

2021–23 Physician Supply:

Estimates for Washington

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Executive summary

We combined multiple data sources to generate estimates of physicians practicing in Washington for the three years from 2021 to 2023. Similar to previous reports that we published on estimates of physician supply using the same data sources, this report contains estimates of total physicians, their primary specialties, their main demographic characteristics, and the counties and the Accountable Communities of Health where they practiced.

Data sources and method

The main data source for this report is the Network Access Reports (NAR) that health insurance carriers submit monthly to the Washington State Office of the Insurance Commissioner. The NARs contain information of individual providers affiliated to one or more provider networks that provide direct care in Washington. We matched provider records in the NAR with records in the state's health care provider license database and with the national provider identifiers in the National Plan and Provider Enumeration System. In cases where a physician practices at multiple locations, we used a record weighting method that accounts for the different locations without overcounting the total number of physicians.¹

Results

- **Overall physician supply:** The number of physicians practicing in Washington grew by an annual rate of approximately 2.6% from 21,334 in 2021 to 22,452 in 2023. This physician supply accounted for 65% of those holding a Washington physician license. The physician supply continued to grow faster than the state's overall population, as evidenced by the increase in physician rate from 275 physicians (per 100,000 population) in 2021 to 282 in 2023.
- **Physician supply by specialty:** Of the 13 primary specialty groupings for the physicians we adapted for this report, the distribution remained relatively unchanged during the 2021–23 period. Not counting the other specialty group which consists of specialties not included in the other 12 groups, the largest specialty group was *family medicine/general practice*, with 4,100 or approximately 19% of the total physicians. The *emergency medicine* group and the *hospitalist* group had the largest percent increases of 9.5% from 2021 to 2023.
- **Supplies of primary care physicians and specialist care physicians:** Primary care physicians accounted for slightly over one-third of the total physicians. The number of primary care physicians increased significantly from 7,561 in 2021 to 7,945 in 2022, and to 7,987 in 2023. The supply of specialist physicians had a slight increase from 13,773 in 2021 to 13,896 in 2022, and a large increase to 14,465 in 2023.
- **Physician demographics:** Overall, four in ten physicians were females. However, there was a large difference in the share of female physicians between primary care and specialist care physician groups. Women accounted for half of the primary care physicians but just slightly more than one-

¹ For detailed information on the data sources and method, see the Data Sources and Method section.

third of the specialist physicians. The median physician age was 49, and there was little change from 2021 to 2023. Specialist physicians had a median age greater by one year than the median age of primary care physicians (49 and 48, respectively). There was a consistent difference in the median age between male physicians and female physicians, regardless of primary care vs. specialist care designation, with female physicians' median age of 45 years compared to 51 years for male physicians.

- **Physician supplies in counties and Accountable Communities of Health:** The state's five most populous counties accounted for approximately three-quarters of the state's total physicians, with King County's share being the largest (41.8% in 2023) and the shares of the other four counties between 5% and 10%. Twenty-five of the 39 counties each had a share of less than 1%. The large shares of physicians of the most populous counties did not necessarily translate to the largest physician rates. Chelan County had the highest number of physicians per 100,000 population at all times (593 in 2023). Of the five most populous counties, only King had a physician rate that was above the state average (399 in King and 282 for state average in 2023). Among the nine Accountable Communities of Health (each consisting of one or more counties), the HealthierHere ACH (consisting of King County alone) had both the largest share of total physicians (41.8% in 2023) and the highest physician rate (399 per 100,000 population in 2023). The shares in the remaining ACHs ranged from 3% to 14% (2023 estimates). Besides HealthierHere, only one other ACH, Thriving Together NCW, had a physician rate (290) above the state rate in 2023.

We publish companion chartbooks on the Office of Financial Management's Health Care webpage² for estimates of physician demographics and specialties for counties and ACHs in 2021–23.

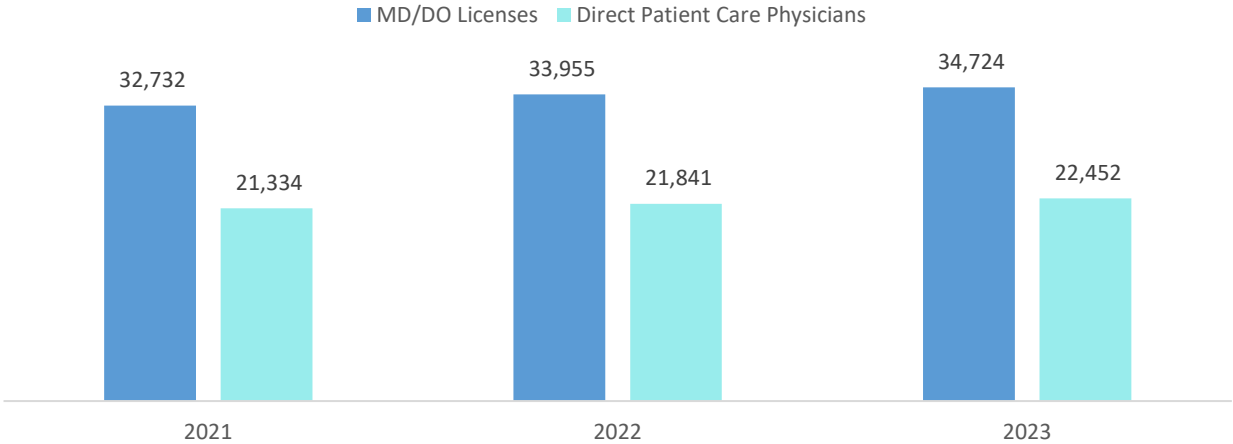
Finally, the appendix at the end of this report documents in detail the data sources and methods used.

² <https://ofm.wa.gov/washington-data-research/health-care>.

Total physician supply

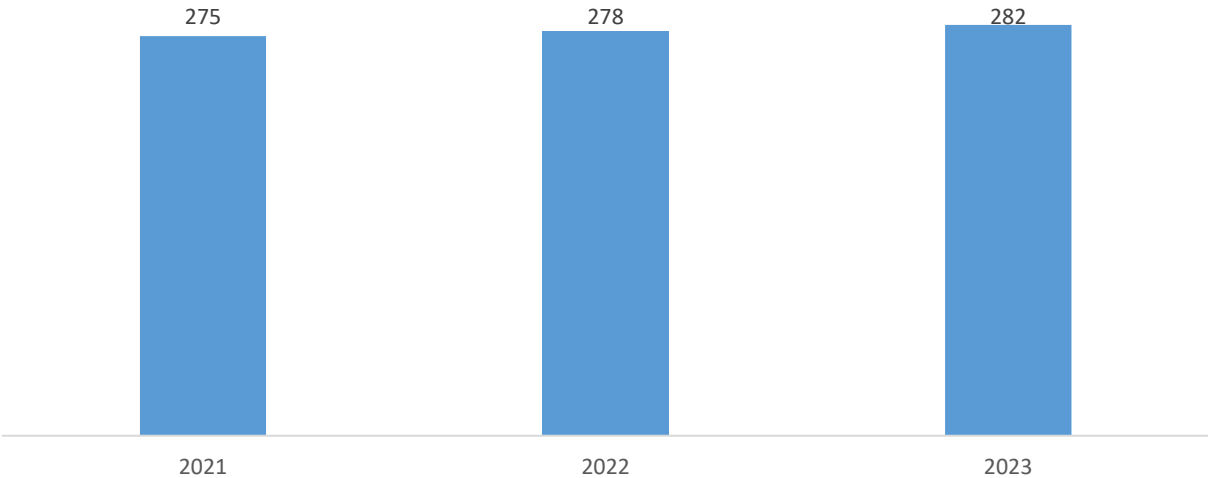
The number of physician licenses in Washington increased by 6% from 32,732 in 2021 to 34,724 in 2023.³ Not all physicians holding Washington licenses practiced in the state (Figure 1). The share of physicians practicing in the state was approximately 65% in each of the three years. They numbered 21,334 in 2021, 21,841 in 2022 and 22,452 in 2023. The annual growth rate was approximately 2.6%. **Estimates in the remainder of this report refer to physicians practicing in Washington.**

Figure 1. Physician Licenses and Physicians Providing Direct Patient Care, Washington State: 2021–23



To put the increase in practicing physicians in the context of overall population growth in the state, we calculated the rate of physicians per 100,000 population. This rate increased from 275 physicians per 100,000 population in 2021 to 278 in 2022, and to 282 in 2023 (Figure 2). The consecutive increases of the rate from 2021 to 2023 suggest that Washington’s physician supply grew faster than the state’s overall population, which also increased during this period.

Figure 2. Total Practicing Physicians per 100,000 Population, Washington State: 2021–23

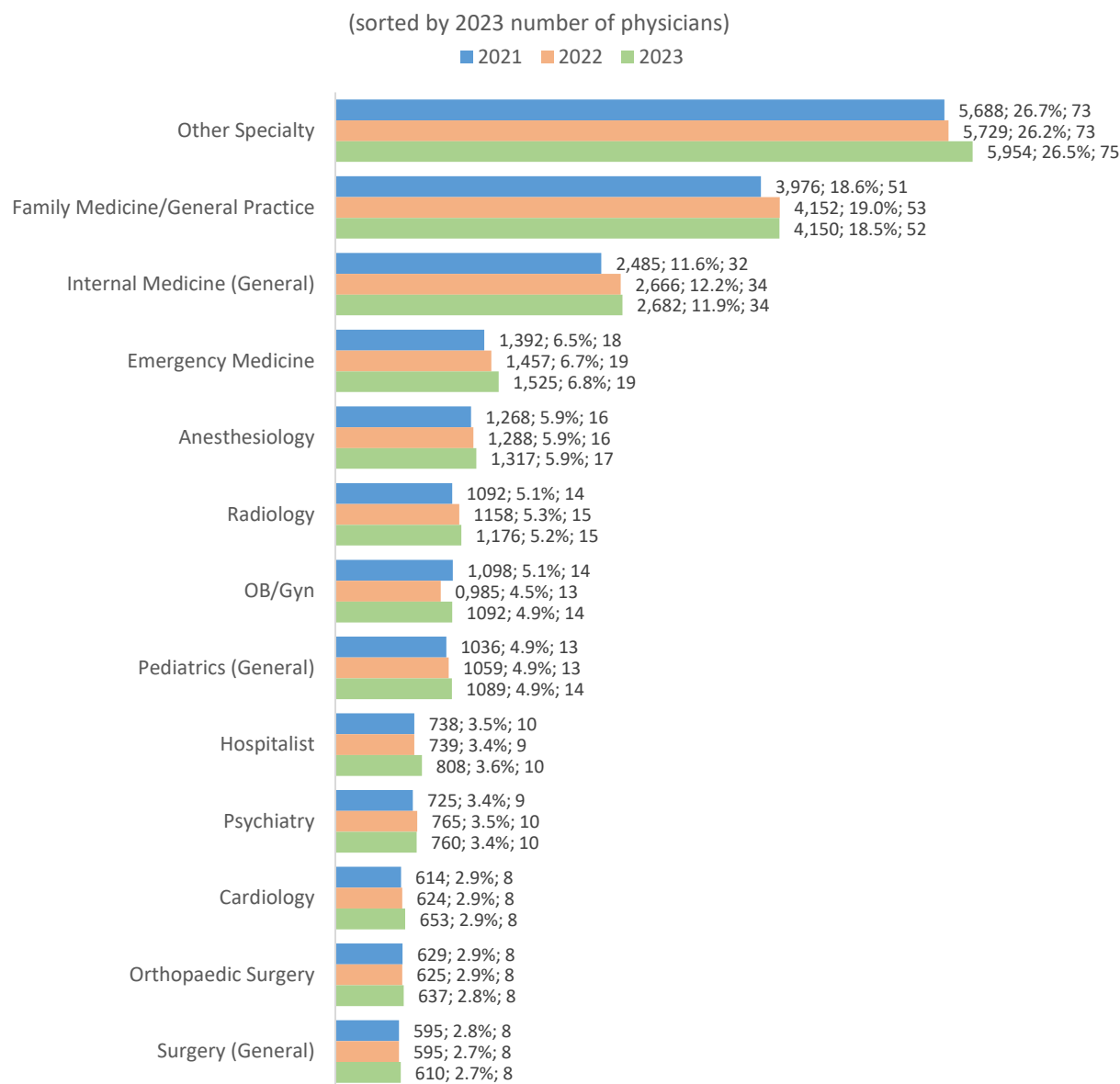


³ The DOH physician licenses include those issued for MDs and DOs.

