

Aging Alone by 2040

Why Passive, Privacy-Preserving Home Sensing Will Matter for a Growing Population of Solo Elders

Executive Summary

By 2040, the United States will have roughly 78.3 million residents aged 65 and older — about one in five Americans, up from one in six today. A large and growing share of them will live alone, at the same time that the number of family members available to check on them is shrinking. The result is a widening “care gap”: more people who need light daily oversight, and fewer people positioned to provide it in person.

This paper lays out the demographic trajectory behind that gap, why the two dominant home-monitoring approaches — cameras and wearables — have struggled to close it, and why a passive, ambient sensing approach — the kind of system Khai is built to be — is well positioned to fill the space between full independence and full-time care.

1. The Demographic Trajectory

The scale of population aging over the next fifteen years is well documented and largely already “baked in,” since everyone who will be 65 in 2040 has already been born. A few figures frame the shift:

78.3 million Americans projected to be 65 or older by 2040, roughly 22% of the U.S. population — up from about 17% in 2022.

~1 in 4–1 in 3 of adults 65+ already live alone today (28% per the Administration for Community Living; 27% per the Census Bureau's 2021 estimate), and that share has held roughly steady even as the underlying population has grown sharply.

13 million Americans projected to be living with Alzheimer's disease by 2050, more than double today's 6 million — a population disproportionately likely to need daily oversight without disrupting independence.

Holding the living-alone rate roughly constant against a larger 65+ population implies on the order of twenty million older Americans living alone by 2040 — a rough extrapolation from current Census and ACL figures, not itself a published projection, but one that is directionally hard to avoid.

2. A Shrinking Circle of Support

The population needing light oversight is growing at the same time the population available to provide it is shrinking, for two independent reasons.

The caregiver support ratio is collapsing

AARP's Public Policy Institute tracks a “caregiver support ratio”: the number of adults aged 45–64 (the most common caregiving age range) for every person aged 80 and older (the group most likely to need support). That ratio was better than 7-to-1 in 2010. It is projected to fall to 4-to-1 by 2030, and below 3-to-1 by 2050, as the Baby Boom generation moves fully into its eighties while smaller, more geographically dispersed younger generations follow behind it.

Kinlessness is rising

A parallel trend compounds the first: a growing share of older adults have no spouse and no living children — the two groups most likely to provide informal care. Research by demographers Verdery and Margolis projects that “kinless” older adults will rise from roughly 7–8% of white Americans 55+ in 2015 to 8–10% by 2040, and from 10–11% to 12–13% among Black Americans 55+ over the same period. Separate estimates put the number of fully kinless older Americans — no spouse, no children, no siblings — at close to a million already, a figure expected to keep climbing.

Put together, more elders will be aging alone at exactly the moment fewer people are structurally available to notice if something goes wrong.

3. Why This Matters: The Cost of Not Noticing

Living alone is not inherently risky. What's risky is a health event going unnoticed. Falls are the clearest illustration:

~1 in 4 adults 65+ falls each year — more than 14 million falls annually — resulting in over 3 million emergency-room visits.

12% vs. 67% the mortality difference between older adults found within one hour of a fall versus those left helpless for more than 72 hours, according to research cited in prior fall-detection patent filings.

75–77% of adults 50+ say they want to age in place rather than move to assisted living — a preference the data above suggests is often more fragile than it looks, absent some way to catch problems early.

Falls are the most measurable case, but the same logic extends to subtler signals: a routine that quietly stops (no morning activity for the first time in months), a device that goes dark and stays dark, or a sleep pattern that drifts in ways that often precede a broader decline. None of these are emergencies in the moment. All of them are exactly the kind of pattern a distant family member has no practical way to track — and exactly the kind of pattern a continuously listening system can.

4. Why the Existing Options Fall Short

The two dominant approaches to home monitoring each solve part of the problem and abandon the rest.

- Cameras are accurate but are routinely rejected for bedrooms and bathrooms, are expensive to install with real coverage, and still require someone — a family member or a monitoring service — to actually watch or review footage.

- Wearables and medical-alert pendants work only if worn and charged every day, and compliance is worst precisely among the population that needs them most: older adults living alone, without a spouse to remind them, are the least likely group to consistently wear a device.
- Simple presence or motion sensors report that a room is occupied and little else — no distinction between a bad night's sleep and a fall, no sense of whether today looks like a normal Tuesday or something has changed.

Each of these approaches asks something of the older adult — comply with a routine, accept a camera, remember a device — at the exact life stage when compliance becomes hardest to count on.

5. Where a System Like Khai Fits

Khai's approach — passively reading the ordinary Wi-Fi and Bluetooth traffic already present in a home, resolving it into device identity and activity episodes, and narrating the result as a daily journal — is structurally suited to this specific gap, for reasons that follow directly from the problem above rather than from the technology itself:

- Nothing to wear or charge. The sensing runs from the existing devices in the home and one small edge unit — there is no daily compliance step for an elder to forget.
- No camera in the bedroom or bathroom. Because it reads signal metadata rather than images or audio, it sidesteps the privacy objection that keeps many families from installing cameras in the rooms where falls are most common and most dangerous.
- A baseline, not just an alarm. A daily narrative journal gives a distant adult child something to actually read — “Quiet morning, no activity by 10am, unusual for a Tuesday” — rather than a silent system that only speaks up after a threshold is crossed, by which point it may already be an emergency.
- Built for exactly the solo-ager case. The hypothesis ledger and correction loop described in Khai's patent application are suited to a household with one occupant and no one nearby to correct misclassifications in real time — the system has to reason its way to confidence on its own, which is precisely the setting a kinless or geographically distant elder represents.

None of this makes Khai a medical device or a fall-detection system in the clinical sense, and it should be positioned as a complement to — not a replacement for — personal emergency response systems, telehealth, and in-person care where those are available. Its value is in the much larger space beneath the emergency threshold: the ordinary days, most of them, where the most useful thing a system can do is notice quietly that everything is normal, and say so.

Conclusion

The demographic math behind 2040 is not speculative — the people who will be 65 and older that year are alive today, and the trends in living-alone rates, caregiver

availability, and kinlessness are already well underway in the data. What's less settled is how that population will be cared for, given that the traditional answer — a family member nearby — will be available to a shrinking share of them.

Passive, ambient, privacy-preserving sensing is not a complete answer to that question, but it addresses the specific failure mode that cameras, wearables, and simple presence sensors each leave open: a system that asks nothing of the person it's protecting, and that produces something a caregiver can actually read. As the population this paper describes grows from tens of millions today to tens of millions more by 2040, that combination is likely to move from a nice-to-have to a expectation.

Selected Sources

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This paper is an independent analysis prepared to accompany the Khai System patent application; it is not itself part of that filing and does not constitute legal, medical, or investment advice.