28}	Number screened/counseled; medication reconciliation completed; referral completion
Primary-care role	Diagnose and manage migraine where appropriate; screen for red flags and suspected MOH; initiate or optimize prevention; coordinate follow-up and referral	Author-developed GCC adaptation of established headache-care principles; prospective pathway evaluation required	Preventive-treatment initiation/optimization; follow-up completion; appropriate specialist referral
Structured management and specialist escalation	Provide education; individualized withdrawal/reduction when appropriate; optimize prevention; use headache diary; reassess at 1-3 and 6 months; escalate complex cases	Aligned with systematic review, EAN guidance, randomized trials, and regional management literature; no single sequence is appropriate for every patient ³⁰⁻³⁶	Change in headache days, medication days, disability, relapse, and urgent-care use
Shared minimum dataset	Capture headache days, medication days/class, headache phenotype, disability, prevention status, withdrawal/reduction advice, referral, and follow-up	Author-developed registry-ready proposal for local governance, privacy review, and prospective validation	Dataset completeness; follow-up rate; proportion with longitudinal medication-day data
Policy and system support	Develop bilingual patient information, clinician/pharmacist education, referral criteria, electronic-record prompts, and transparent preventive-treatment pathways	System-level proposal informed by mapped care gaps; requires stakeholder and country-specific adaptation	Training completion; pathway uptake; audit cycles; continuity indicators

Abbreviations: EAN, European Academy of Neurology; GCC, Gulf Cooperation Council; ICHD-3, International Classification of Headache Disorders, 3rd edition; MOH, medication-overuse headache.

Note: This framework is an author-developed GCC adaptation informed by established structured headache-service principles, international guidance, pharmacist and screening literature, treatment evidence, and the regional gaps identified in this scoping review. It is intended for local adaptation and prospective evaluation and should not be interpreted as a formal GCC guideline, consensus statement, or endorsement by Lifting The Burden or any other professional organization. Suggested metrics represent candidate implementation and outcome measures rather than validated GCC quality standards.

Future Research Priorities

First, harmonized epidemiology is needed: Bahrain, Oman, Qatar, and the UAE require directly measured MOH/pMOH evidence, while Saudi Arabia and Kuwait need contemporary replication with ICHD-3-compatible definitions, standardized denominators, and observed/adjusted estimates kept distinct. Resident-inclusive sampling should be considered where appropriate.

Second, clinical and implementation studies should prospectively record headache days, medication days by class, disability, prevention, reduction strategy, adherence, relapse, emergency use, quality of life, and follow-up. Multicenter cohorts and pharmacy-primary-care-specialist trials should test burden and pathway outcomes.

Third, pediatric/adolescent epidemiology, Arabic screening-tool validation, mixed-methods pathway research, and formal economic evaluation are needed.

Finally, a shared registry-ready minimum dataset could support cross-center comparison without imposing a uniform service model. Country evidence gaps and priorities are summarized in Supplementary Table S4 as a prospective research agenda, not prescriptive regional guidance.

Strengths and Limitations

This is, to our knowledge, the first dedicated GCC MOH scoping review. Strengths include explicit denominators; reconciliation of unique versus linked reports; separation of population signals, questionnaire proxies, clinical cohorts, and awareness/medication-use evidence; analysis of case ascertainment; design-appropriate JBI appraisal; and a clear evidence-to-recommendation boundary. A second author-reviewer independently verified the final corpus, geography, linked-report classification, denominators, ascertainment categories, and key numerical extractions. Country-level mapping identifies priority evidence gaps.

Important limitations remain. The original search retained only the aggregate 412-record yield, not source-specific counts, exact database-specific Boolean strings, or a reconstructable deduplicated record library. Complete retrospective independent duplicate screening was therefore impossible and no agreement statistic was generated. Later quality-control/corrective verification was targeted and is reported separately rather than as a reconstructed original search.

