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The 2026 U.S. Migraine Risk Index: 100 Cities Ranked

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100 CITIES ANALYZED

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A 100-city analysis of weather-driven migraine risk across America

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A 100-city analysis of weather-driven migraine risk across America

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Executive Summary

This is the first 100-city migraine risk analysis published since Sperling's "America's Migraine Hot Spots" study in 2006. Two decades of weather data, elevation profiles, and climate pattern research have refined our understanding of how geography drives migraine frequency. This index updates that picture for 2026.

Key findings:

- **Denver, Colorado is America's highest-risk city for weather-driven migraines**, with a score of 73.78 – nearly 2.96× the national median (24.94).
- **The Mountain West dominates the top of the ranking.** 5 of the 10 highest-risk cities sit at elevations where atmospheric pressure is materially lower than sea level, amplifying the impact of weather-driven pressure swings.

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November is America's worst migraine month, listed in the peak-trigger season for 80 of the 100 largest U.S. metros.

- **California dominates the best-cities list**, taking 5 of the 20 most favorable metros, led by San Diego.
- **Spring (March–April) and late fall (October–November) are the twin peaks of U.S. migraine risk**, corresponding to the most active frontal passage seasons.

Methodology

Each of the 100 largest U.S. metropolitan areas was scored on four factors derived from documented weather patterns, atmospheric data, and established migraine trigger research. Data was compiled from a 12-month rolling window ending March 2026.

Four-Factor Composite Score (0–100, higher = more challenging for migraine sufferers)

- 1. Season Length (40% weight).** The number of months per year classified as peak migraine-trigger season for that city. Cities with year-round elevated risk score highest; cities with a narrow 2–3 month window score lowest.
- 2. Trigger Diversity (25% weight).** The count of distinct weather-based migraine triggers documented for each city – hurricanes, Chinook winds, atmospheric rivers, severe thunderstorm activity, frontal passages, temperature inversions, and similar. More distinct triggers means more frequent exposure.
- 3. Severity (25% weight).** A textual analysis of severity-indicator terms in each city's weather profile – "severe," "extreme," "rapid," "sudden," "intense," "volatile," and specific named phenomena like "Chinook," "atmospheric river," "nor'easter," "polar vortex," and others. More severity language corresponds to more dramatic pressure swings.
- 4. Baseline Stability (10% weight).** Combines altitude effects (cities at higher elevation have lower baseline atmospheric pressure, making weather-driven pressure changes a

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Each factor was min-max normalized across the 100-city sample and combined using the weights above. Scores range from 0 (most favorable) to 100 (most challenging).

Why these factors matter

Peer-reviewed research repeatedly links barometric pressure changes, humidity, and temperature volatility to migraine onset. A 2023 study in *Headache: The Journal of Head and Face Pain* followed 4,375 adults using a smartphone tracker and found migraines were significantly more common on days with higher humidity, more rainfall, and barometric pressure changes. A 2025 systematic review in *Cureus* examining all published barometric-pressure research confirmed that pressure drops and rapid fluctuations are consistently associated with increased migraine frequency. The American Migraine Foundation reports that over one-third of migraine sufferers identify specific weather patterns as reliable triggers.

What this index is not

This is a weather-driven migraine risk index. It does not measure migraine prevalence (the share of the population diagnosed with migraine), healthcare access, or medical outcomes. It measures the likelihood that a given city's climate and geography will produce the kinds of atmospheric changes that trigger migraine attacks in people who have the condition.

Top 10 Most Challenging Cities for Migraine Sufferers

#1. Denver, CO – Score: 73.78

Denver's mile-high elevation makes it unique among major US cities for migraine considerations. The lower baseline pressure means the atmosphere is thinner, and weather-related pressure changes represent a larger percentage shift compared to sea-level cities.

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Peak season: Year-round, especially march through may. Baseline pressure: 840 hPa.

#2. Colorado Springs, CO – Score: 62.98

Colorado Springs sits higher than Denver at the foot of 14,115-foot Pikes Peak, creating one of the most dramatic mountain-to-plains transitions of any US city. The Palmer Divide to the north and the Rampart Range to the west funnel weather patterns, and the city's elevation means baseline pressure is about 830 hPa.

Peak season: March through may and november through january. **Baseline pressure:** 830 hPa.