Physician supply by specialty

For this report, we have grouped physicians into 13 groups according to their primary specialties. The distribution of the 13 specialty groups remained relatively unchanged from 2021 to 2023. Twelve of the 13 groups consisted of one or two specialties while the thirteenth group consisted of specialties not included in the other 12 groups (e.g., allergy, dermatology, neurology, urology, etc.). Of the first 12 groups, the *family medicine/general practice* group was the largest, accounting for nearly 19% of all physicians (Figure 3). The *internal medicine* group accounted for another 12%. Five other groups each accounted for 5% to 7%: *emergency medicine, anesthesiology, radiology, OB/GYN* and *general pediatrics*. Another five groups each accounted for 3% to 4%: *hospitalist, psychiatry, cardiology, orthopedic surgery* and *general surgery*. The thirteenth group, *other specialty*, was the largest group of all, accounting for more than a quarter of the total physicians.

Figure 3. Number, percent and rate (per 100,000) of physicians by primary specialty, Washington: 2021–23



Although the distribution by specialty groups remained relatively unchanged, there were several specialty groups with increases worth mentioning. The *emergency medicine* group and the *hospitalist* group had the largest percent increase (9.5%, Table 1). The *general internal medicine* group and the *radiology* group had the second largest percent increases (about 8% each). However, the group with the largest increase in absolute number was the *other specialty* group, which gained 265 physicians (or 5%) from 2021 to 2023.

Table 1. Physician supply changes from 2021 to 2023 by primary specialty: Washington

Primary Specialty	2021	2022	2023	Change (N)	Change (%)
<i>Other Specialty</i>	5,688	5,729	5,954	265	4.7%
<i>Family Medicine/General Practice</i>	3,976	4,152	4,150	174	4.4%
<i>Internal Medicine (General)</i>	2,485	2,666	2,682	197	7.9%
<i>Emergency Medicine</i>	1,392	1,457	1,525	133	9.5%
<i>Anesthesiology</i>	1,268	1,288	1,317	49	3.9%
<i>Radiology</i>	1,092	1,158	1,176	84	7.7%
<i>OB/GYN</i>	1,098	985	1,092	-6	-0.6%
<i>Pediatrics (General)</i>	1,036	1,059	1,089	54	5.2%
<i>Hospitalist</i>	738	739	808	70	9.5%
<i>Psychiatry</i>	725	765	760	35	4.8%
<i>Cardiology</i>	614	624	653	39	6.4%
<i>Orthopedic Surgery</i>	629	625	637	9	1.4%
<i>Surgery (General)</i>	595	595	610	16	2.6%
<i>Total</i>	21,334	21,842	22,452	1,118	5.2%

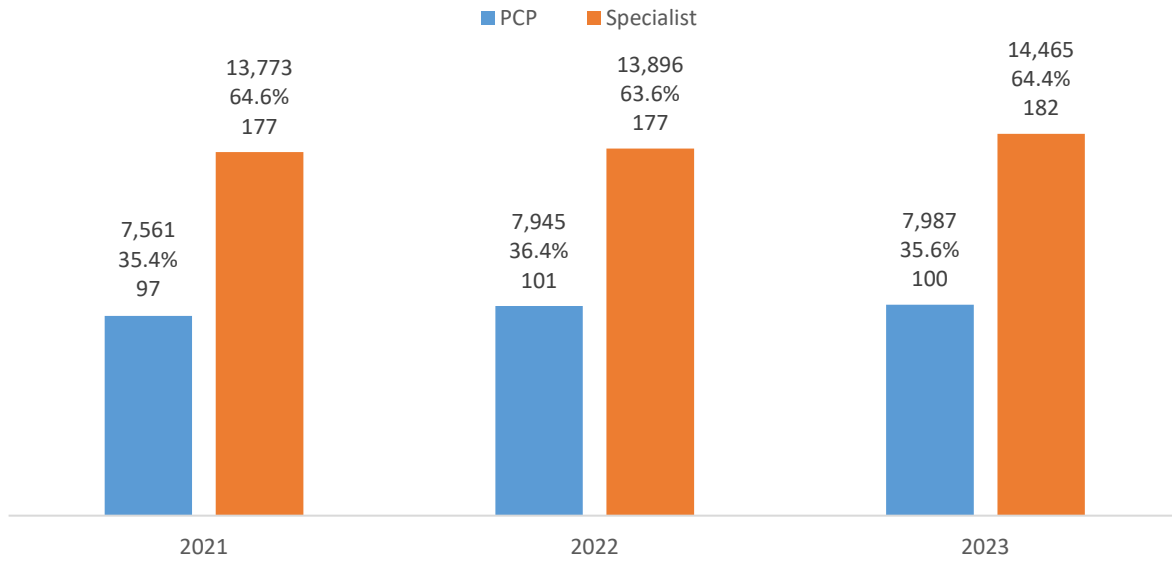
Supplies of primary care physicians and specialist care physicians

In addition to grouping physicians by their primary specialties, we also grouped them into two broad categories: primary care physicians and specialist care physicians. The former group consisted of physicians with these four specialties: *family medicine/general practice*, *geriatric medicine*, *general internal medicine* and *general pediatrics*. The specialist care group consisted of all other specialties.

The number of primary care physicians increased consecutively from 7,561 in 2021 to 7,945 in 2022, and to 7,987 in 2023 (Figure 4). Their share of the total physicians increased from 35.4% in 2021 to 36.4% in 2022 but dropped to 35.6% in 2023. Similarly, the physician-to-population rate of the primary care physicians increased from 97 physicians per 100,000 population in 2021 to 101 in 2022, and then decreased slightly to 100 in 2023.

The number of specialist physicians also increased consecutively from 2021 to 2023. It had a slight increase from 13,773 in 2021 to 13,896 in 2022, and then a large increase to 14,465 in 2023. Their share of the total physicians showed no change between 2021 and 2023, at approximately 64.5%, despite a slight drop in 2022. The rates of specialist physicians remained unchanged between 2021 and 2022, at 177 per 100,000 population, but the rate increased substantially to 182 in 2023.

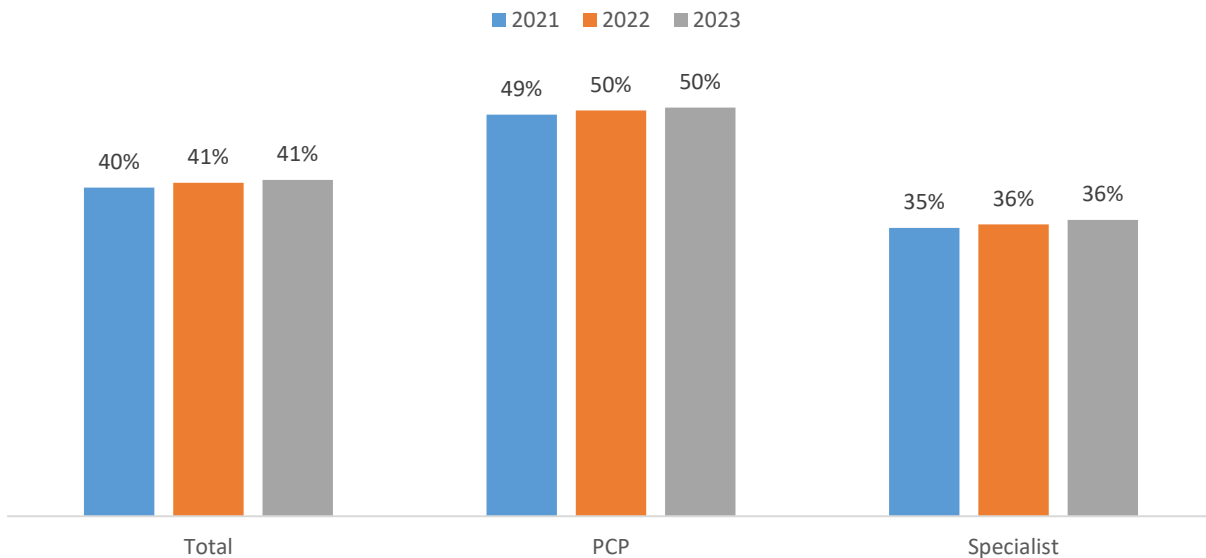
Figure 4. Number, percent and rate (per 100,000) of PCPs and specialists, Washington: 2021–23



Physician demographics

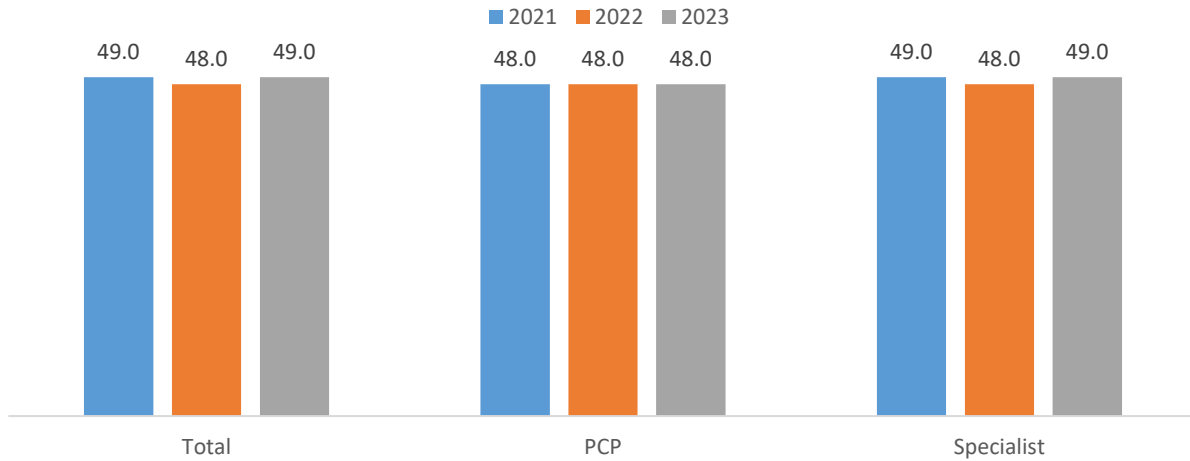
Gender – In the overall physician supply and the specialist physician supply, the shares of female physicians continued to be smaller in 2021–23, at approximately 41% and 36%, respectively (Figure 5). However, female physicians had an equal share with male physicians as primary care physicians. The share of female physicians increased slightly from 2021 to 2023, from 40% to 41% in total physician supply, from 49% to 50% in primary care physician supply, and from 35% to 36% in specialist physician supply.

