Geographic and Social Vulnerability Drivers of Pharmacy Access in Oregon: A Statewide Census-tract Analysis to Inform Medicaid Managed Care Strategy

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Background

- **Pharmacies are frontline access points for medications, immunizations, screenings, and clinical counseling.**
- **Pharmacies are the most accessible part of health care, and they're disappearing.** Oregon has the second-fewest retail pharmacies per person of any state (AP, 2024, via Lund Report [7]).
- **Closures hurt adherence.** After a pharmacy closes, statin adherence drops by about 5.9 percentage points (Qato 2019 [1]).
- **Adherence is a payer metric.** In 2027 Star Ratings, the diabetes, RAAS antagonist, and statin adherence measures each carry triple weight (CMS [6]).
- **The payment model is pushing pharmacies out.** Oregon's critical access pharmacies spend about $17.78 to fill each prescription, while PBM dispensing fees are often under $1 (OHA 2024 study). In 2025, HB 3212, a PBM reform bill, failed (Oregon Capital Chronicle [8]).
- **Plans can't see the gaps.** Network adequacy is checked by county or member-level time and distance rules. Those can pass while whole neighborhoods sit in deserts. Examples are the OHA CCO 95% standard and Part D's rural 70%-within-15-miles rule.
- **Social vulnerability adds to the risk.** Neighborhoods with older, poorer, or carless residents feel a closure most, which is why you map desert status together with CDC SVI.

Objectives & Methods

Objectives

To identify census tracts in Oregon where pharmacy deserts overlap with high social vulnerability, and to locate the keystone pharmacies whose closure would create new deserts, so that Medicaid managed care plans can target network and reimbursement strategy.

Design and Setting

Cross-sectional geospatial analysis of all 992 Oregon census tracts (2020 boundaries), aligned with the methodological frameworks used by Mathis et al. (2025, JAMA Network Open), the Cencora US pharmacy desert dashboard (2024), and the Mass HPC census block group analysis (2026), together with HRSA workforce shortage definitions.

Pharmacy Desert Definition

A tract was classified as a pharmacy desert if its population-weighted centroid satisfied any of the criteria adapted from Mathis et al. (2025):

- Urban tract: > 1-mile straight-line distance to nearest pharmacy.
- Rural tract: > 10 miles straight-line distance to nearest pharmacy.
- Drive time: > 15 minutes estimated travel time in any tract.

Methods

- **Design:** a statewide cross-sectional study of all 993 populated 2020 census tracts in Oregon.
- **Pharmacies:** the Oregon Board of Pharmacy extract from 9/4/2026 lists 663 licensed outlets. After hand review, 495 are accessible community pharmacies, which are geocoded to their addresses. All 663 were also run as a baseline.
- **Distance:** straight-line distance from each tract's population-weighted center to the nearest pharmacy. Drive time is estimated as distance × 1.3, at 25 mph in urban tracts and 40 mph in rural ones.
- **Desert definition:** an urban tract (≥ 500 people per square mile) more than 1 mile away, a rural tract more than 10 miles away, or any tract more than a 15-minute estimated drive away (Qato 2014; USDA ERS).
- **Risk measures:** keystone pharmacies, one-closure tracts, and dual-burden tracts (SVI ≥ 0.75, CDC/ATSDR SVI 2022).
- **Statistics:** logistic regression for rural vs urban desert odds (odds ratio with 95% CI) and a Spearman correlation between SVI and distance. Tracts were grouped into CCO regions by county.

What is a Pharmacy Desert?

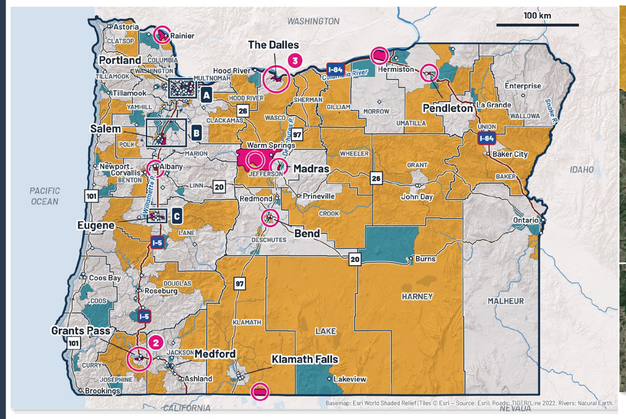
A census tract that crosses any of these distance or drive-time thresholds.

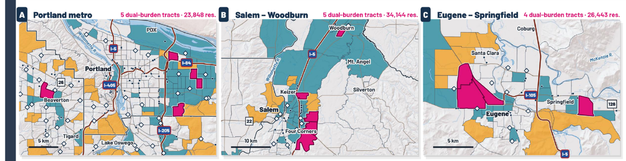




Results

Figure 1: Pharmacy Deserts meet Social Vulnerability





LEGEND

Dual burden: desert + SVI ≥ 0.75 · Pharmacy desert only · High SVI (≥ 0.75) only · Neither

Ring = dual-burden tract(s); badge = count when grouped · Census tract (thin) / county boundary (bold) · Accessible pharmacy (n = 495) · Keystone: only pharmacy in range of ≥1 tract (n = 141) · Interstate · US / state highway · River · Zoom inset (A–C)

Desert: urban tract >1 mi, rural >10 mi, or >15 min est. drive to nearest pharmacy (drive time estimated: straight-line × 1.3 at 25/40 mph). Data: 2014 – USDA ERS.
Sources: Oregon Board of Pharmacy extract 9/4/2026; CDC/ATSDR SVI 2022; 2020 Census tracts & population; Esri; TIGER/Line 2022; Natural Earth.

