

How Public County Data Can Guide Equitable Cardiovascular–Kidney–Metabolic Prevention in California

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ABSTRACT

Cardiovascular–kidney–metabolic (CKM) prevention requires both clinical risk assessment and practical access to sustained care. We combined published clinical evidence with publicly available aggregate data for California’s 58 counties to examine how economic deprivation and insurance gaps could inform prevention planning when the state’s distribution of CKM stages and arrhythmias is unknown. American Community Survey estimates identified 7.54 million residents below 150 percent of poverty in 2020–24. Separate 2023 estimates identified 567,018 uninsured adults ages 18–64 at or below 138 percent of poverty. The two measures mapped differently: economic disadvantage was concentrated in several inland and northern counties, whereas the highest low-income uninsured percentages occurred in the coastal counties of Monterey, Ventura, and Santa Barbara. A third dimension, absolute volume, pointed elsewhere again: Los Angeles accounted for 30.8 percent of the statewide low-income uninsured population. We present an explicitly defined, single-indicator economic-deprivation percentile, not an official Social Vulnerability Index, and we keep five arrhythmia outcomes clinically distinct. These maps cannot establish CKM prevalence or progression. They support a policy approach that separates outreach intensity, service capacity, and individual clinical eligibility, finances the specific barriers that prevent completed care, and evaluates programs on completed assessment and patient-important outcomes rather than on detection volume.

Keywords: Cardiovascular–kidney–metabolic (CKM) syndrome; Economic deprivation; Health insurance gaps; Arrhythmia prevention; Health disparities

INTRODUCTION

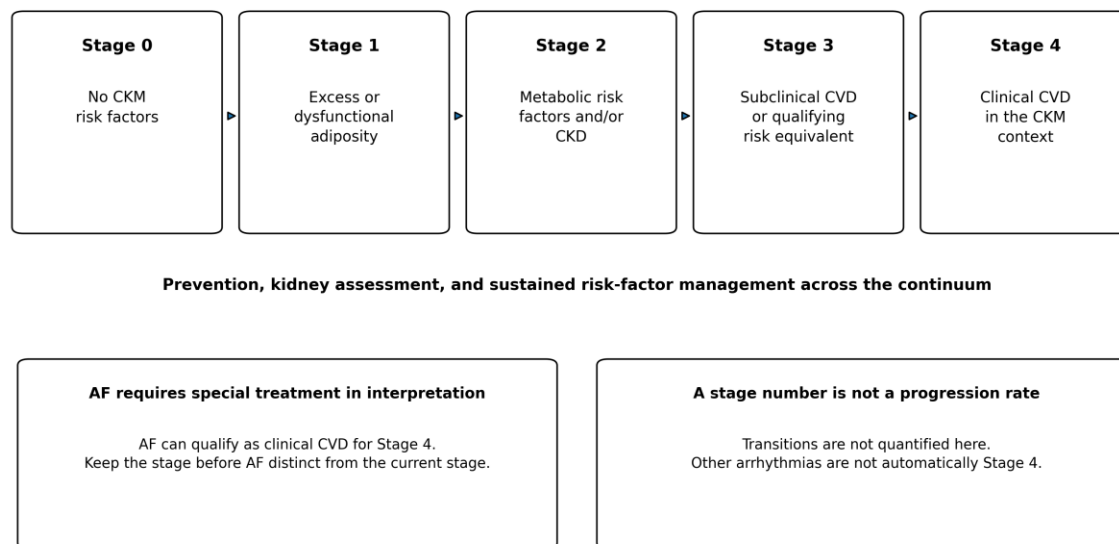
California’s prevention policy must confront a practical mismatch. Clinical guidance increasingly treats metabolic, kidney, and cardiovascular disease as interconnected, while access to prevention still depends on whether people can obtain, navigate, and sustain care. The CKM framework supplies a common clinical language that runs from excess or dysfunctional adiposity, through metabolic risk factors and chronic kidney disease, to subclinical and then clinical

cardiovascular disease (Exhibit 1). The American Heart Association's 2023 presidential advisory and the 2026 AHA/ACC/ADA/ASN guideline support integrated assessment rather than separate disease-specific encounters.^{1,2}

Exhibit 1. CKM stage and intervention opportunity are not the same measure

CKM stage and intervention opportunity are not the same measure

Clinical staging framework · not a patient-flow diagram or a county transition model



Source: AHA CKM presidential advisory (2023) and multisociety CKM guideline (2026). Abbreviated, not diagnostic criteria. CVD, cardiovascular disease; CKD, chronic kidney disease. Higher-stage qualifying features take precedence.

SOURCE: Abbreviated from the AHA CKM presidential advisory (2023) and the AHA/ACC/ADA/ASN CKM guideline (2026).^{1,2}

NOTES: CVD, cardiovascular disease; CKD, chronic kidney disease; AF, atrial fibrillation. Arrows do not imply inevitable progression, uniform speed, or a measured transition probability. Full guideline criteria, including CKD severity and risk equivalents, remain necessary for individual staging; higher-stage qualifying features take precedence.

The burden implied by this framework is large. In nationally representative examination data, roughly half of US adults met criteria for Stage 2 and about one in seven for Stages 3–4.³ For health policy, however, a clinical framework is not an allocation rule. A county with a high proportion of economically disadvantaged residents may need intensive outreach. A large county with a less extreme proportion may need substantially greater service capacity. A county with relatively favorable aggregate economic conditions may still have substantial insurance gaps among its low-income residents. Treating these as a single ranking can misdirect both investment and accountability.