Figure 5. Percentage of females among total physicians, PCPs and specialists, Washington: 2021–23



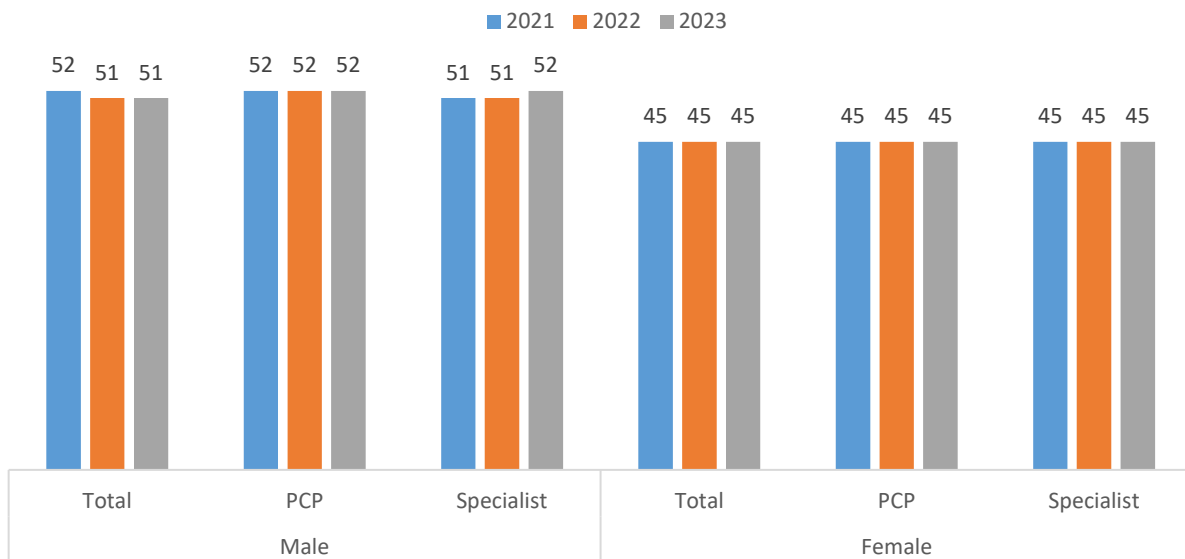
Median age – Overall, the median age of physicians dropped by one year from 49 years in 2021 to 48 in 2022 but increased back to 49 in 2023 (Figure 6). The same was true with the median age of specialist physicians. There was no change in the median age (48) of primary care physicians.

Figure 6. Median age of total physicians, PCPs and specialists: 2021–23



Median age of male and female physicians – Male physician median age was 7 years greater than the median age of female physicians. This was true across categories. Male physicians’ median age was 51 to 52 while the median age of the female physicians was 45. (Figure 7).

Figure 7. Median age of total physicians, PCPs and specialists by gender, Washington: 2021–23

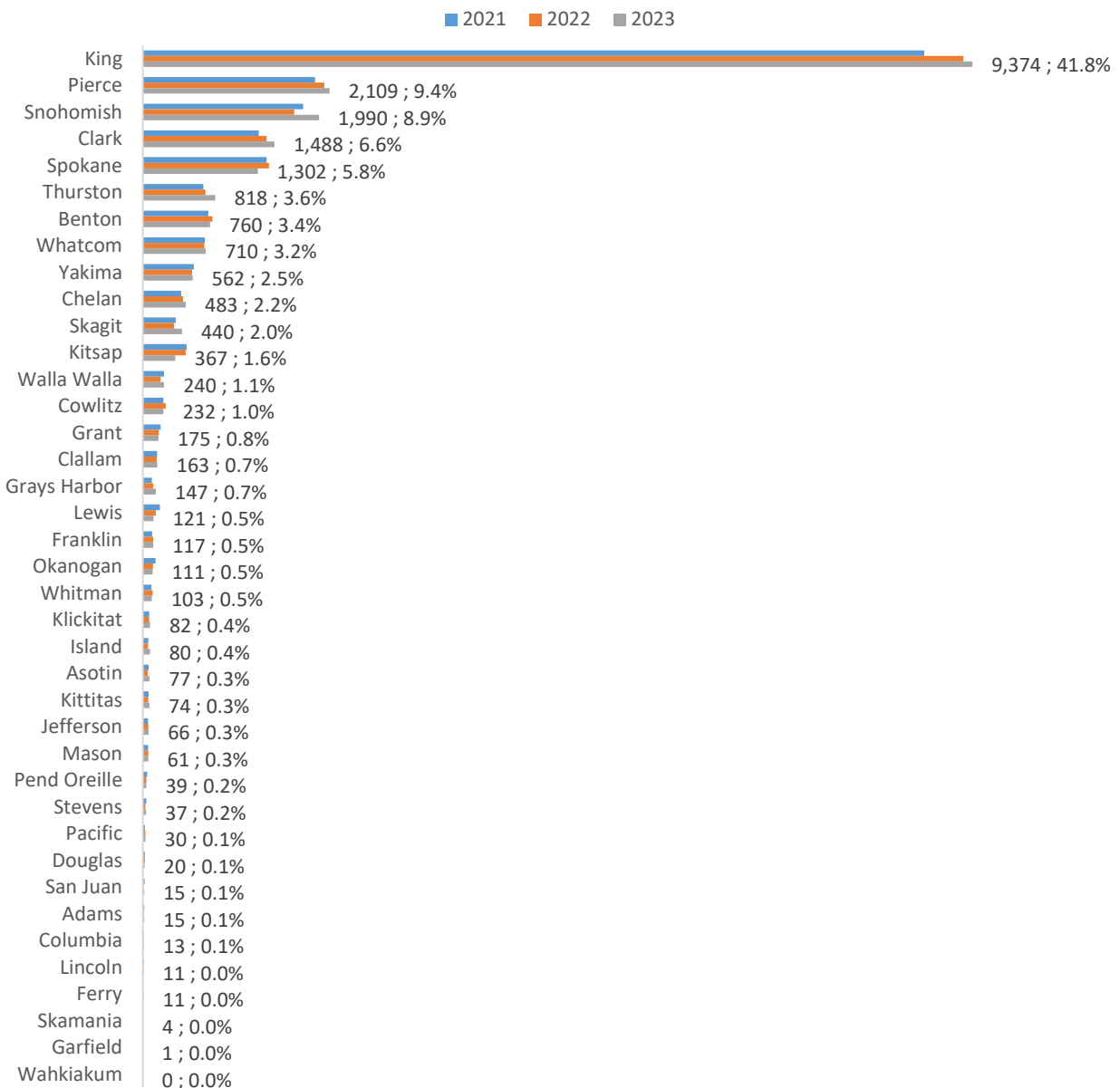


County distribution of physicians

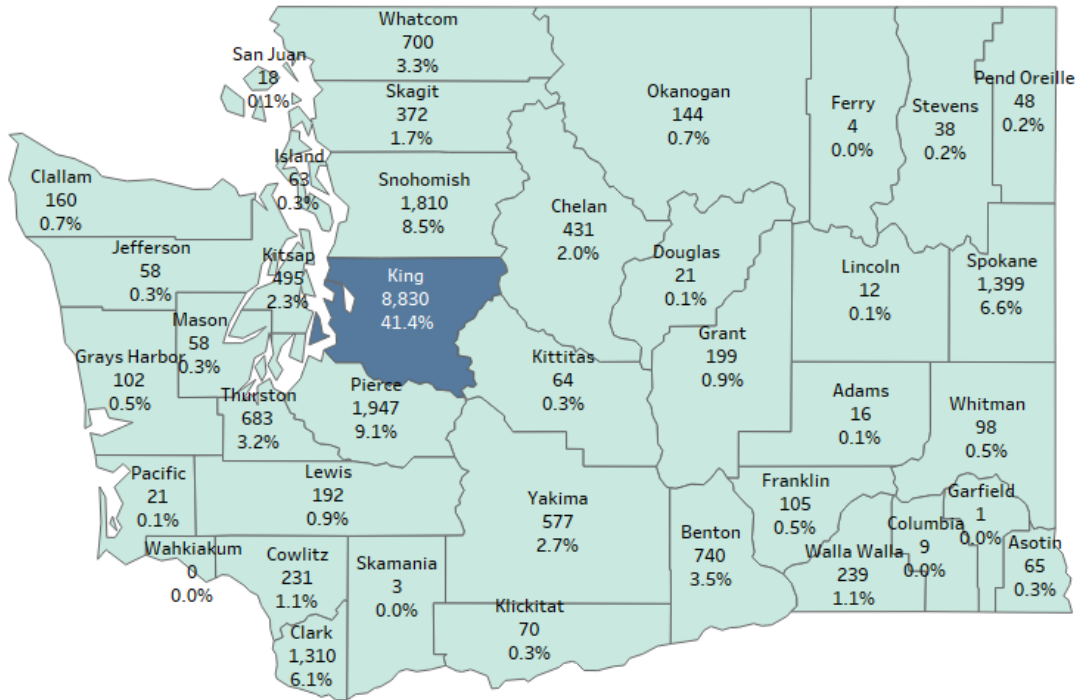
Number and percent of physicians – The shares of physicians in the state’s five most populous counties remained above 5% each (Figure 8 and Maps 1–3). The remaining counties each had a share of less than 5% with the majority of the counties (25 out of 39) having a share of less than 1% each. The five most populous counties are King, Pierce, Snohomish, Spokane and Clark. Of these five, King County had the largest share, at 41.8% (or 9,374) of the total physicians in 2023. The other four counties each had a share between 5% and 10% (or between 1,300 and 2,100 physicians). Together, these five counties accounted for over 70% (or 16,200) of the state’s total physicians. From 2021 to 2023, shares in these counties increased, with the exception of Spokane.