#3. Flagstaff, AZ – Score: 59.44

Flagstaff sits at 7,000 feet at the base of the 12,600-foot San Francisco Peaks, the highest point in Arizona. Despite being in the same state as Phoenix, Flagstaff's climate is radically different, with 100+ inches of annual snowfall and summer temperatures 30 degrees cooler.

Peak season: November through march and july through september. **Baseline pressure:** 790 hPa.

#4. Santa Fe, NM – Score: 47.5

Santa Fe sits at 7,200 feet on a plateau at the base of the 12,600-foot Sangre de Cristo Mountains, giving it the second-lowest baseline pressure of any state capital after Denver. The thin atmosphere means more intense UV radiation and faster dehydration, both migraine triggers that persist year-round.

Peak season: July through september. **Baseline pressure:** 790 hPa.

#5. Duluth, MN – Score: 45.93

Duluth cascades from 800-foot bluffs down to the Lake Superior waterfront, creating dramatic elevation differences within city limits. The lake's massive cold-water surface moderates coastal temperatures but generates intense storms, especially in November when temperature differentials between the water and Arctic air are greatest.

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Peak season: September through may. Baseline pressure: 1013 hPa.

#6. Rapid City, SD – Score: 41.34

Rapid City sits at 3,200 feet on the eastern slope of the Black Hills, where the Great Plains meet a 7,200-foot mountain island. This geographic position creates some of the most extreme temperature changes on earth.

Peak season: March through may and october through december. **Baseline pressure:** 948 hPa.

#7. Minneapolis, MN – Score: 41.07

The Twin Cities sit where three major air masses compete: dry Arctic air from Canada, moist Gulf air from the south, and Pacific air from the west. This three-way convergence produces more frequent and severe pressure changes than most US metros, with winter being particularly intense.

Peak season: October through april. **Baseline pressure:** 1014 hPa.

#8. Fargo, ND – Score: 40.16

Fargo sits on the Red River of the North in one of the flattest major river valleys in North America. The prehistoric bed of glacial Lake Agassiz provides zero topographic resistance to weather systems, meaning the city takes the full, unmoderated impact of every frontal passage.

Peak season: October through april. **Baseline pressure:** 1013 hPa.

#9. Boston, MA – Score: 39.27

Boston's harbor location amplifies the impact of Atlantic storms. The city sits at the convergence of the cold Labrador Current and warm Gulf Stream influences, creating sharp temperature gradients offshore that fuel intense storm development right at the city's doorstep.

Peak season: September through april. **Baseline pressure:** 1015 hPa.

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#10. Des Moines, IA – Score: 37.95

Des Moines sits at the confluence of the Des Moines and Raccoon rivers in the rolling prairies of central Iowa. The flat, open terrain provides no topographic barrier to weather systems approaching from any direction.

Peak season: March through June and October through December. **Baseline pressure:** 1013 hPa.

Top 10 Most Favorable Cities for Migraine Sufferers

#100. San Diego, CA – Score: 6.25

San Diego's protected harbor and consistent Pacific high pressure make it one of the more favorable climates for migraine sufferers. However, the city is not immune to weather triggers, and individuals who relocate here from more volatile climates may find their threshold for pressure sensitivity actually decreases over time.

Peak season: December through February. **Baseline pressure:** 1016 hPa.

#99. Bakersfield, CA – Score: 12.11

Bakersfield sits at 400 feet at the southern end of the San Joaquin Valley, hemmed in by the Sierra Nevada to the east, the Tehachapi Mountains to the south, and the Temblor Range to the west. This nearly enclosed basin creates some of the worst air quality in the United States, with particulate matter from agriculture, oil production, and vehicle emissions trapped under inversions.

Peak season: November through February. **Baseline pressure:** 1013 hPa.

#98. Tucson, AZ – Score: 12.34

Tucson sits at 2,400 feet in a broad desert basin ringed by five mountain ranges, including the 9,000-foot Santa Catalinas to the north. These mountains trigger orographic lift that initiates thunderstorm development, often visible hours before storms reach the city floor.

Peak season: July through september. Baseline pressure: 950 hPa.



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#97. Fresno, CA – Score: 13.43

Fresno sits in the heart of the San Joaquin Valley, a 250-mile trough between the Sierra Nevada and the Coast Ranges. This valley traps air pollution from agriculture and vehicle emissions under persistent winter inversions, creating some of the worst air quality in the nation.