We therefore ask a specific policy question: how can publicly available county information guide equitable CKM prevention when a complete California distribution of CKM stages and arrhythmias is unavailable? We combine an evidence synthesis with a descriptive analysis of two public county measures. The contribution is not a new patient-risk algorithm. It is a transparent method for distinguishing where outreach is needed, where coverage barriers are evident, and where the number of residents potentially needing assistance is greatest.

The clinical scope includes atrial fibrillation (AF), atrial flutter, atrioventricular (AV) block, ventricular tachycardia (VT), and other supraventricular tachycardia (SVT). These outcomes remain separate throughout because their ascertainment, clinical consequences, and relationships to CKM staging differ. County social conditions are never substituted for their prevalence.¹

Study Data and Methods

Evidence synthesis

We conducted a targeted, non-systematic synthesis of professional guidance, national examination-survey findings, rhythm-specific research, intervention trials, California service-delivery policies, and publicly accessible social and insurance estimates, reviewed through October 5, 2026. We did not perform exhaustive database screening, independent duplicate review, a formal risk-of-bias assessment, or a meta-analysis. We integrated sources while preserving each one's provenance; this does not imply distributed model training or patient-level record linkage.

The two evidence streams play different roles. Clinical evidence establishes why prevention matters and which outcomes must remain distinct. County data describe social conditions and coverage. Neither supplies the missing joint distribution of CKM stage, rhythm diagnosis, and county. No claims database, individual patient record, proprietary risk model, or synthetic population was used.

County measures

We extracted two complete California county tables from the National Institute on Minority Health and Health Disparities' HDPulse portal. The first reports American Community Survey (ACS) 2020–24 five-year estimates of the percentage and number of residents below 150 percent of poverty, covering all ages, races and ethnicities, and both sexes within the source's poverty-status universe. The second reports Census Small Area Health Insurance Estimates (SAHIE) for 2023: the percentage and number uninsured among adults ages 18–64 at or below 138 percent of poverty.^{4,5}

These measures deliberately answer different questions. The poverty measure describes economic disadvantage broadly; the insurance measure describes a coverage gap within a specified low-income adult population. They differ in age coverage, income threshold, and observation period. We did not multiply their percentages, infer their individual-level overlap, or label their counts as patients with CKM.

We retained the displayed source values, matched all 58 counties by name to five-digit Federal Information Processing Standards (FIPS) identifiers, and checked completeness and arithmetic. County counts summed exactly to each source's reported California total. Published state percentages served as descriptive reference lines and were not replaced by unweighted averages of county percentages.⁶

Economic-deprivation percentile and mapping

To give the map a consistent within-state scale, we calculated an economic-deprivation percentile as $100 \times (\text{ascending average rank of the county's poverty percentage} - 1) / 57$. Tied source percentages receive average ranks. Higher values represent greater relative economic disadvantage; the endpoints are the lowest and highest observed counties. Raw percentages are retained alongside the transformation (Appendix Exhibit S1).⁶

This is a transparent, author-derived single-indicator measure—not the CDC/ATSDR Social Vulnerability Index (SVI), the Area Deprivation Index, the Social Deprivation Index, or any validated multidomain score. The 2022 CDC SVI incorporates sixteen social factors across four themes; its construct and reference population differ from a within-California poverty ranking. We did not obtain and verify a complete official SVI extract and therefore neither display nor infer official SVI scores (Appendix Exhibit S4).⁷

County maps use Census-derived display geometry projected to California Albers. Percentile categories (0–<25, 25–<50, 50–<75, 75–100) are display bands, not clinical thresholds; insurance and raw-poverty maps use fixed, non-overlapping percentage bands. County numbers are alphabetical identifiers, not risk ranks (Appendix Exhibit S2). A scatterplot displays the two underlying percentages without a fitted causal or predictive model.

Limits of inference

The analysis is cross-sectional and ecological. It cannot identify individual social needs, undiagnosed disease, CKM stage transitions, treatment effects, or county-specific causes of progression. Sampling intervals for the county measures were not extracted, so we make no statistical-significance claims about county differences; ranking one-decimal estimates also hides uncertainty and creates ties, and small counties require particular caution. County boundaries are administrative, not biological. Findings are intended to support local validation and program design, not automatic funding or patient eligibility.

Study Results

Economic disadvantage and coverage gaps produce different maps

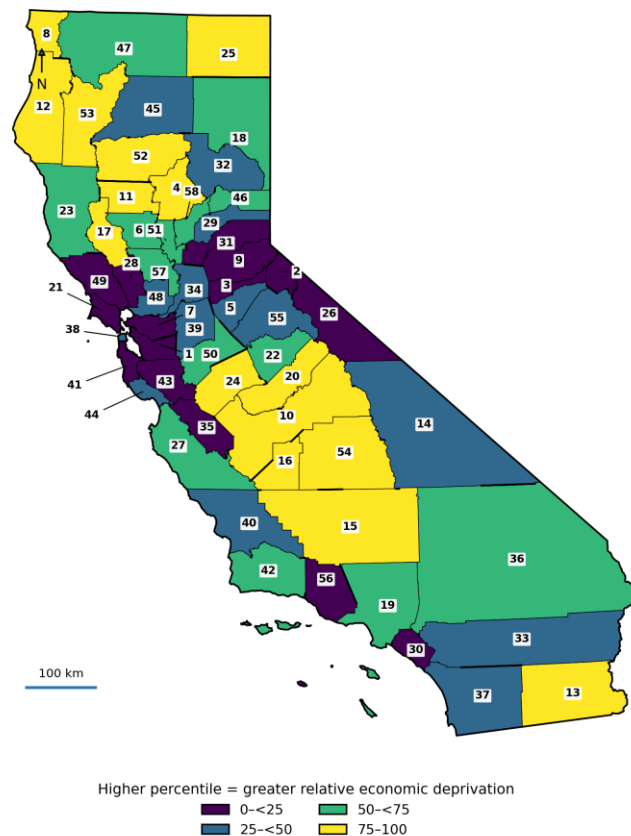
The ACS table identified 7,540,972 California residents below 150 percent of poverty, or 19.5 percent of the relevant population. Seventeen counties had a displayed percentage of at least 25 percent: Trinity's estimate was 36.9 percent, Imperial's 34.1 percent, and Kern's and Madera's each 31.3 percent. Exhibit 2 shows the relative

geographic distribution; Appendix Exhibit S1 preserves the directly interpretable percentage scale. These are economic indicators, not estimates of CKM prevalence.^{4,6}

Exhibit 2. Economic deprivation across California, 2020–2024

Economic deprivation across California

Within-state percentile of the population share below 150% of poverty, 2020–2024
Author-derived single-indicator measure; not CDC SVI or a validated composite.