Figure 8. Number and percent of physicians by county in 2021–23

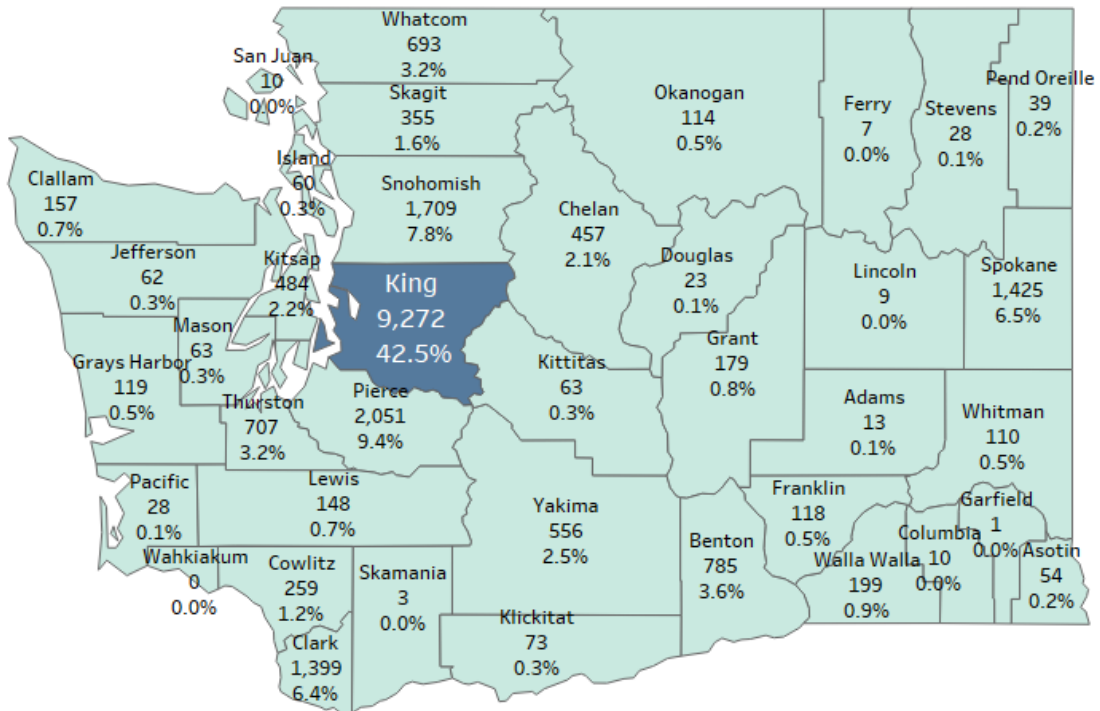
(sorted by 2023 distribution; numbers shown for 2023 only)



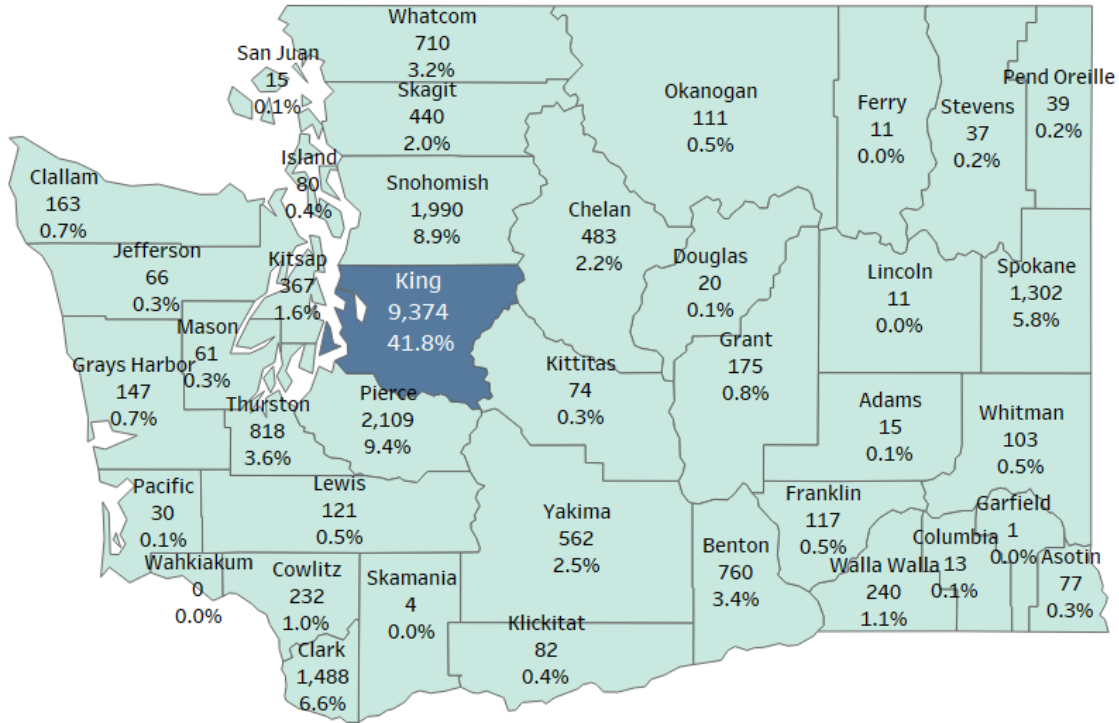
Map 1. Number and percent of physicians: counties 2021



Map 2. Number and percent of physicians: counties 2022



Map 3. Number and percent of physicians: counties 2023



Number of physicians per 100,000 population – The distribution of the rates of physicians per 100,000 population at the county level did not follow the distribution of the counties’ shares of the total physicians. The county with the highest rate was Chelan. It had the highest rate in all three years with consecutive increases from 528 in 2021 to 593 in 2023 (Figure 9 and Maps 4–6). King County’s rate was a distant second at below 400 in all three years with only small changes from one year to another.

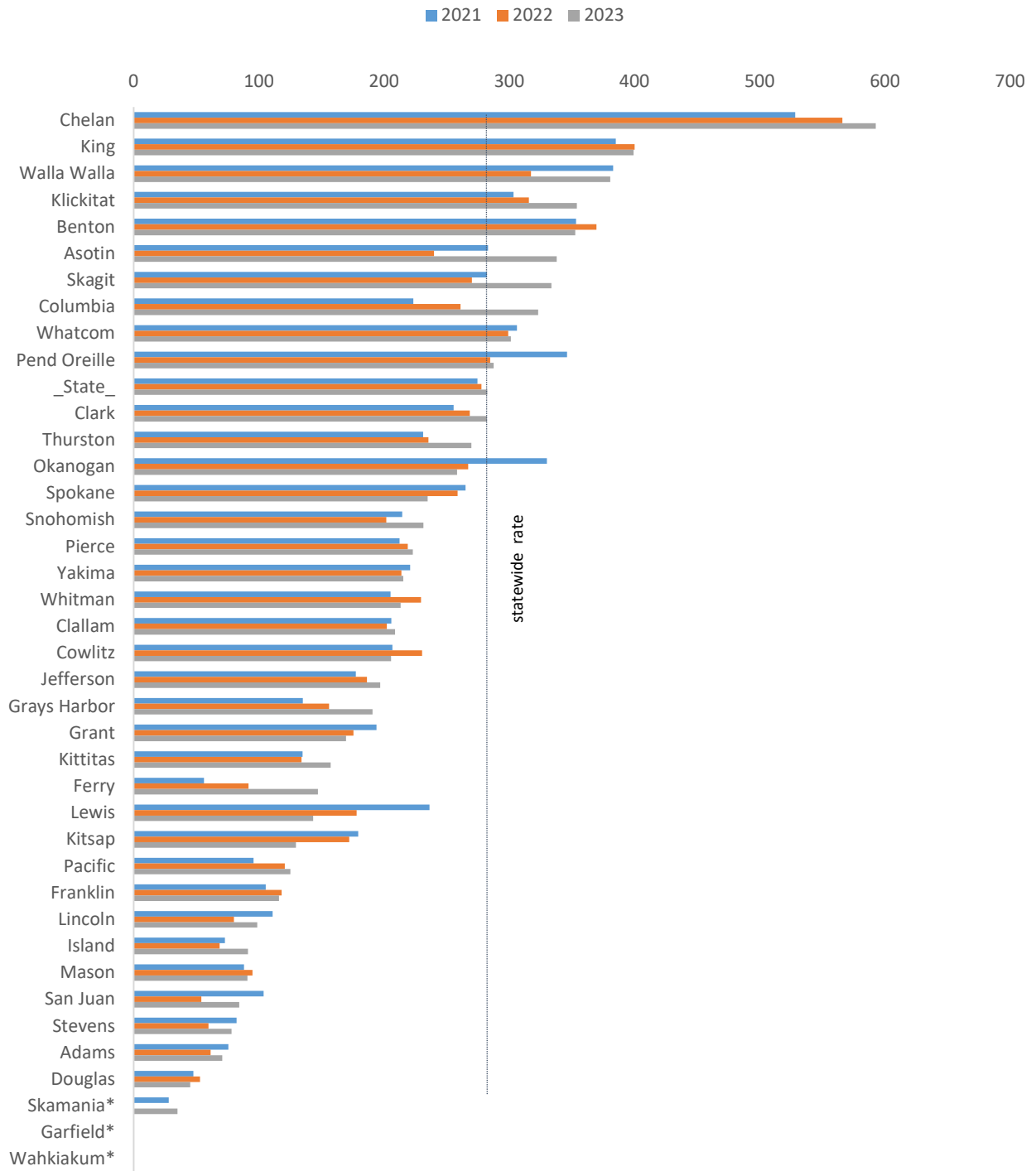
In 2023, only ten counties had rates higher than the state’s rate of 282. In addition to Chelan and King, these counties included Asotin, Benton, Columbia, Klickitat, Pend Oreille, Skagit, Walla Walla and Whatcom. Of the five most populous counties that also had the five largest shares of the total physicians, only King County had a rate in 2023 (399) that was above the statewide rate.

Between 2021 and 2023, there were some large changes in the physician rates in some counties. Ferry County’s rate in 2023 (147) more than doubled its rate in 2021 (56). On the opposite end, Lewis County had a 40% reduction, from 246 to 143. However, these two counties had relatively small populations, and for counties like these, even a small change in the number of physicians could yield a sizeable change in the physician-to-population rate.

