

2017-21 Advanced Registered Nurse Practitioner Supply in Provider Networks:

Estimates for Washington

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2017-21 Advanced registered nurse practitioner supply in provider networks: Washington estimates

Executive summary

This report contains annual estimates of Washington's advanced registered nurse practitioner (ARNP) supply in the health provider networks during 2017-21. The ARNP is a health profession license category in Washington that includes four practice roles: nurse practitioner, certified nurse-midwife, certified registered nurse anesthetist and clinical nurse specialist.¹ Nurse practitioner is the most common role under the ARNP category. An ARNP can practice independently to admit, manage, and discharge patients to and from health care facilities and may prescribe medications.² The first ARNP licenses in Washington were issued in the mid-1970s. The ARNPs have since become an important part of the health care delivery system in Washington.

Our data sources and method

The main data source for our analysis is the Network Adequacy Reports (NARs) that health insurance carriers are required to file each month with the Washington State Office of the Insurance Commissioner. These reports contain individual providers information. These providers are affiliated with one or more private provider networks that provide direct care in Washington.

We matched ARNP records in the NARs with records in the state's health provider license database and the national provider identifiers in the National Plan & Provider Enumeration. When we found that an ARNP had multiple practice locations, we used a record weighting system that accounts for the different locations without overcounting the total ARNP workforce.³

Here is what we found

- **Overall ARNP supply increased each year.** The ARNP supply in Washington's provider networks grew at approximately 400 new providers each year from 4,130 in 2017 to 5,902 in 2021. The ARNP supply growth outpaced the general population growth, since the number of ARNPs per 100,000 population increased from 56 in 2017 to 76 in 2021.
- **Increase in ARNP supply came almost entirely from specialist care ARNPs.** ARNPs in the provider networks are designated as 'primary care' or 'specialist care providers', or both by the health insurance carriers.⁴ Although the numbers of both groups increased from 2017 to 2021, the ARNP increase in primary care barely kept up with the population growth while the specialist care increase outpaced the population growth. The number of primary care ARNPs changed from 20 to 21 per 100,000 population from 2017 to 2021. During the same time, the number of specialist care ARNPs

¹ [Advanced Registered Nurse Practitioner | Nursing Care Quality Assurance Commission \(wa.gov\)](#)

² [WAC 246-840-300](#) (ARNP Scope of Practice).

³ For detailed information on the data sources and method, see the Data Sources and Method section.

⁴ Information on what criteria are used to make the primary/specialist care designation is not available in the NAR data source. Similar trend, i.e., a decreasing share of primary care providers and an increasing share of specialist care providers was observed in physician supply in provider networks in the same data source and for physicians, the primary/specialist care designation was made using provider taxonomy codes. For our reports on physician supplies, visit <https://ofm.wa.gov/washington-data-research/health-care/health-care-workforce>.

increased from 36 to 55 per 100,000 population. This accounted for 72% of the total ARNP workforce in Washington's provider networks in 2021.