County numbers correspond to the full county key in Appendix Exhibit S2. California Albers projection.
Source: HDPulse / Census ACS, 2020–2024.

SOURCE: Authors’ calculations from NIH/NIMHD HDPulse; U.S. Census Bureau, American Community Survey 2020–2024 five-year estimates.⁴

NOTES: Author-derived single-indicator economic-deprivation percentile; not CDC SVI, ADI, SDI, or a validated composite. All ages, all races and ethnicities, both sexes. Rank uses 58 counties and average ranks for ties. A percentile is not a disease probability or a percentage of residents with CKM. Missing uncertainty intervals preclude significance claims.

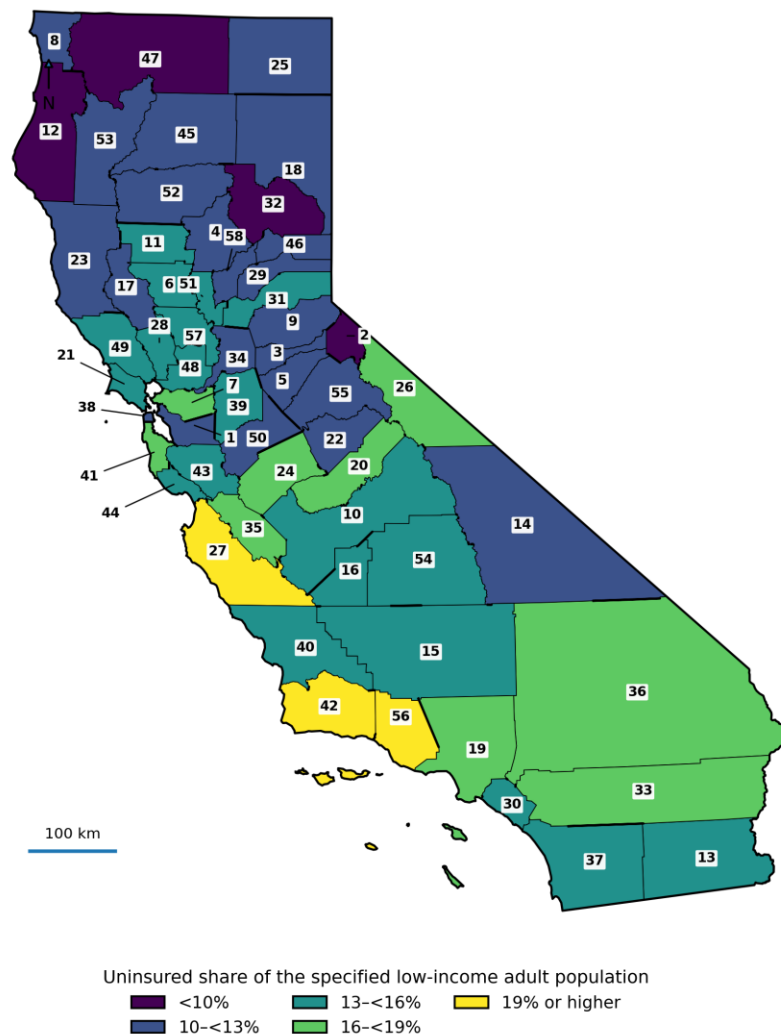
The SAHIE table identified 567,018 uninsured low-income adults ages 18–64, or 15.3 percent of that group. The highest percentages were in Monterey (20.7 percent), Ventura (20.6 percent), and Santa Barbara (19.7 percent)—

counties that are not at the top of the deprivation map. Their prominence in Exhibit 3 illustrates why a deprivation-only allocation rule could miss an important access problem. The map shows the coverage pattern without assuming that uninsured residents have CKM.⁵

Exhibit 3. Coverage gaps among low-income adults, 2023

Coverage gaps among low-income adults

Uninsured adults aged 18–64 at or below 138% of poverty, 2023



County numbers correspond to the full county key in Appendix Exhibit S2. California Albers projection.
Source: HDPulse / Census SAHIE, 2023.

SOURCE: NIH/NIMHD HDPulse; U.S. Census Bureau, Small Area Health Insurance Estimates (SAHIE), 2023.⁵