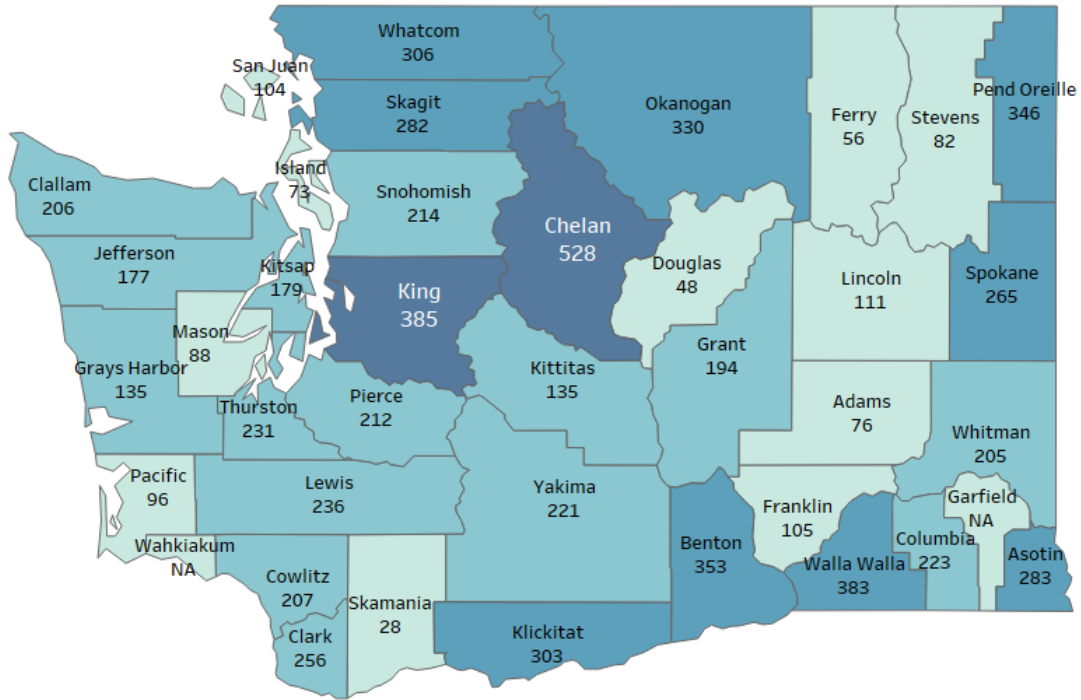
Figure 9. Number physicians per 100,000 population by county: 2021–23

(sorted by 2023 distribution)

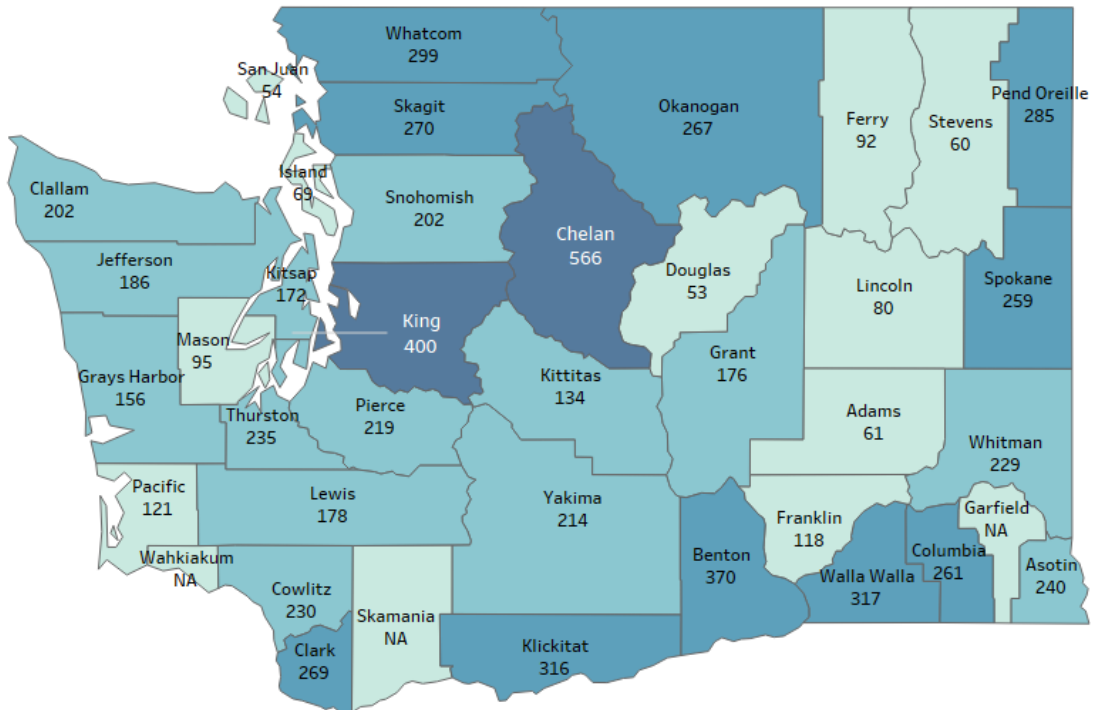
(*=too few physicians for rate calculation)



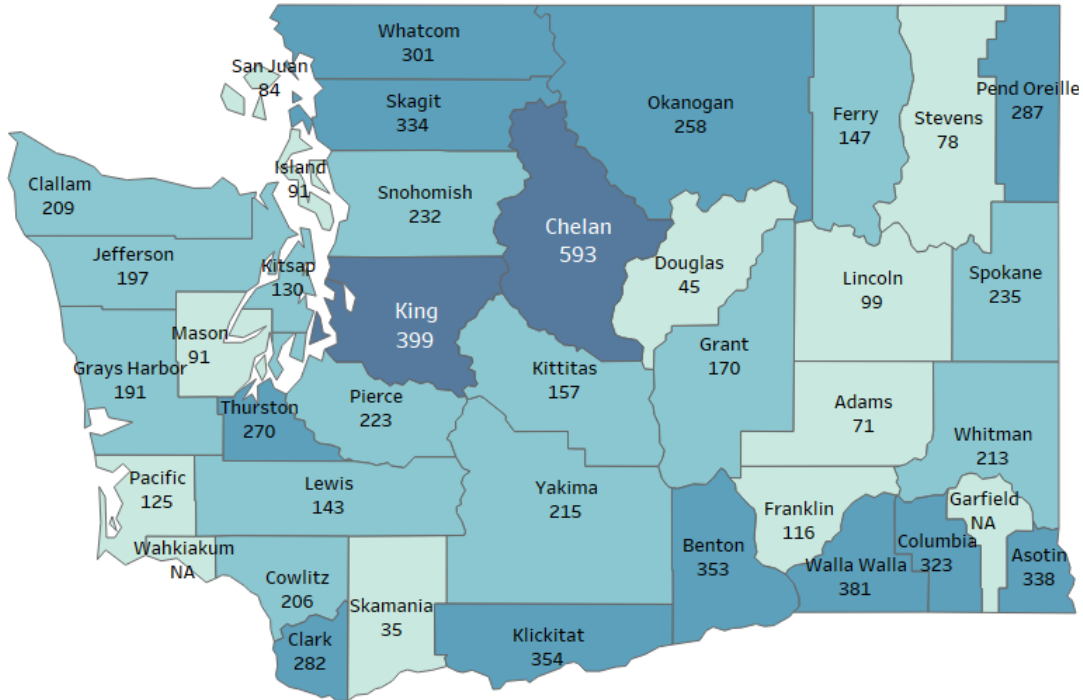
Map 4. Number of physicians per 100,000 population: counties, 2021



Map 5. Number of physicians per 100,000 population: counties, 2022



Map 6. Number of physicians per 100,000 population: counties, 2023



More estimates on county-level physician supplies including physician demographics and specialty details are published in the companion chartbook *2021–23 Physician Supply – Estimates for Counties: Washington State* on OFM’s Health Care webpage⁴.

⁴ <https://ofm.wa.gov/washington-data-research/health-care>.

ACH distribution of physicians

An Accountable Community of Health, or ACH, is a regional coalition made up of representatives from a variety of sectors who work together to improve population health. Each ACH represents a county or a group of adjacent counties. The nine ACHs, with the counties in each, are:⁵

1. Better Health Together: (Adams, Ferry, Lincoln, Pend Oreille, Spokane and Stevens counties, and the Reservations of the Kalispel Tribe of Indians, Spokane Tribe of Indians, and the Confederated Tribes of the Colville Reservation)
2. CHOICE (Cowlitz, Grays Harbor, Lewis, Mason, Pacific, Thurston and Wahkiakum counties, and the sovereign nations of Chehalis, Cowlitz, Nisqually, Quinault, Shoalwater Bay, Skokomish, and Squaxin Island Tribes)
3. Elevate Health (Pierce)
4. Greater Health Now (Asotin, Benton, Columbia, Garfield, Franklin, Kittitas, Walla Walla, Whitman, and Yakima counties, and the Yakama Nation)
5. HealthierHere (King)
6. Thriving Together NCW (Chelan, Douglas, Grant and Okanogan counties, and the Confederated Tribes of the Colville Reservation)
7. North Sound ACH (Island, San Juan, Skagit, Snohomish and Whatcom counties and the Lummi Nation, Nooksack Tribe, Upper Skagit Tribe, Samish Indian Nation, Swinomish Indian Tribal Community, Stillaguamish Tribe of Indians, Tulalip Tribes, and Sauk-Suiattle Indian Tribe)
8. Olympic Community Health (Clallam, Jefferson and Kitsap counties and the Sovereign Nations of Hoh, Jamestown S’Klallam, Lower Elwha Klallam, Makah, Port Gamble S’Klallam, Quileute, Suquamish)
9. SWACH (Southwest Washington ACH) (Clark, Klickitat and Skamania)

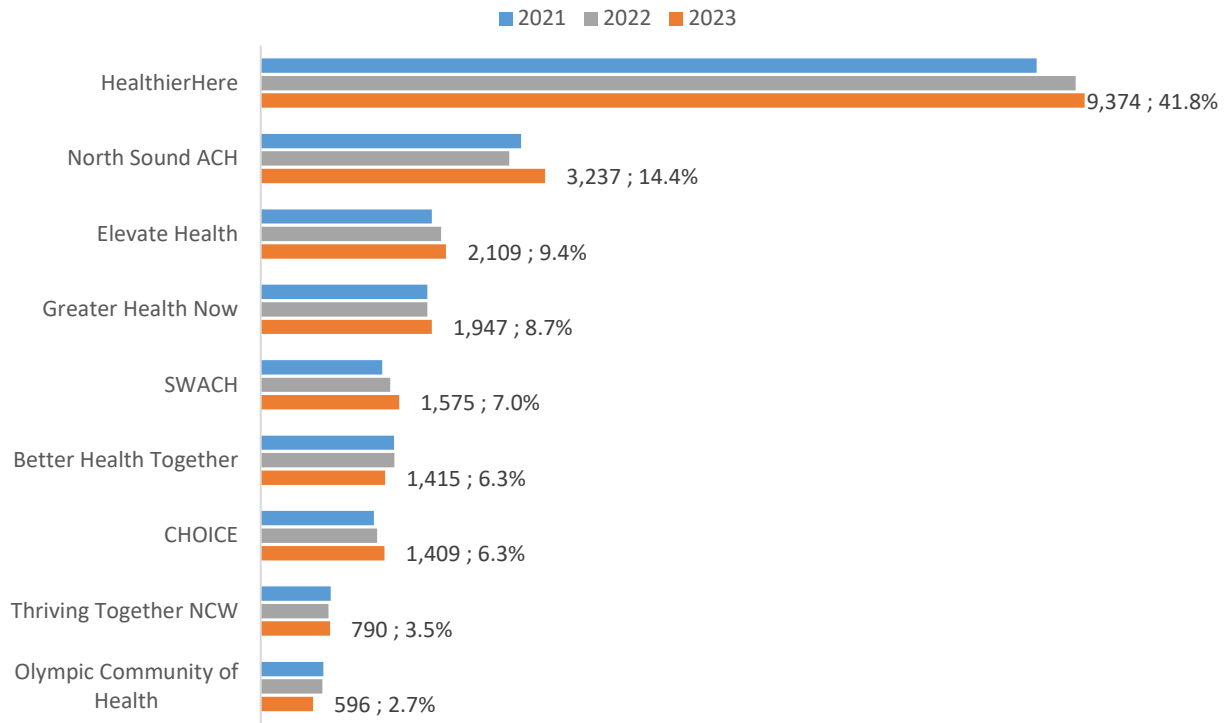
Number and percent of physicians – Among the nine ACHs, HealthierHere accounted for about 40% of the total physician supply in all three years, followed by North Sound ACH (around 14%), Elevate Health (around 9%) and Greater Health Now (around 9%) (Figure 10 and Maps 7–9). The remaining ACHs each accounted for 7% or less in all three years.