Peak season: November through march. **Baseline pressure:** 1013 hPa.

#96. New York, NY – Score: 13.92

New York's coastal position means weather systems arriving from both the Atlantic and the continent converge over the city. The urban heat island effect adds temperature stress, and subway-to-street temperature swings of 20+ degrees in winter create additional trigger exposure for commuters.

Peak season: Late september through november. **Baseline pressure:** 1015 hPa.

#95. Nashville, TN – Score: 13.92

Nashville's music may be famous, but its weather volatility is underappreciated. The city sits at the convergence of multiple weather influences and experiences an extended severe weather season.

Peak season: March through may. **Baseline pressure:** 1013 hPa.

#94. Phoenix, AZ – Score: 13.94

Phoenix's desert basin traps heat and creates strong surface low-pressure during summer afternoons. The 40-degree daily temperature swing between predawn lows and afternoon highs is one of the largest of any major US city, creating a daily cycle of atmospheric change that sensitive individuals may notice.

Peak season: July through september. **Baseline pressure:** 1012 hPa.

#93. Los Angeles, CA – Score: 14.33



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Los Angeles benefits from generally stable Pacific high pressure for much of the year, but stability breaks dramatically during Santa Ana events. Wildfire smoke during fire season adds particulate matter triggers on top of pressure changes, making fall particularly challenging for migraine sufferers in the LA basin.

Peak season: October through January. **Baseline pressure:** 1016 hPa.

#92. Topeka, KS – Score: 14.36

Topeka sits along the Kansas River at the transition between the Flint Hills tallgrass prairie and the Smoky Hills to the west. The city's 900-foot elevation is low enough that Gulf moisture reaches it with minimal weakening, creating the fuel for severe storms.

Peak season: March through June. **Baseline pressure:** 1012 hPa.

#91. Mesa, AZ – Score: 14.48

Mesa sits at 1,250 feet on the eastern edge of the Phoenix metro, where the Sonoran Desert floor begins to rise toward the Superstition Mountains and Tonto National Forest. The city's proximity to higher terrain means it often receives monsoon storms earlier and more intensely than western Phoenix suburbs.

Peak season: July through September. **Baseline pressure:** 990 hPa.

Regional Breakdown

REGION	AVERAGE RISK SCORE
Mountain West	34.63
Midwest	30.55
Northeast	28.22
South	23.07



Pacific Coast

21.08

The **Mountain West** leads with an average score of 34.63 – driven by cities at 5,000+ feet elevation where baseline atmospheric pressure is 10–20% lower than at sea level. Weather-driven pressure swings at altitude represent a larger percentage shift than the same absolute change at sea level, which appears to amplify the trigger effect for sensitive individuals.

The **Pacific Coast** scores lowest at 21.08, largely due to the stability of the Pacific High pressure system that dominates the region for most of the year. California alone contributes 5 cities to the bottom 20 – San Diego, Los Angeles, Fresno, Bakersfield, and San Francisco all score in the most favorable third of the index.

The **Midwest** (30.55) and **Northeast** (28.22) sit in the middle, affected by severe winter storms, spring severe weather season, and the three-way collision of Arctic, Gulf, and Pacific air masses that produces sharp pressure contrasts.

The **South** (23.07) ranks more favorable than expected – while hurricanes create dramatic individual pressure events, the long stable periods between storms and the absence of sustained frontal activity through much of the year keep average risk lower than Midwestern or Northeastern metros.