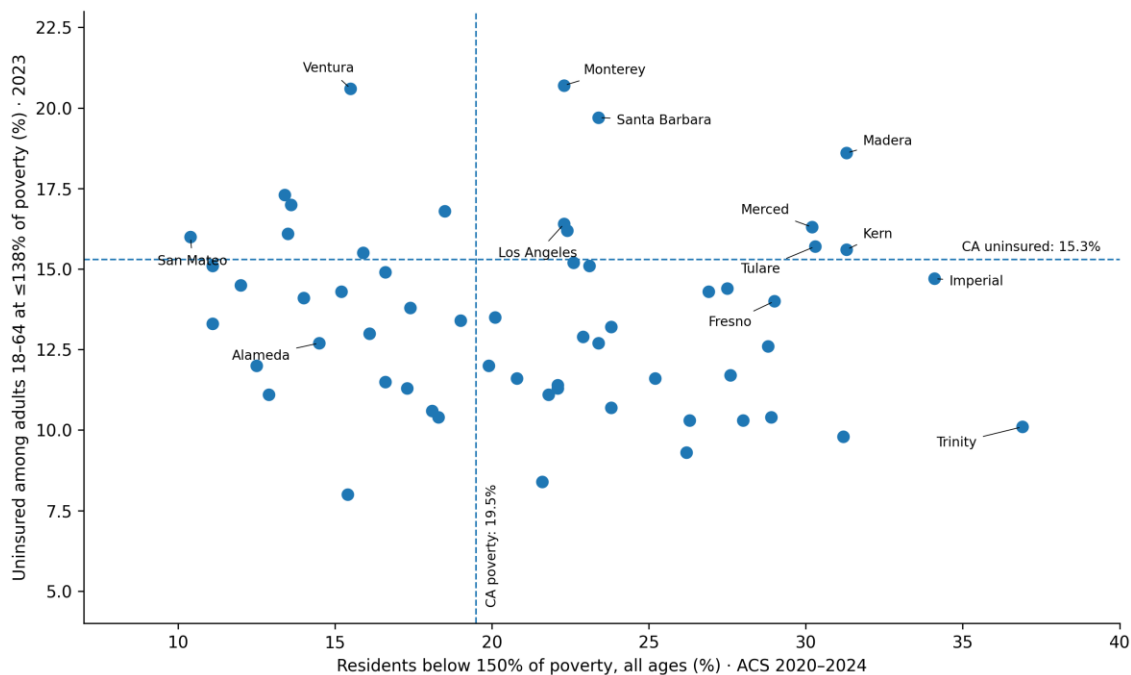
NOTES: Denominator: adults ages 18–64 at or below 138 percent of poverty—not all adults and not patients with CKM. California estimate: 15.3 percent. The 2023 estimate predates later changes in eligibility, enrollment, and policy. Fixed descriptive categories are not clinical or statistical thresholds.

Exhibit 4 places the two measures on common axes. Madera combined a poverty percentage of 31.3 with a low-income uninsured percentage of 18.6; Trinity combined 36.9 with 10.1; Ventura combined 15.5 with 20.6. Counties therefore fall into recognizably different situations—high deprivation with high coverage gaps, high deprivation with comparatively good coverage, and moderate deprivation with large coverage gaps. These contrasts identify different questions for local investigation; they do not show why coverage differs or whether a county program is effective, and no line in the plot defines a causal exposure or a funding threshold.^{4,5}

Exhibit 4. Economic deprivation and coverage are different dimensions

Economic deprivation and coverage are different dimensions

Each point is one county; reference lines are published California estimates, not allocation thresholds



Source: NIH/NIMHD HDPulse; ACS 2020–2024 and SAHIE 2023. Different populations and periods.
Descriptive ecological comparison. No regression, causal effect, CKM count, or individual-level overlap is inferred.

SOURCE: Authors’ analysis of NIH/NIMHD HDPulse: ACS 2020–2024 five-year estimates and SAHIE 2023.^{4,5}

NOTES: The two indicators have different population denominators and observation periods. Points are equally weighted counties, not people. Dashed lines are published statewide estimates, not allocation thresholds. Label selection is illustrative; the complete county table is in the reproducibility files.

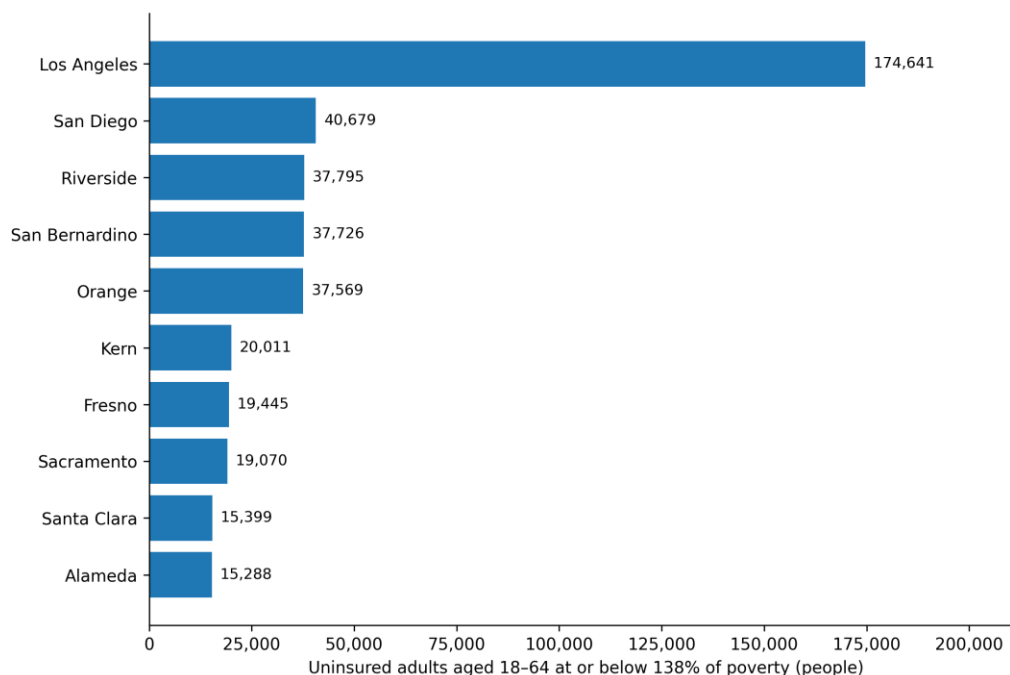
Absolute numbers change the capacity question