- **The ARNP workforce is predominantly women.** Between 2017 and 2021, the share of women in the ARNP workforce was in the upper 80%. There was little difference in this share between primary care ARNPs and specialist care ARNPs.
- **Median age of ARNPs was around 45 years.** The median age of ARNPs dropped from slightly above 45 years in 2017 to slightly below 45 in 2019 and stayed unchanged for the next two years. The pattern is the same for ARNPs in total, primary care and specialist care.
- **Male ARNPs were one year younger than female ARNPs on average.** Overall, male ARNPs were one year younger than female ARNPs during the 2017-21 period. The same was true among specialist care ARNPs. However, among primary care ARNPs, males were about one year older until 2020 and in 2021, they had the same median age, 43, as female ARNPs.
- **Wide variations in ARNP supplies and characteristics existed among counties.** King County had the largest share of total ARNPs in the provider networks, approximately 40%. In 23 counties, the share was less than 1% each during 2017 and 2021. Chelan County and Benton County, however, consistently ranked among the highest ARNPs rates with approximately 100 ARNPs per 100,000 population. Asotin County's increase in ARNP rate was the largest, from 55 per 100,000 in 2017 to the highest of 119 per 100,000 in 2021. The rates of primary care ARNPs had little change in most counties and stayed around 20 per 100,000 population. The specialist care ARNP rates were higher than primary care ARNP rates and increased in most counties from 2017 to 2021. While the share of female ARNPs was high in all counties, it had a wide range with a 5-year average low of 71% in Grant County and a high of 98% in Adams County. The 5-year average of ARNPs' median age in most counties was above the state average of 45 years, with a range from 42 years in Franklin County to 61 years in Ferry County.
- **Variations in ARNP supplies and characteristics also existed among the ACHs.** The state has nine health service regions called Accountable Communities of Health that cover all 39 counties, with each ACH consisting of one or more counties. The variations in the provider networks' ARNP supply at the county level also existed among the ACHs, although to a lesser degree. The HealthierHere ACH (King County) had approximately 40% of the provider networks' total ARNPs while shares for the other ACHs ranged from 3% to 13%. HealthierHere also had the highest rate of ARNPs per 100,000 population. Its rate also had the largest increase of all ACHs, from 71 in 2017 to 99 in 2021. Rates of primary care ARNPs had some ups and downs in all ACHs, but stayed below 30 per 100,000 population. Rates of specialist care ARNPs varied a lot among the ACHs, from 30 in SWACH to 77 in HealthierHere in 2021. All ACHs had increases in specialist care ARNP rates from 2017 to 2021. The 5-year average share of female ARNPs varied a little, ranging from 82% in the Greater Columbia ACH to 89% in HealthierHere. The 5-year average of ARNPs' median age had a relatively large variation with a low of 42 years in HealthierHere and a high of 52 years in Olympic Community of Health.

State’s supply of advanced registered nurse practitioners in provider networks

Overall supply

In 2017, the first year of data that we included in this analysis, there were 8,005 licenses for the profession of Advanced Registered Nurse Practitioner. In 2018, the total licenses increased by 440. For the next two years, the increase continued, with more than 800 new licenses per year. The largest increase was in 2021, with 1,260 new licenses to 11,476. The majority of the ARNP licenses each year were in the nurse practitioner subcategory. Each year, nurse practitioners accounted for approximately 80% of the total ARNP licenses. The second largest share was the anesthetist subcategory, followed by midwife, temporary permit/other and clinical specialist subcategories,