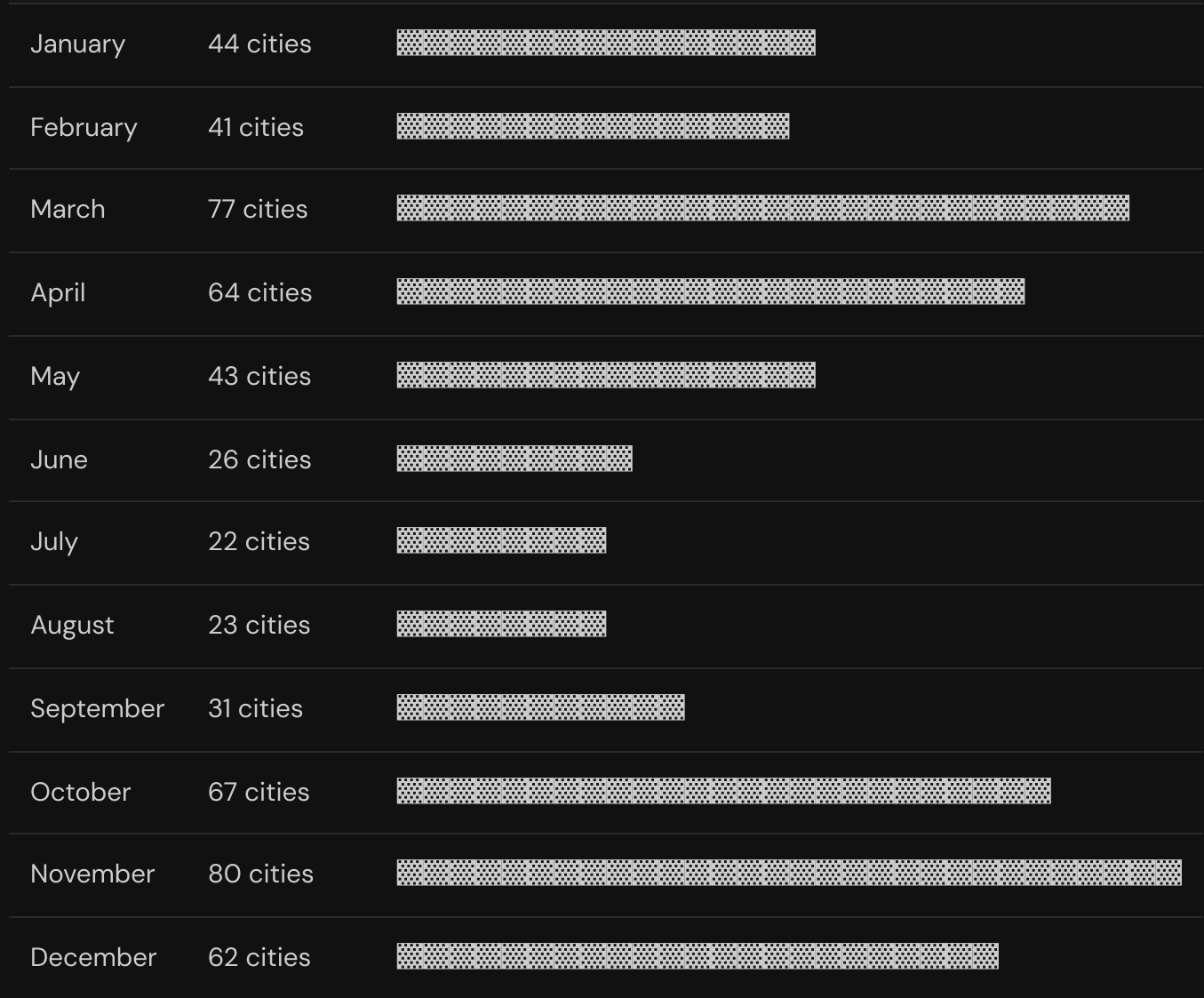
Seasonal Patterns

When 100 U.S. cities are analyzed together, the shape of the American migraine year becomes clear.



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CITIES WITH
MONTH IN
PEAK
SEASON



November is America's worst migraine month, appearing in the peak-trigger season for 80 of 100 cities. Late fall frontal passages, rapid temperature drops, and the onset of winter storm season combine to make the eight-week window from mid-October through mid-December the most challenging period of the year for weather-sensitive migraine sufferers.

Spring is the secondary peak, with March (77 cities) and April (64 cities) driven by severe weather season across the Plains and Midwest and the return of active frontal activity after the winter lull.



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Summer is the most stable period. July (22 cities) and August (23 cities) see the fewest triggers, placing them as peak-trigger months. The seasonal pattern reflects the underlying atmospheric dynamic: migraine triggers are correlated with atmospheric *volatility*, not with any particular absolute temperature, humidity, or pressure reading. Calmer weather means fewer triggers, and summer is America's calmest season for most of the country.