The number of physicians increased in all but three ACHs from 2021 to 2023. The three ACHs experiencing a decrease were Better Health Together, Thriving Together NCW and Olympic Community of Health. The decrease in Better Health Together changed its ranking from the fifth largest supply of physicians to the sixth largest, switching ranking places with SWACH. The rankings of the other ACHs remained unchanged. In 2023, HealthierHere had the largest number of 9,374 physicians and Olympic Community of Health had the smallest number of 596 physicians.

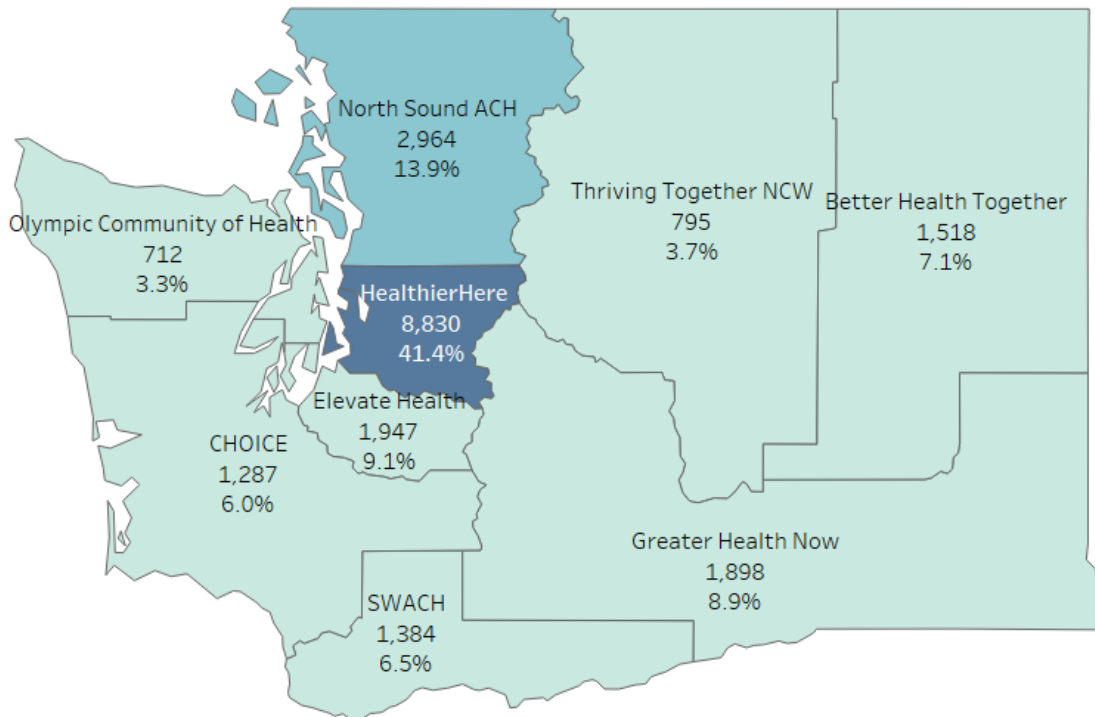
⁵ See <https://www.hca.wa.gov/assets/program/achfactsheet.pdf>.

Figure 10. Number and percent of physicians by ACH, 2021–23

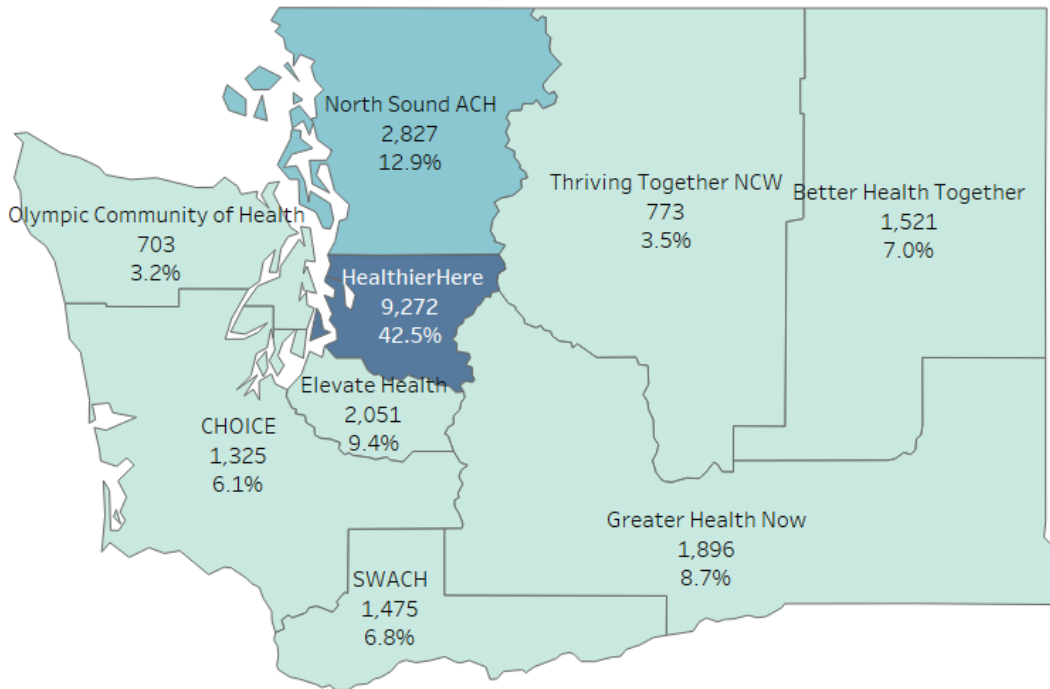
(sorted by 2023 distribution; numbers shown for 2023 only)



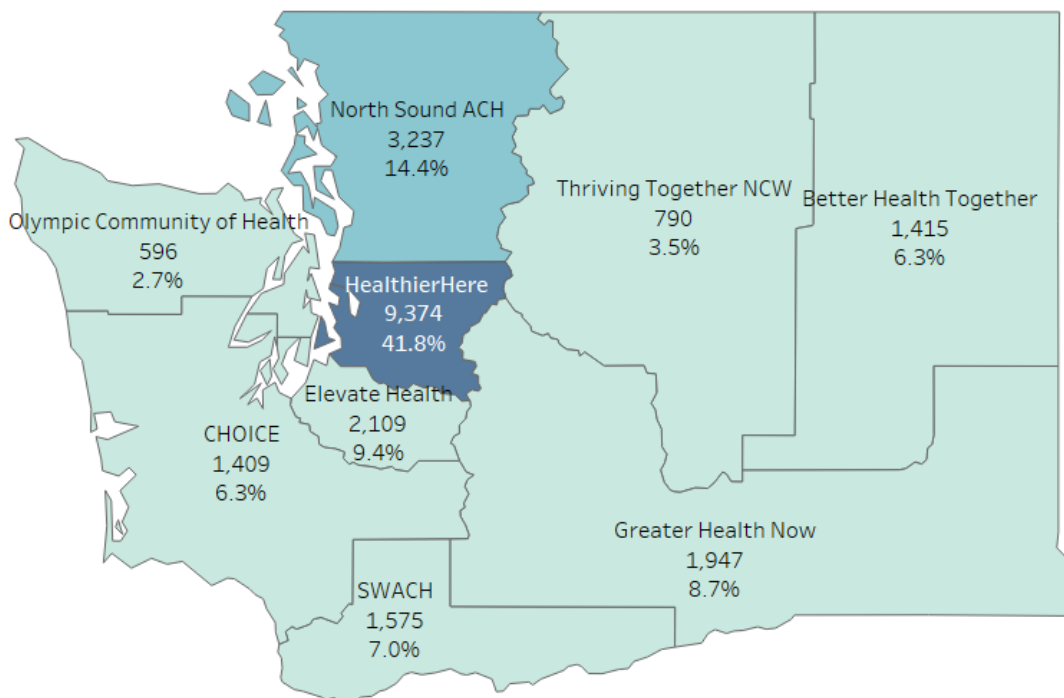
Map 7. Number and percent of physicians: ACH regions, 2021