27 dual-burden tracts
132,572 residents live where a pharmacy desert meets high social vulnerability (SVI ≥ 0.75)

194 desert tracts
802,804 residents

248 high-SVI tracts
1,128,137 residents

WHERE THE 27 ARE
5 Marion · 3 Wasco · 4 Lane · 2 Josephine · 4 Multnomah · 2 Jefferson · +7 more counties, 1 each

DESERT RATE
10.9% of high-SVI tracts · **22.4%** of other tracts
Where they overlap, both risks stack.

Who lives in Oregon's pharmacy deserts?

194 tracts · 802,804 residents

153,263 adults 65 and older — 19% of residents

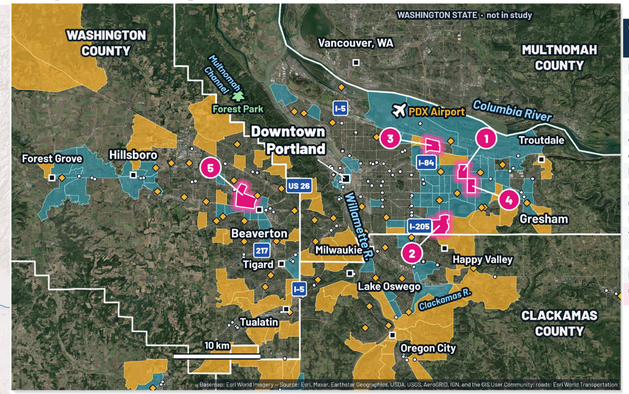
134,687 residents below 150% of poverty — 17% of residents

112,329 people with a disability — 14% of residents

195,808 racial or ethnic minority residents — 25% of residents

12,482 households with no vehicle — 4% of households

Figure 2: Access Gaps and Vulnerability intersect in Portland Metro Area



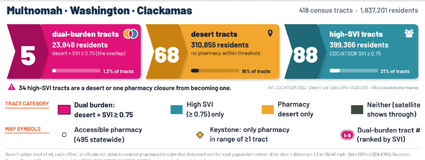
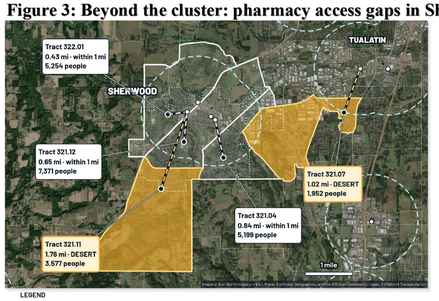


Figure 3: Beyond the cluster: pharmacy access gaps in Sherwood, Oregon



LEGEND

Pharmacy-desert tract (>1 mi, urban) · Tract within 1 mi (satellite shows through) · 1-mile reach of any pharmacy · Sherwood city limits (2020) · Accessible pharmacy (v6 list of 495) · Tract population center to nearest pharmacy

Desert: urban tract >1 mi, rural >10 mi, or >15 min est. drive to nearest pharmacy (Data: 2014, USDA ERS). Distances are straight-line from the 2020 tract population center, not road distance. Tracts shown: overlap >2% of Sherwood city area. Sources: Oregon Board of Pharmacy extract 9/4/2026/495 accessible pharmacies/2020 Census tracts, population & centers of population; Esri.

2 Sherwood-area tracts are still deserts
5,529 residents
1.02–1.76 mi to the nearest pharmacy

4 pharmacies in Sherwood, all within 0.63 mi of each other

0.84 mi average pop.-weighted, all 5 tracts: under 1 mi

WHY IT MATTERS FOR PLANS

A city, ZIP or county average looks well served. Only tract-level distances show the edge neighborhoods past the 1-mile line.

THE 5 TRACTS

Tract 321.11	1.76 mi	desert · 3,577
Tract 321.07	1.02 mi	desert · 1,952
Tract 321.04	0.84 mi	within 1 mi · 5,199
Tract 321.12	0.65 mi	within 1 mi · 7,371
Tract 322.01	0.43 mi	within 1 mi · 5,254

All 5 tracts are urban (1-mile rule). 23,353 residents total. Tract 321.07's nearest pharmacy is in Tualatin.