The Elevation Effect

One of the clearest signals in the 2026 index is the relationship between elevation and migraine risk. The top five cities all sit at elevations where baseline atmospheric pressure is materially below sea level:

RANK	CITY	ELEVATION (APPROX)	BASELINE PRESSURE
1	Denver, CO	5,280 ft	840 hPa
2	Colorado Springs, CO	6,035 ft	830 hPa
3	Flagstaff, AZ	7,000 ft	790 hPa
4	Santa Fe, NM	7,200 ft	790 hPa
6	Rapid City, SD	3,200 ft	948 hPa

At sea level, a typical weather-driven pressure drop of 10–15 hPa represents a swing of about 1.0–1.5% of baseline. At Denver's 840 hPa baseline, the same absolute drop is 1.2–1.8%. At Flagstaff's 790 hPa baseline, it rises to 1.3–1.9%. While the absolute change is identical, the relative change is larger – and migraine research increasingly suggests it is relative pressure change, not absolute pressure, that correlates with attack onset.

Residents of high-elevation cities also face Chinook winds (dramatic pressure and temperature crashes), upslope storm systems, and intensified UV exposure – all documented migraine triggers that stack on top of the baseline altitude effect.

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State-Level Averages

(States with 2+ cities in the sample)

Most challenging states:

STATE	AVG SCORE	CITIES
CO	68.38	2
MN	43.5	2
SD	37.64	2
NM	34.37	2
WI	32.44	3
MO	30.22	3
WA	27.9	2
NV	27.3	2
PA	27.02	2
MI	27.01	2

Most favorable states:

STATE	AVG SCORE	CITIES
CA	15.21	7
KS	17.94	2
TN	19.37	4

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STATE

AVG SCORE

CITIES

OK	21.51	2
GA	21.61	3
KY	22.57	2
LA	22.65	3
FL	23.15	6
TX	23.38	8
NC	24.11	4

Complete 100-City Ranking

RANK	CITY	SCORE	BASELINE PRESSURE (HPA)
1	Denver, CO	73.78	840
2	Colorado Springs, CO	62.98	830
3	Flagstaff, AZ	59.44	790
4	Santa Fe, NM	47.5	790
5	Duluth, MN	45.93	1013
6	Rapid City, SD	41.34	948
7	Minneapolis, MN	41.07	1014
8	Fargo, ND	40.16	1013

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SCORE

BASELINE PRESSURE (HPA)

	CITY	SCORE	BASELINE PRESSURE (HPA)
9	Boston, MA	39.27	1015
10	Des Moines, IA	37.95	1013
11	Portland, OR	36.14	1015
12	Providence, RI	36.14	1015
13	Omaha, NE	34.85	1012
14	Missoula, MT	34.61	948
15	Sioux Falls, SD	33.94	1012
16	Madison, WI	33.91	1013
17	St Louis, MO	32.59	1014
18	Reno, NV	32.56	870
19	Anchorage, AK	31.7	1013
20	Buffalo, NY	31.7	1014
21	Green Bay, WI	31.7	1014
22	Milwaukee, WI	31.7	1014
23	Philadelphia, PA	31.7	1015
24	Kansas City, MO	31.69	1013
25	San Antonio, TX	30.38	1015
26	Indianapolis, IN	29.47	1014
27	Austin, TX	29.06	1013
28	Cleveland, OH	28.57	1014

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SCORE

BASELINE PRESSURE (HPA)

	CITY	SCORE	BASELINE PRESSURE (HPA)
29	Grand Rapids, MI	28.57	1014
30	Hartford, CT	28.57	1015
31	Syracuse, NY	28.57	1014
32	Tallahassee, FL	28.57	1015
33	Washington, DC	28.57	1015
34	Spokane, WA	28.55	960
35	Salt Lake City, UT	27.72	866
36	Boise, ID	27.57	946
37	Augusta, GA	27.25	1014
38	Baton Rouge, LA	27.25	1016
39	Corpus Christi, TX	27.25	1016
40	Mobile, AL	27.25	1016
41	Seattle, WA	27.25	1015
42	Tampa, FL	27.24	1016
43	Springfield, MO	26.39	1011
44	Little Rock, AR	25.93	1014
45	Baltimore, MD	25.45	1015
46	Detroit, MI	25.45	1014
47	Norfolk, VA	25.45	1016
48	Richmond, VA	25.45	1015



RANK
CITY
MigrAid

SCORE

BASELINE PRESSURE (HPA)