The evidence is predominantly cross-sectional and heterogeneous in population, sampling, denominator, and ascertainment; several studies used online/convenience samples and questionnaire proxies. A pooled GCC prevalence is therefore unjustified. Evidence is concentrated in Saudi Arabia and Kuwait, with no eligible primary estimate included from four GCC states, and citizen/national sampling may not represent entire resident populations. Appraisal includes reviewer judgment, and contextual international literature informing implementation recommendations was not subjected to the core GCC eligibility process.

One review author co-authored the contextual 2026 UAE paper; other author-reviewers independently verified its classification and extraction without his adjudication. Independent verification strengthened internal consistency, but residual publication-retrieval risk cannot be completely excluded.

Conclusion

Medication-overuse headache represents a measurable but incompletely mapped component of headache burden in the GCC. The available evidence is concentrated in Saudi Arabia and Kuwait and spans substantially different populations, denominators, sampling approaches, and methods of case ascertainment. These differences preclude a scientifically defensible pooled GCC prevalence and underscore the need to distinguish population-derived pMOH signals from questionnaire proxies, selected clinical cohorts, and awareness or medication-use studies.

The next step should be methodological and clinical harmonization rather than numerical aggregation. Future studies should use clearly reported, contemporary case definitions; record monthly headache days and acute-medication days by class; apply transparent denominators; and extend epidemiological sampling to currently evidence-sparse GCC states and, where appropriate, broader resident populations. Clinically, earlier recognition

will require greater continuity across community pharmacy, primary care, emergency services, and specialist headache care.

The framework proposed in this review is therefore intended as a locally adaptable, prospectively testable model rather than a regional guideline. Evaluating whether structured screening, medication reconciliation, preventive-treatment optimization, referral, and longitudinal follow-up improve patient outcomes should now become a priority. These lessons also extend beyond the GCC to health systems in which fragmented access to acute headache treatment complicates recognition and prevention of medication overuse.

Statements and Declarations

Funding: No funding was received for this work.

Ethical approval: Ethical approval was not required because this scoping review used published literature and did not involve human participants, intervention on participants, or identifiable patient-level data.

Consent to participate: Not applicable.

Consent for publication: Not applicable.

Data availability: All study-level data used in the evidence synthesis are reported in the main manuscript and supplementary tables. The retrospective review registration is publicly available on the Open Science Framework at <https://osf.io/b79js>. The documented post-registration PubMed/MEDLINE quality-control and corrective-verification strategy and evidence-update log through 15 August 2026 are provided in Supplementary Table S1. A complete historical record-level screening library and source-specific original database search counts or strings are not available and are not claimed to have been archived.

Conflicts of interest and relevant nonfinancial relationships: Isa Ahmed Alsharoqi, Abdulla I. Salem Alsharoqi, and Saeed A. Bohlega declare no relevant financial or nonfinancial conflicts of interest. Abu-Baker Almadani was a co-author of the 2026 Dubai HARSHIP publication cited in this review as contextual UAE headache evidence. This represents a relevant nonfinancial relationship; he did not adjudicate that publication's classification or extraction for the present review, which were independently verified by the other author-reviewers. No financial conflict related to that publication is declared.

Artificial intelligence disclosure: OpenAI ChatGPT assisted with language editing, manuscript organization, and drafting assistance. It was not used to generate study data, analyze patient data, determine study eligibility, independently screen records, perform scientific critical appraisal, select evidence, or determine the scientific conclusions of the review. All AI-assisted text was critically reviewed, verified, and edited by the authors, who take full responsibility for the final manuscript. The final publication Figures 1 and 2 were produced using deterministic, non-generative methods and were not AI-generated.

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Author Contributions

Isa Ahmed Alsharoqi: Conceptualization; Methodology; Investigation; Data curation; Formal analysis; Project administration; Visualization; Writing - original draft; Writing - review & editing. Abu-Baker Almadani: Validation; Writing - review & editing. Abdulla I. Salem Alsharoqi: Investigation; Data curation; Validation; Writing - review & editing. Saeed A. Bohlega: Supervision; Validation; Writing - review & editing. All authors reviewed and approved the final manuscript and agree to be accountable for all aspects of the work.

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