Map 8. Number and percent of physicians: ACH regions, 2022



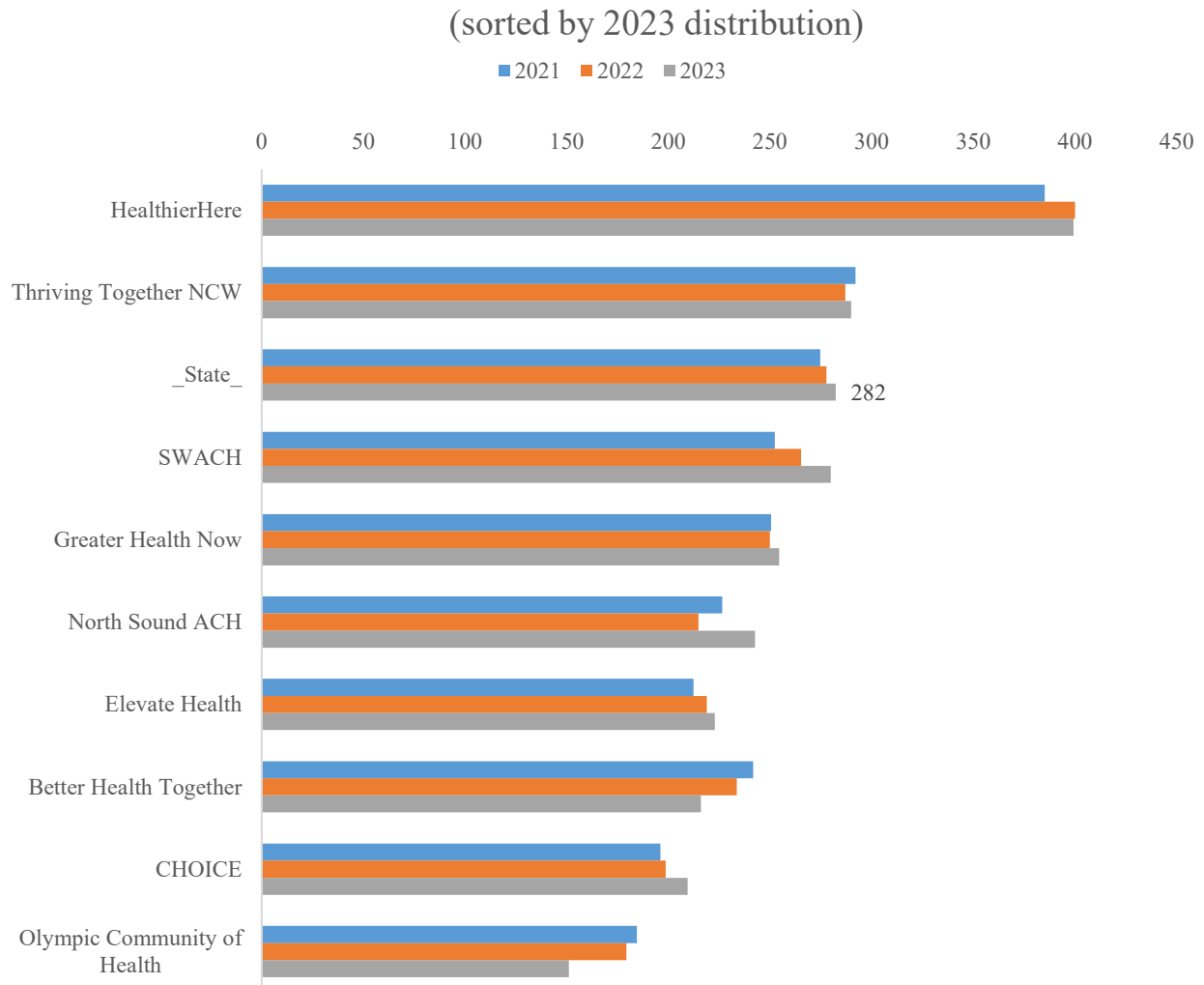
Map 9. Number and percent of physicians: ACH regions, 2023



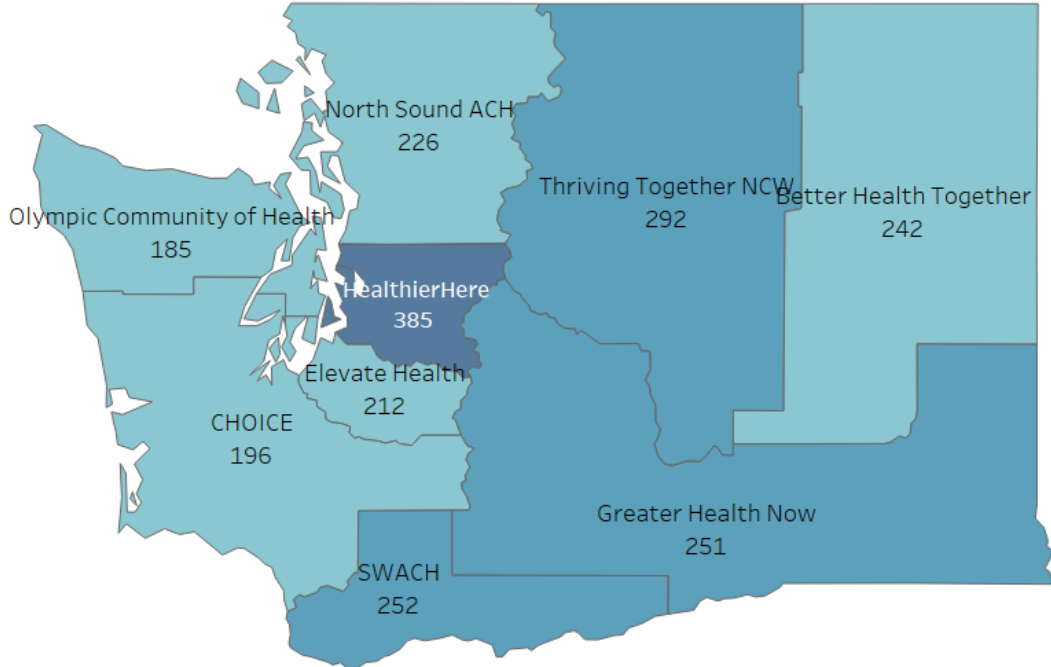
Number of physicians per 100,000 population – HealthierHere also led the ACHs in the physician rates. In all three years, its rate was close to 400 per 100,000 population (Figure 11 and Maps 10–12). Thriving Together NCW was the ACH with a distant second highest rate, close to 300. These two ACHs were the only ACHs with a physician rate greater than the statewide rate in all three years. There were small changes from 2021 to 2023 in these two ACHs’ physician rates. For HealthierHere, the rate increased from 385 to 399. For Thriving Together NCW, however, the rate decreased, from 292 to 290.

Among the remaining ACHs, the physician rates were between 200 and 300, except for Olympic Community of Health which had a rate below 200 in all three years. Two of these ACHs also experienced a decline in their rates, Better Health Together and Olympic Community of Health. Olympic Community of Health’s decline was the largest, from a rate of 185 in 2021 to 151 in 2023. Better Health Together’s decline from 242 to 216 changed the ACH’s ranking from the fifth highest rate in 2021 to the eighth highest in 2023. In total, including HealthierHere, there were seven ACHs with increases in their physician rates. The largest increase took place in SWACH, from 252 to 280.

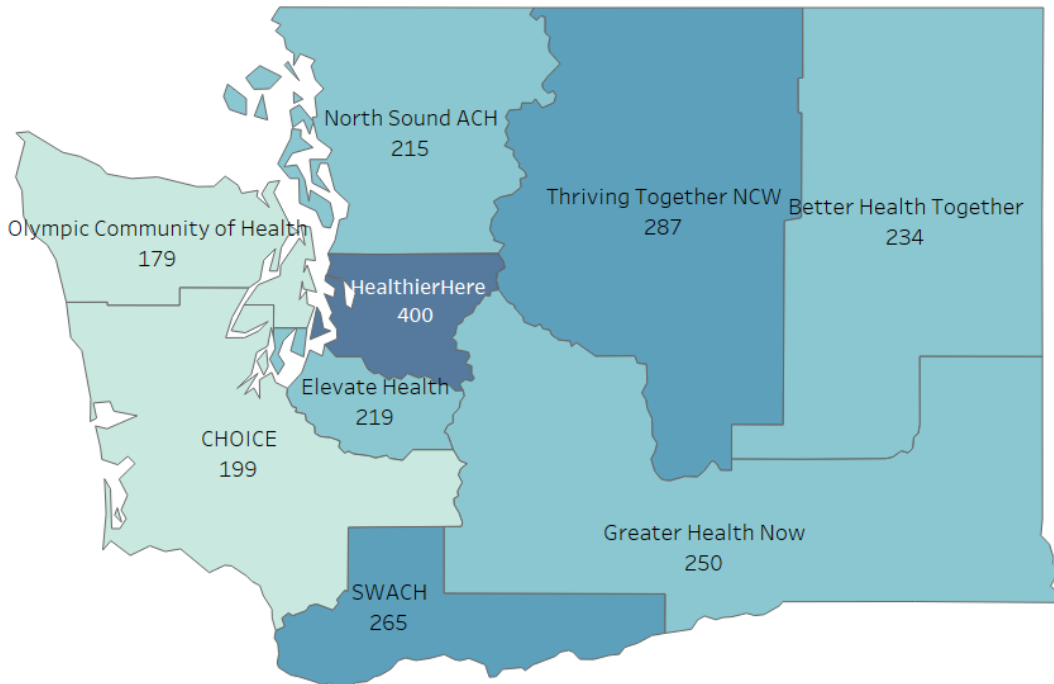
Figure 11. Number of physicians per 100,000 population by ACH: 2021–23



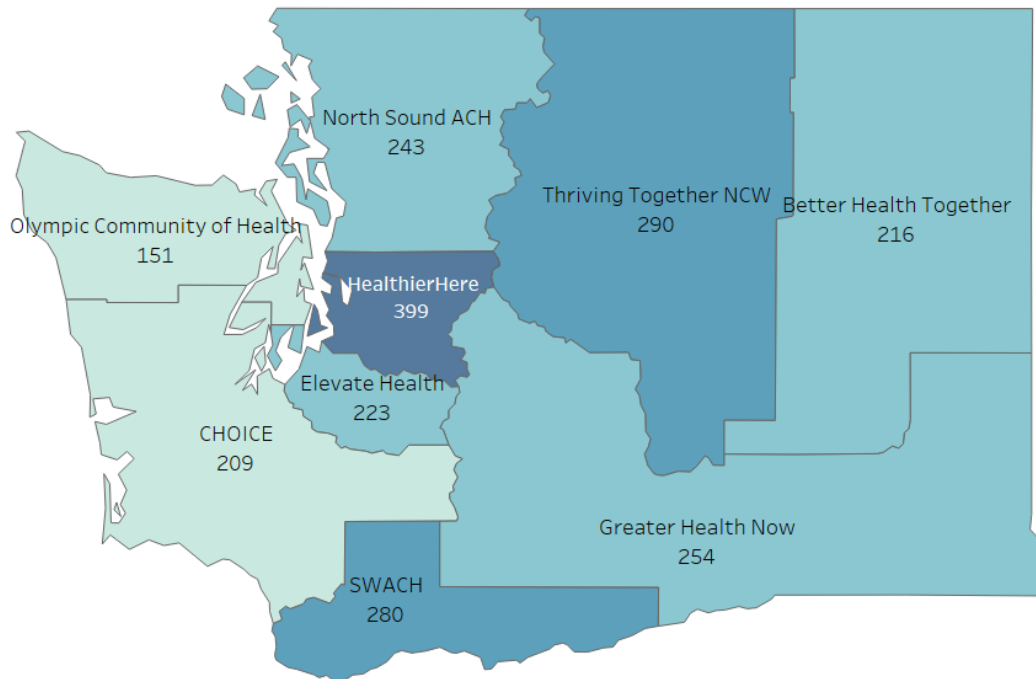
Map 10. Number of physicians per 100,000 population: ACH regions, 2021



Map 11. Number of physicians per 100,000 population: ACH regions, 2022



Map 12. Number of physicians per 100,000 population: ACH regions, 2023



More estimates on ACH-level physician supplies including physician demographics and specialty details are published in the companion chartbook *2021–23 Physician Supply – Estimates for Accountable Communities of Health: Washington State* on OFM’s Health Care webpage⁶.

⁶ <https://ofm.wa.gov/washington-data-research/health-care>.