Table 1: A double burden: Pharmacy deserts meet social vulnerability

County	CCO region	Population (2020 Census)	High-SVI tracts	High-SVI residents	Desert tracts	Dual-burden tracts	Dual-burden residents
Marion	PacificSource Marion-Polk	345,920	32	175,884	8	5	**34,144**
Lane	Trillium Southwest	382,971	21	91,424	17	4	**26,443**
Multnomah	Health Share / Trillium Tri-County	815,428	57	266,955	21	4	**20,887**
Wasco	PacificSource Columbia Gorge	26,670	4	14,276	4	3	**11,148**
Josephine	AllCare / Jackson Care Connect	88,090	7	32,236	6	2	**8,152**
Jefferson	PacificSource Central Oregon	24,502	3	12,592	5	2	**6,310**
Linn	InterCommunity Health Network	128,610	7	32,126	3	1	**5,777**
Deschutes	PacificSource Central Oregon	198,253	5	21,100	14	1	**4,450**
Columbia	Columbia Pacific	52,589	2	7,885	2	1	**4,380**
Morrow	Eastern Oregon CCO	12,186	2	9,021	1	1	**4,097**
Washington	Health Share / Trillium Tri-County	600,372	21	91,637	24	1	**2,981**
Umatilla	Eastern Oregon CCO	80,075	10	48,555	3	1	**2,353**
Klamath	Cascade Health Alliance	69,413	9	28,687	9	1	**1,472**
Oregon (all 36 counties)		**4,237,256**	**248**	**1,128,137**	**194**	**27**	**132,572**

TAKEAWAYS: TABLE 1 — Plan action: target outreach CCO by CCO

61% — In just 3 counties
Marion, Lane & Multnomah: 13 of 27 tracts and 81,474 of 132,572 residents

42% — Small counties hit hard
of Wasco lives in a dual-burden tract (11,146 of 26,670) vs 3.1% statewide

10 — CCO regions affected
13 counties: every CCO here needs a pharmacy-access plan

TAKEAWAYS: TABLE 2 — Plan action: low-cost fixes reach the highest-need members

9 of 10 — Highest need is urban
Oregon's most vulnerable deserts sit in towns and cities

≤2 mi — Just past the 1-mile line
Urban tracts: 1.1–2.0 mi (3–6 min). Delivery or mail order could close the gap

42,615 — Residents, SVI ≥ 0.88
10 tracts hold 32% of Oregon's dual-burden residents

Table 2: Compounding barriers: Oregon's most socially vulnerable pharmacy deserts.

#	Census tract	Place	County	SVI percentile	Residents (2020)	Nearest pharmacy (mi)	Est. drive (min)	Area
1	93.01	Portland	Multnomah	0.98	6,285	1.2	4	Urban
2	9602.01	Madras	Jefferson	0.97	3,688	1.1	3	Urban
3	3612.01	Grants Pass	Josephine	0.97	4,029	1.1	3	Urban
4	42	Eugene	Lane	0.95	3,309	1.2	4	Urban
5	89.04	Portland	Multnomah	0.95	5,006	1.5	5	Urban
6	9705	The Dalles	Wasco	0.94	3,813	1.2	4	Urban
7	103.04	Woodburn	Marion	0.93	6,893	1.2	4	Urban
8	9400	Warm Springs (CDP)	Jefferson	0.91	2,622	11.2	22	**Rural**
9	79	Portland	Multnomah	0.89	4,617	1.3	4	Urban
10	9507	Pendleton	Umatilla	0.88	2,353	2.0	6	Urban

Conclusion

Limitations

1. **Population-weighted centroids** — One point per tract; within-tract variation is not captured.
2. **Estimated drive time** — Straight-line × 1.3 at 25/40 mph, not road-routed.
3. **Service not modeled** — Hours, network status, eligibility, stock, mail order. A license ≠ access.
4. **Different time periods** — SVI 2022, population 2020, licenses Sept 2026; later closures not reflected.
5. **Ecological design** — Tract-level associations, not individual access, adherence, or cost.

Future Directions

From tract maps to member-level action

1. **Road-routed access** — Routed drive and transit times from block-level population. Fixes limits 1–2
2. **Open, not just licensed** — Add hours, network status, vaccines, delivery; track closures. Fixes limits 3–4
3. **Member-level outcomes** — Link CCO claims: PDC and Star adherence, desert vs. not. Fixes limit 5
4. **Test the fixes** — Keystone dispensing fees, telepharmacy, delivery, mobile units. Payer levers
5. **Scale beyond Oregon** — Rerun the tract method against Part D and Medicaid network rules. Generalize

Conclusion

194 of 993 tracts · 495 pharmacies · CDC/ATSDR SVI 2022

1 in 5 — Oregonians live in a pharmacy desert: 802,804 people (18.9%)

78% — of desert residents live in cities; rural odds no higher (OR 1.03)

141 — keystone pharmacies: one closure from desert for 971,623 more

27 — dual-burden tracts (132,572 residents): desert plus high SVI

TAKEAWAY
Find the keystones, fund them, and plan before they close.
Nearly 1 in 5 Oregonians live in a pharmacy desert; 141 keystones hold up access for nearly 1 million more.

RXAccess
"Mapping Pharmacy Deserts and Social Vulnerability in Oregon"
A statewide census-tract analysis to guide Medicaid managed care



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