Rates and counts lead to different conclusions. Los Angeles had 174,641 uninsured adults in the specified low-income population—30.8 percent of the statewide total, calculated from the source counts—even though its 16.4 percent uninsured estimate is not the state’s highest. The next four counties by volume (San Diego, Riverside, San Bernardino, and Orange) each had roughly 37,600–40,700 (Exhibit 5). A county’s position on a rate map therefore says little about the scale of navigation, enrollment, and clinical capacity it requires.⁵

Exhibit 5. Absolute numbers change the service-capacity question

Absolute numbers change the service-capacity question

Ten counties with the largest estimated numbers of uninsured low-income adults, 2023



Source: NIH/NIMHD HDPulse / Census SAHIE, 2023. Values are population estimates, not CKM patient counts.
Los Angeles: 174,641 of 567,018 statewide, or 30.8% (authors' arithmetic).

SOURCE: NIH/NIMHD HDPulse; U.S. Census Bureau, SAHIE, 2023. Share of statewide total calculated by the authors.⁵

NOTES: Ten counties with the largest estimated numbers of uninsured adults ages 18–64 at or below 138 percent of poverty, ranked by count rather than rate. Values are population estimates, not CKM patient counts. California total across all 58 counties: 567,018.

What these patterns add to the CKM evidence

National examination data establish that CKM-related risk is widespread, but they are not California estimates. In NHANES 2011–March 2020 (n = 10,762 adults), age-standardized prevalence was 49.0 percent for Stage 2 and 14.6 percent for Stages 3–4 combined (5.4 and 9.2 percent, respectively). The analysis lacked AF, peripheral artery disease, and some subclinical cardiovascular measurements, limiting alignment with a fully assessed clinical stage. Appendix Exhibit S3 displays the published estimates and confidence intervals without transporting them to California or multiplying them by county populations.^{3,6}

The same study found substantially more advanced CKM in older adults, and a separate national analysis associated social disadvantage, including lower income and food insecurity, with advanced CKM.^{3,8} These findings justify attention to social conditions, but they do not convert a county poverty percentage into the probability that an individual has advanced disease. Demographic categories should not be treated as biological explanations, and the county tables used here cannot characterize the demographics of California patients with CKM.

The most defensible interpretation is therefore layered. National and clinical evidence establishes the importance of prevention; public county information identifies possible barriers to reaching residents; individual assessment establishes disease and eligibility. Keeping those levels distinct makes the maps useful without assigning them diagnostic properties.

Arrhythmias require a clinically specific response

AF can qualify as clinical cardiovascular disease within the CKM Stage 4 definition (Exhibit 1). The stage before incident AF is therefore different from the stage after qualifying AF develops, and a claim that AF predicts an AF-defined transition becomes circular. The more informative question is whether a rhythm diagnosis precedes subsequent kidney deterioration, heart failure, stroke, or another independently defined outcome.^{1,2}

The other rhythm groups cannot simply inherit AF's staging role (Exhibit 6). First-degree and advanced AV block are different outcomes. Nonsustained VT detected during prolonged monitoring is not equivalent to sustained VT or sudden cardiac death. In the ARIC cohort, albuminuria was associated with higher AF prevalence, time in AF, and nonsustained VT; a community study of advanced AV block identified associations with suboptimal blood pressure and fasting glucose.^{9,10} These studies do not establish a common county-level arrhythmia gradient or show that modifying those factors prevents every rhythm outcome.

Exhibit 6. Five rhythm outcomes require five separate interpretations

Rhythm outcome	Relationship to CKM staging	Distinction to preserve	Evidence used here
Atrial fibrillation (AF)	Can qualify as clinical cardiovascular disease within Stage 4	Keep the stage before incident AF distinct from the stage after AF; test AF against independently defined outcomes (kidney decline, heart failure, stroke)	AHA advisory and 2026 guideline ^{1,2} ; albuminuria associated with higher AF prevalence and time in AF (ARIC) ⁹
Atrial flutter	Related but separately reported rhythm	Do not substitute automatically for AF in staging or in outcome counts	No flutter-specific CKM estimate identified in this synthesis
Atrioventricular (AV) block	Not automatically Stage 4	Separate first-degree from advanced block; pacemaker implantation is a different outcome	Advanced AV block associated with suboptimal blood pressure and fasting glucose in a community cohort ¹⁰
Ventricular tachycardia (VT)	Not automatically Stage 4	Separate nonsustained from sustained VT; sudden cardiac death is not VT prevalence	Albuminuria associated with higher prevalence of nonsustained VT on prolonged monitoring (ARIC) ⁹
Other supraventricular tachycardia (SVT)	Not automatically Stage 4	Excludes AF and flutter; distinguish brief runs from clinical tachycardia	No SVT-specific CKM estimate identified in this synthesis

SOURCE: Authors' clinical synthesis of CKM guidance and the rhythm-specific studies cited.

NOTES: The table describes endpoint distinctions, not comparative risks or treatment recommendations. No California stage-by-arrhythmia prevalence is estimated. Clinical evaluation and treatment depend on the patient and rhythm subtype.

For policymakers, the implication is not indiscriminate monitoring in high-deprivation counties. Diagnostic access should follow clinical indications and lead to an actionable care pathway. In the LOOP randomized trial of 6,004 adults ages 70–90 with stroke risk factors, implantable-loop-recorder screening increased AF detection but did not significantly reduce stroke or systemic embolism (4.5 vs 5.6 percent; hazard ratio, 0.80; 95% CI, 0.61–1.05; $p = 0.11$).¹¹ Detection volume alone is therefore an inadequate measure of program benefit.