RANK	CITY	SCORE	BASELINE PRESSURE (HPA)
49	Rochester, NY	25.45	1014
50	Asheville, NC	24.94	980
51	Burlington, VT	24.54	1014
52	Knoxville, TN	24.18	1011
53	Lexington, KY	24.15	1012
54	Charleston, SC	24.13	1016
55	Charlotte, NC	24.13	1013
56	Cincinnati, OH	24.13	1013
57	Dayton, OH	24.13	1013
58	Wilmington, NC	24.13	1016
59	Chicago, IL	23.22	1014
60	Pensacola, FL	23.22	1016
61	Raleigh, NC	23.22	1014
62	Birmingham, AL	22.83	1012
63	Honolulu, HI	22.81	1016
64	Houston, TX	22.81	1016
65	Sacramento, CA	22.81	1015
66	Shreveport, LA	22.81	1014
67	Pittsburgh, PA	22.35	1012
68	Las Vegas, NV	22.03	971

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SCORE

BASELINE PRESSURE (HPA)

	CITY	SCORE	BASELINE PRESSURE (HPA)
69	Jackson, MS	21.9	1014
70	San Jose, CA	21.9	1015
71	Oklahoma City, OK	21.51	1012
72	Tulsa, OK	21.51	1012
73	Wichita, KS	21.51	1012
74	Dallas, TX	21.49	1014
75	Albuquerque, NM	21.23	842
76	Charleston, WV	21.05	1011
77	Jacksonville, FL	21.0	1016
78	Louisville, KY	21.0	1013
79	Lubbock, TX	20.44	928
80	Columbus, OH	20.09	1014
81	Miami, FL	20.09	1016
82	Atlanta, GA	19.71	1012
83	Chattanooga, TN	19.71	1012
84	Memphis, TN	19.68	1014
85	Orlando, FL	18.78	1016
86	Fort Worth, TX	18.36	1013
87	New Orleans, LA	17.88	1014
88	Savannah, GA	17.88	1016



NR CITY
MigrAid

SCORE

BASELINE PRESSURE (HPA)

89	El Paso, TX	17.22	878
90	San Francisco, CA	15.65	1016
91	Mesa, AZ	14.48	990
92	Topeka, KS	14.36	1012
93	Los Angeles, CA	14.33	1016
94	Phoenix, AZ	13.94	1012
95	Nashville, TN	13.92	1013
96	New York, NY	13.92	1015
97	Fresno, CA	13.43	1013
98	Tucson, AZ	12.34	950
99	Bakersfield, CA	12.11	1013
100	San Diego, CA	6.25	1016

Scientific Background

Migraine affects an estimated 12% of U.S. adults, with women three times more likely than men to be diagnosed (American Migraine Foundation). It is among the leading causes of disability worldwide (World Health Organization, Global Burden of Disease Study).

Weather has been a suspected migraine trigger for over a century, but only recently have large-scale studies begun to quantify the relationship. Recent findings include:



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A 2025 retrospective cohort study in *Frontiers in Neurology* analyzed Japanese medical data and meteorological data and found significant associations between seasonal atmospheric pressure change and migraine occurrence.

- A 2023 study in *Headache: The Journal of Head and Face Pain* using smartphone-tracked data from 4,375 adults found migraines correlated with humidity, rainfall, and pressure changes.
- A 2025 systematic review published in *Cureus* examined all available literature on barometric pressure and migraine and concluded that pressure drops and rapid fluctuations are consistently associated with increased migraine frequency, though not with migraine severity or duration.
- The *Washington Post* reported in August 2025 on the emerging clinical field of "meteoropathy" – the study of physiological reactions to environmental changes, particularly barometric shifts – as practitioners begin to recognize weather sensitivity as a legitimate medical phenomenon.

The 2026 U.S. Migraine Risk Index builds on this research by translating city-level climate and geography into a comparable risk metric.

About MigrAid

MigrAid is an iOS migraine tracking application that helps users identify personal triggers, forecast elevated-risk days, and share symptom data with their healthcare providers. The app integrates local barometric pressure, humidity, and temperature data with user-logged migraine history to produce 48-hour personalized risk forecasts.

The 2026 U.S. Migraine Risk Index was compiled by MigrAid's research team using the app's city-level atmospheric profiles, publicly available weather data, and peer-reviewed migraine trigger literature.



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High-resolution graphics, interactive maps, and interview availability: migrain.app/press/

Methodology notes, scoring source data, and city-by-city detail available on request. This index will be updated annually.

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MigrAid is not a medical device and does not provide medical advice.