Appendix: Data sources and method

Data sources

Network Access Report – Health insurance companies conducting business in Washington are required by the state’s Office of the Insurance Commissioner (OIC) to file a monthly Network Access Report (NAR). The purpose of these reports is for an insurer to demonstrate that it has an adequate supply of health care providers in its network(s) for the intended services. The report contains records of health care providers in contract with an insurance company’s provider network. The information on individual providers includes name, credential, specialty and practice location(s). Starting in 2017, the state’s NARs discontinued the previous provider specialty categories and replaced them with the Health Care Provider Taxonomy Codes Set issued by the National Uniform Claim Committee. The NARs are publicly available on OIC’s website. This study used the public NARs.

National Provider Identifier Registry: The National Provider Identifier (NPI) registry is a database in the National Plan and Provider Enumeration System (NPPES) that the federal Centers for Medicare and Medicaid Services (CMS) created. The NPI is a 10-digit unique number assigned to an individual or organizational provider in the nation. Part of the NPI database is publicly available. The public information for individual NPIs includes a provider’s name, NPI number, taxonomy and practice location. The public NPI data were used for this study.

Provider License Database – Health care providers must obtain a provider license with the Washington State Department of Health (DOH) to practice in the state. After initial licensing, providers must renew their licenses at certain intervals depending on the professions. Physicians must renew their licenses every two years. The provider license database includes information on the provider’s name, age, sex, credential type, license start date, most recent renewal date and expiration date. A subset of the provider license information is available for public search on the department’s website. However, for this study, we used an extract file from the license database.

Data processing

1. Processed the June Network Access Reports for 2021–23

We downloaded the NARs for each June from 2021 to 2023 from OIC’s website.⁷ Once we collected all insurance companies’ reports, we combined them by year and processed each year’s data separately. The NARs are structured in such a way that there are five blocks of rows of data and, depending on the block, the column name and purpose may be different. For example, a column in the block for “individual provider information” may be the individual NPI number, but in the block for “organization contract information,” it may be the organization NPI number. That’s why our next step was to “rectangularize” the data records by transforming the blocks of data rows into blocks of data columns so that each row was a record for an individual provider. Our final step was to remove non-physician records and retain only physician records.

⁷ If the June NAR is not available for an insurance company, then the closest earlier month of NAR available is used.

2. Matched physician records from the Network Access Reports with records in the National Provider Identifier registry and the DOH provider license database

We matched processed physician records from the Network Access Reports with the National Provider Identifier registry on the NPI numbers. The NPI is a unique identifier issued to health care providers. It is required for Medicare services, but is also used by health insurance carriers. We only retained records that matched on NPI between the two files.

Next, the matched NAR-NPI records were matched with the DOH license database on the physician credential number. In this step, we only retained matched records with non-expired licenses as of June of the selected year.

3. Recoded provider taxonomies and primary specialty assignments

The number of provider taxonomies in the NARs was too large for meaningful analyses. To reduce the number for reporting, we constructed a file that converts provider taxonomy into 13 provider specialty groups. We then applied the taxonomy groupings to the NAR file to create the primary specialty field. We determined a physician's primary specialty by the first taxonomy code linked to that physician at a practice location. If different insurance companies had different first taxonomy codes for this physician at that particular location, then we assigned the physician multiple primary specialties. The physician was also assigned multiple primary specialties if they had multiple practice locations and different first taxonomies associated with those locations. The 13 specialty groups we adopted for this report are:

1. Anesthesiology
2. Cardiology
3. Emergency medicine
4. Family medicine/general practice
5. Hospitalist
6. Internal medicine (general)
7. OB/GYN
8. Orthopedic surgery
9. Pediatrics (general)
10. Psychiatry
11. Radiology
12. Surgery (general)
13. Other specialty

4. Final record selection

There are numerous duplicate records due to cross-carrier reporting and/or cross-plan reporting within a carrier's report. In the final record selection process, only one record was retained from the data field combination of NPI, primary specialty, practice geo-coordinates and practice name. In addition, we excluded a small number of records from the final selection because of missing data on the state of the practice location, physician's last name or NPI.

5. Constructed physician record weights

We counted each physician as no more than one person even though the NAR data included physicians who had multiple practice locations or more than one primary specialty. To meet this requirement, we constructed “data weights” and applied the weights to the physician records.

Initial weight – Each physician was assigned the weight of 1, initially. If a physician was associated with more than one primary specialty, then the initial weight would be redistributed equally among the primary specialties. For example, if a physician had two primary specialties, each primary specialty would receive an initial weight of 0.5.

ZIP code-level weight – After we assigned the initial weights, we redistributed initial weights to a physician’s records for different ZIP codes associated with a primary specialty. To do that, we first counted the number of ZIP codes associated with a physician’s primary specialty. Then, we summed up the populations of the ZIP codes.⁸ We calculated each ZIP code’s fraction of the total population from all associated ZIP codes. We used these fractions to distribute the initial weight into ZIP codes associated with a physician’s primary specialty.

For example, suppose the initial weight for one of a physician’s two primary specialties (internal medicine) was 0.5 and the physician was associated with three ZIP codes that accounted for 70%, 20% and 10% of the total population of the three ZIP codes combined. The ZIP code with 70% of the population would receive 70% of the initial weight for the primary specialty, thus, 0.35 (i.e., $0.5 \times 70\%$), the 20% ZIP code would receive a weight of 0.1 and the 10% ZIP would receive a weight of 0.05.

In some cases, a physician’s primary specialty was associated with multiple locations within a ZIP code area. In that case, each location would receive an even share of the ZIP code-level weight that we previously assigned. Using the physician example above, suppose the physician’s internal medicine specialty was associated with three locations in the 70% ZIP code area. That means the final weight for each location record for this ZIP code associated with this physician’s internal medicine specialty would be 0.1167 (i.e., $0.35/3$).

Finally, the sum of weights associated with a physician should equal 1 and the sum of weights for all physicians should equal our count of physicians without the weights. We can use the ZIP code-level weights to analyze a single ZIP code, clusters of ZIP codes and the state.

County-level weight – For county-level analyses, an additional step was necessary to further distribute the physician record weight at the ZIP code-level for ZIP codes that cross county boundaries. Similar to the approach we used to construct ZIP code-level weight, a county’s fraction of such a ZIP code’s weight was determined by the county’s fraction of the population for that ZIP code in relation to the total population of the ZIP code. Using the same physician example from above, suppose the 20% ZIP code is associated with two counties and County A’s population fraction of the ZIP code’s total population is 70% and County B’s fraction is 30%. Then the ZIP Code-level physician record weight of 0.1 is

⁸ Some ZIP Codes in the original Network Access Reports do not have associated population data. These are either institution ZIP Codes (e.g., campus ZIP Code for universities) or mailbox ZIP Codes. Online ZIP Code maps were used to choose a substitute ZIP Code. The substitute ZIP Code is one that either encircles or shares the longest borderline with the ZIP Code in question.

redistributed into 0.07 (0.1×0.7) to County A and 0.03 (0.1×0.3) to County B. For ZIP codes whose areas are within the boundary of a single county, the ZIP code-level weights were then copied over to the county-level weight.

From this process, the sum of weights of all records associated with a physician should sum to 1 and the sum of weights of all physicians should equal the unique count of physicians without weights. The county-level weights can be used for analyses for counties, regions consisting of counties and the state.

6. Defined terms

Physician count: The physician count is calculated by summing the physician record weights in our analysis file. A physician can have more than one primary specialty and may practice at multiple locations. When we weight these records, we assume each physician identified in the NARs is working at full-time equivalency (FTE). We then distribute the physician's FTE into primary specialties, then to practice locations in different ZIP code areas, and then into different counties when a ZIP code area crosses county boundaries. Therefore, one physician's FTE in a specific area can sometimes mean several physicians each contribute a fraction to the FTE.

Primary specialty: A primary specialty is the first provider taxonomy code of a physician listed under a health insurance carrier's plan for a practice location in the NAR.

PCP/Specialist physicians: A PCP is a physician who provides primary care. Primary care, in general, refers to "the provision of integrated, accessible health care services by clinicians who are accountable for addressing a large majority of personal health care needs, developing a sustained partnership with patients, and practicing in the context of family and community."⁹ Physicians whose practice is not mainly in primary care are specialists. What a physician does in their practice should be used to describe the physician as a PCP or specialist. But in reality, it is quite difficult to collect such information. Instead, analysts generally classify physicians practicing with certain specialties as PCPs, although not all analysts agree on the set of specialties. For this study, primary care specialties include the following: family medicine/general practice, geriatric medicine, internal medicine (general) and pediatrics (general).

Physician rate: We calculate a physician rate as the number of physicians for a given population size of a specific geographic area. The usual population size we use is 100,000. Although physicians in certain specialties treat only specific groups of the population, such as physicians in pediatrics and OB/GYN, we base the physician rate calculation on the overall population, not the population groups those physicians generally provide care for. For this study, we calculated the physician rate as number of physicians per 100,000 population for the state, counties and Accountable Communities of Health (each consisting of one or more counties).

7. Limitations

The Network Access Report is the main data source we used for physician supply estimates in this study. There are two possible sources of errors that may affect data accuracy in NARs and our study estimates, although we don't expect either error to be large. One source is the omission of providers who are not affiliated with any insurance networks. Often these providers include some solo practitioners, some in

⁹ Donaldson MS, Yordy KD, Lohr KN, Vanselow NA, Editors. Primary Care: America's Health in a New Era. Committee on the Future of Primary Care, Division of Health Care Services. Institute of Medicine. National Academy Press. Washington, D.C. 1996: p. 31.

small practice groups and those who work for the federal or state institutions exclusively (e.g., Veterans Affairs hospitals, military hospitals and state hospitals). This error would undercount the physician supply. Another source of error would overcount the physician supply, occurring when insurance companies fail to promptly remove records from NARs for providers who no longer practice in Washington (due to retirement or moving to another state, for example), although they maintain a state license.

These two errors, because of their opposite effect, may reduce each other's impact to a certain degree. Without a perfect census of the providers practicing in Washington, though, it is impossible to precisely quantify these two errors and their overall effect on physician supply estimates.

Another potential error may exist due to the weighting method we used. When a physician has multiple primary specialties or multiple practice locations within a ZIP code area, we evenly distributed the initial weight to each primary specialty or each location within that ZIP code area. In reality, physicians with multiple specialties or multiple locations may spend disproportionately more time in one specialty or at one location. With no weighting, however, the analyst would have to arbitrarily choose one specialty or one location to represent the physician.

We have no doubt that these ZIP code-level and county-level weighting techniques improve our estimation of the physician distribution when compared to an analyst arbitrarily choosing specialty and/or which ZIP code area and county to assign the physician. However, the degree of improved precision from these weighting schemes remains unknown.

Yet another issue, though not necessarily a source of error, is that this study's method does not consider bordering states that provide services to Washington residents. For example, Clark County sits across the Columbia River from the greater Portland area in Oregon. Some Clark residents use physician services in the Portland area. Therefore, the actual physician supply would be larger than estimated in this report if we had included physicians serving Washington residents in neighboring states.