DISCUSSION

A County-Informed Prevention Policy

Separate reach, capacity, and clinical eligibility

Exhibit 7 sets out an implementation sequence from geographic information to accountable care. Three decisions must be kept apart: where outreach should be intensified (informed by relative rates, exhibits 2–4), how much

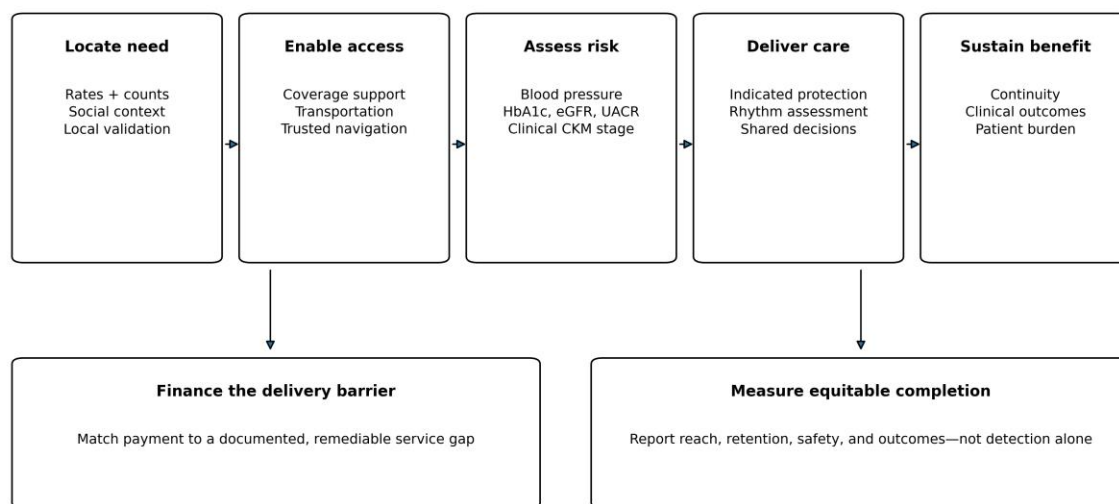
service capacity is required (informed by absolute counts, exhibit 5), and which residents qualify for a particular assessment, treatment, or support (determined only by individual evaluation). County information can inform the first two decisions; it should not replace the third.

Exhibit 7. From county maps to an accountable CKM prevention program

From county maps to an accountable CKM prevention program

Proposed policy framework - arrows represent an implementation sequence, not measured causal effects

Patient eligibility and clinical decisions remain individual; geography guides outreach and capacity.



Source: Authors' proposed synthesis of AHA CKM guidance and California DHCS service-delivery policies. Implementation framework, not a validated score, funded program, or demonstration of intervention effectiveness.

SOURCE: Authors' synthesis of the AHA CKM advisory (2023), the AHA/ACC/ADA/ASN CKM guideline (2026), and California DHCS community health worker and Enhanced Care Management policies.^{1,2,12,13}

NOTES: HbA1c, glycated hemoglobin; eGFR, estimated glomerular filtration rate; UACR, urine albumin-to-creatinine ratio. Arrows represent an implementation sequence, not measured causal effects. Policy and clinical eligibility require individual verification. This is a proposed implementation model, not an evaluated intervention.

We propose maintaining a universal prevention platform while directing additional outreach and navigation toward locally verified barriers. Programs should examine raw rates, absolute counts, and neighborhood context together. A county with high relative deprivation should not automatically displace a populous county with many underserved residents, and a favorable county average should not exclude a disadvantaged neighborhood. Local health departments and community organizations should review the maps' interpretation before it is translated into a budget.

The relative ranking should not become a payment formula by default. A county's percentile can change because another county changes, even when local conditions do not, and one-decimal estimates can move a county across a display boundary without a meaningful change in need. Allocation should rest on a stated objective—such as reducing incomplete kidney assessment or improving coverage continuity—and a measurable service gap, not on the visual intensity of a map.

Pay for the barrier, not merely the clinical encounter

California already has relevant delivery mechanisms. Community health worker services became a Medi-Cal benefit in July 2022, and the Department of Health Care Services describes a preventive role that includes chronic conditions and environmental or climate-sensitive health concerns. Enhanced Care Management gives eligible members with complex needs access to a lead care manager and coordinated services.^{12,13} Eligibility and covered services must be confirmed for the individual and the delivery setting.

We propose linking those mechanisms to a defined CKM prevention pathway rather than labeling every high-deprivation resident as eligible for an intensive program. Where local assessment identifies missed visits, unstable coverage, transportation barriers, or difficulty navigating care, payment should support the work required to resolve that barrier.

For residents who remain uninsured, outreach must connect to enrollment assistance and safety-net services; a benefit available to enrolled members does not by itself close the coverage gap shown in Exhibit 3.

A completed encounter should lead to clinically appropriate assessment, including blood pressure, glycemic status, kidney function, and albuminuria when indicated, with individualized treatment. Randomized evidence, including the EMPA-KIDNEY trial, supports reductions in specified kidney and cardiovascular outcomes in eligible patients; it does not establish that a county navigation program will reproduce a trial effect or prevent every arrhythmia. The clinical and delivery components require separate evaluation.^{2,14}

Evaluate completed care and patient-important outcomes

A practical evaluation framework should begin with the eligible population and then track outreach, assessment completion, treatment initiation when indicated, continuity, and outcomes, each with an explicit denominator. A program can contact many residents while failing to reach those with the greatest access barriers. Conversely, improved ascertainment can temporarily increase recorded CKM or AF prevalence without any worsening of underlying health.

Clinical outcomes should remain distinct from operational performance. Relevant measures include blood-pressure control, completion of indicated kidney assessment, continuity of medication access, and subsequent cardiovascular or kidney events, alongside patient-reported burden, unwanted testing, and downstream procedures. None of these effects is estimated by the present maps, and county comparisons should account for starting clinical risk and diagnostic opportunity before being read as performance differences.

Programs should preserve access for residents outside high-ranked areas and examine whether demographic groups are being reached equitably. Small-cell protections, community involvement, and clear limits on geographic profiling are essential design choices. The purpose of area data is to improve service availability, not to infer an individual's income, insurance status, race, or clinical condition from an address.

Keep environmental exposure and progression claims separate

The current maps do not measure heat, air pollution, wildfire smoke, food access, or travel time. These are candidates for separately sourced local layers, not explanations already established by the deprivation ranking. California research has linked wildfire smoke exposure with acute cardiovascular and cerebrovascular emergency visits; an acute-event association does not quantify multiyear movement between CKM stages.¹⁵ Likewise, differences in current county disease prevalence cannot demonstrate faster progression. That question requires repeated, comparably assessed clinical states and a defensible account of follow-up and competing events; it should not be answered by building a transition model from cross-sectional social data.

LIMITATIONS

This analysis uses one economic indicator and one insurance measure, not a comprehensive deprivation construct. A multidomain index could add information, but its variables, geographic scale, reference population, and intended use would need to be specified, and no concordance with SVI or another established index has been evaluated (Appendix Exhibit S4).⁷ The source periods and populations differ. We did not extract county uncertainty intervals, assess spatial dependence, estimate adjusted associations, or evaluate program effects, and the display geometry is not certified for address assignment. These constraints favor broad planning interpretation over fine-grained county league tables. California stage-specific counts, patient demographics, and joint stage-by-arrhythmia burden remain unestimated.

IMPLICATIONS FOR FURTHER WORK

Three next steps follow directly. First, test whether an official multidomain vulnerability measure, applied at county and tract level, changes local priorities relative to the single-indicator percentile. Second, estimate California's CKM stage distribution and stage-by-rhythm burden from data in which stage and rhythm are clinically ascertained. Third,

evaluate whether a county-informed, barrier-financed intervention improves completed care and patient-important outcomes.

CONCLUSION

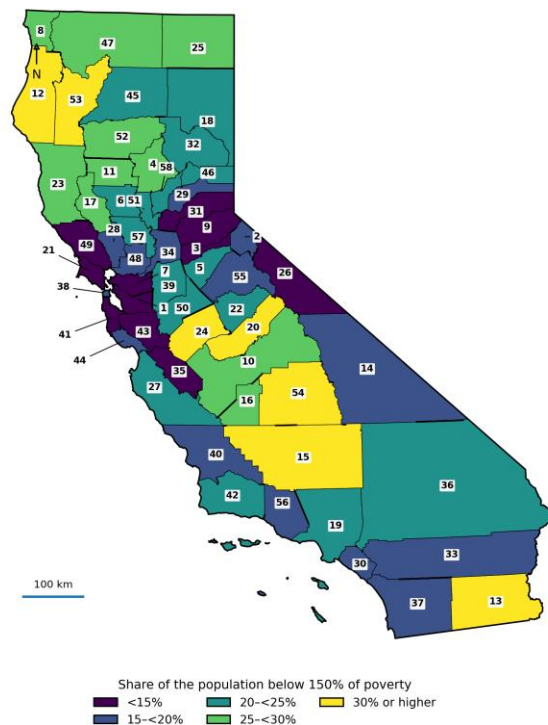
California's CKM prevention challenge is both clinical and organizational. County economic disadvantage, low-income coverage gaps, and the absolute number of potentially underserved residents describe three different aspects of that challenge, and they point to different counties. A transparent public-data map can guide outreach and capacity planning but cannot establish individual CKM stage or county progression rates. The policy priority is to connect geographic context with clinically appropriate assessment, barrier-specific support, and accountable follow-through—without converting an ecological ranking into an individual diagnosis or an automatic entitlement rule.

Appendix Exhibits

Exhibit S1. Economic disadvantage in directly interpretable units

Economic disadvantage in directly interpretable units

Residents below 150% of poverty, all ages, 2020–2024



County numbers correspond to the full county key in Appendix Exhibit S2. California Albers projection.
Source: HDPulse / Census ACS, 2020–2024.

SOURCE: NIH/NIMHD HDPulse; U.S. Census Bureau, ACS 2020–2024 five-year estimates.⁴

NOTES: Raw source percentages, not a composite index. Poverty status is defined by the source survey's universe. California estimate: 19.5 percent. These percentages do not estimate CKM prevalence.

Exhibit S2. County key for all California maps

County key for all California maps

Numbered map labels are alphabetical identifiers, not risk ranks

01 Alameda	30 Orange
02 Alpine	31 Placer
03 Amador	32 Plumas
04 Butte	33 Riverside
05 Calaveras	34 Sacramento
06 Colusa	35 San Benito
07 Contra Costa	36 San Bernardino
08 Del Norte	37 San Diego
09 El Dorado	38 San Francisco
10 Fresno	39 San Joaquin
11 Glenn	40 San Luis Obispo
12 Humboldt	41 San Mateo
13 Imperial	42 Santa Barbara
14 Inyo	43 Santa Clara
15 Kern	44 Santa Cruz
16 Kings	45 Shasta
17 Lake	46 Sierra
18 Lassen	47 Siskiyou
19 Los Angeles	48 Solano
20 Madera	49 Sonoma
21 Marin	50 Stanislaus
22 Mariposa	51 Sutter
23 Mendocino	52 Tehama
24 Merced	53 Trinity
25 Modoc	54 Tulare
26 Mono	55 Tuolumne
27 Monterey	56 Ventura
28 Napa	57 Yolo
29 Nevada	58 Yuba

All 58 counties are included. Five-digit county FIPS identifiers are supplied in the source data.
Source: Census-derived county geometry and authors' alphabetical labeling.

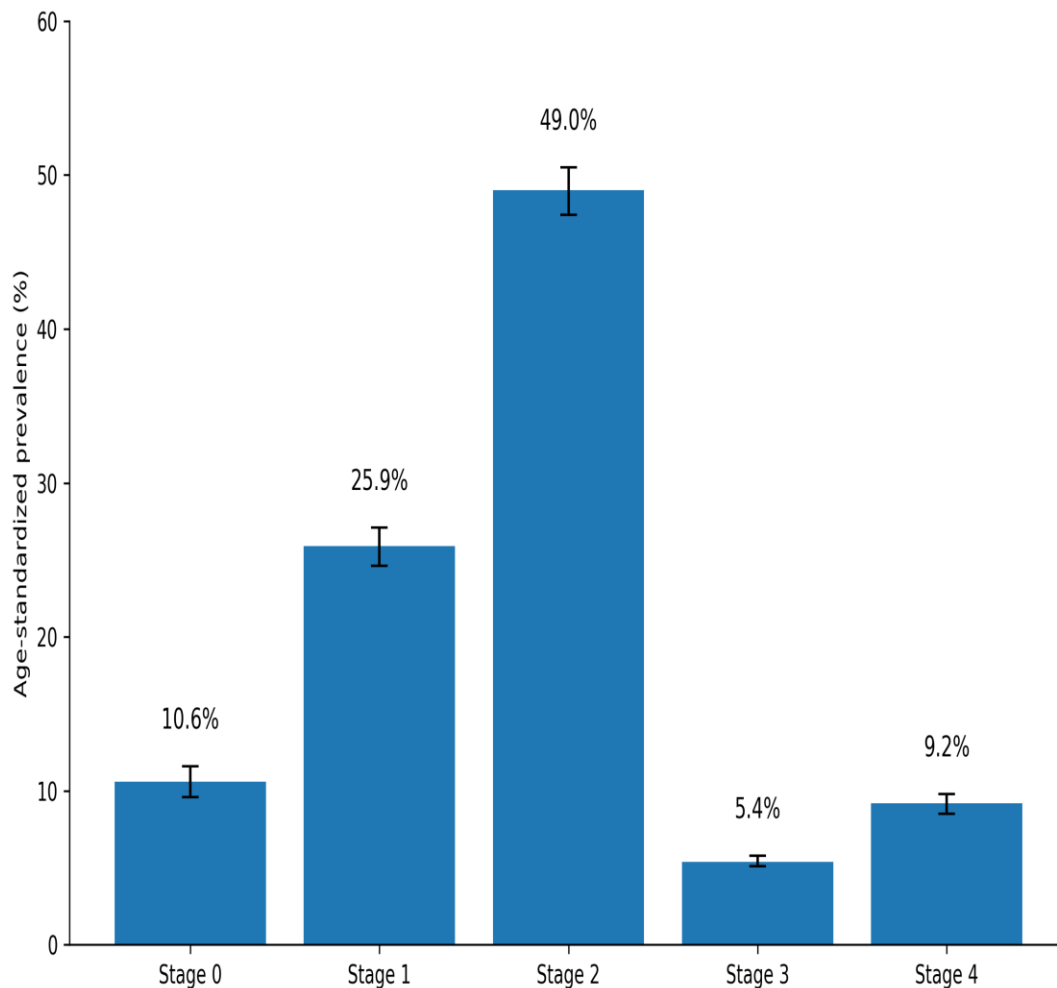
SOURCE: Census-derived county geometry; authors' alphabetical labeling.

NOTES: Map identifiers are alphabetical, not ranks. Five-digit FIPS identifiers accompany the reproducibility files.

Exhibit S3. National CKM stages: a benchmark, not a California estimate

National CKM stages: a benchmark, not a California estimate

US adults aged 20 years or older; age-standardized prevalence, NHANES 2011–March 2020



Source: Aggarwal et al. JAMA. 2024;331:1858–1860. Error bars: published 95% confidence intervals. AF, peripheral artery disease, and some subclinical measurements were unavailable. Rounded percentages sum to 100.1%.

SOURCE: Aggarwal et al., JAMA 2024.³

NOTES: US adults ages 20 and older, NHANES 2011–March 2020 (n = 10,762), age-standardized to the 2010 US adult population; error bars are published 95% confidence intervals. AF, peripheral artery disease, and some subclinical measurements were unavailable. Rounded percentages sum to 100.1. Estimates were not transported to California or multiplied by county populations.

Exhibit S4. A poverty percentile is not the CDC Social Vulnerability Index

A poverty percentile is not the CDC Social Vulnerability Index

Constructs, geography, and intended uses should remain explicit

MAPPED IN THIS PAPER

Economic-deprivation percentile
One input: share below 150% of poverty
58 counties; within-California ranking
Transparent descriptive proxy

NOT COMPUTED IN THIS PAPER

CDC/ATSDR SVI (2022)
16 social factors; four themes
Official county and tract measures
Requires the official score and vintage

Neither index assigns an individual diagnosis

County context can guide outreach. Individual social needs, CKM stage, and clinical eligibility require separate assessment.

Source: Authors' percentile definition; CDC/ATSDR SVI 2022 documentation and official map-service metadata.
No equivalence, conversion, or validation against CDC SVI, ADI, SDI, or HPI is claimed.

SOURCE: Authors' percentile definition; CDC/ATSDR SVI 2022 documentation.⁷

Disclosures: Dr Russo is consultant for iRhythm Technologies; Ken Boyle, Erik Hendrickson and Brent Wright are employed by iRhythm Technologies.

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