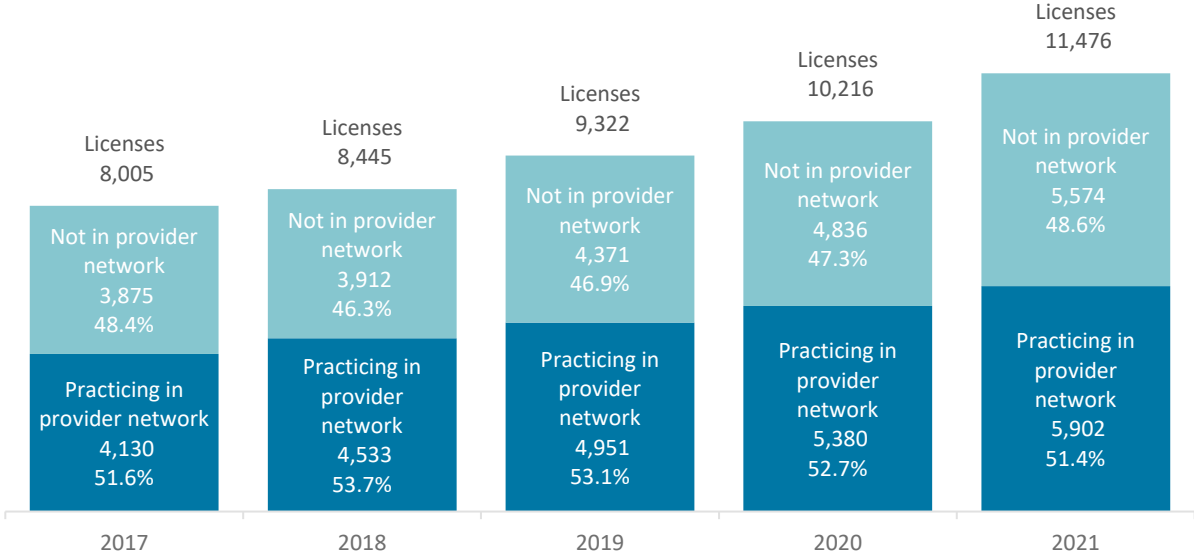
ARNP licenses by subcategories: 2017-21

ARNP subcategory	2017		2018		2019		2020		2021	
	N	%	N	%	N	%	N	%	N	%
Anesthetist	1,018	12.7	1,053	12.5	1,089	11.7	1,144	11.2	1,180	10.3
Clinical specialist	40	0.5	49	0.6	67	0.7	79	0.8	87	0.8
Midwife	481	6.0	491	5.8	501	5.4	536	5.2	560	4.9
Nurse practitioner	6,215	77.6	6,708	79.4	7,390	79.3	8,128	79.6	9,224	80.4
Temporary permit/Other	251	3.1	144	1.7	275	3.0	329	3.2	425	3.7
Total	8,005		8,445		9,322		10,216		11,476	

(A license was selected for each year if its first issuance date was on or before June 30 and its expiration date was after June 30 of the respective year.)

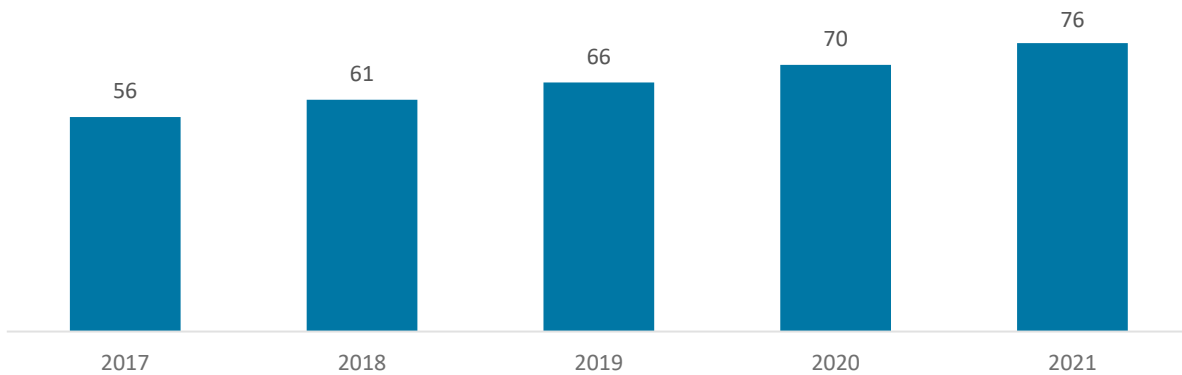
Slightly more than half the ARNPs with Washington licenses practiced in the private insurance networks each year. The number of ARNPs practicing in the provider networks increased by about 400 each year from 4,130 in 2017 to 5,902 in 2021. **We based the analyses in the rest of this report on these ARNPs practicing in Washington’s provider networks.** (Figure 1)

Figure 1. ARNPs with Washington licenses, number and percent practicing in provider networks: 2017-21



The rate of ARNPs practicing in Washington state’s provider networks has steadily increased from 56 ARNPs per 100,000 in 2017 to 76 per 100,000 in 2021. The steady increase in this rate indicates that the ARNP supply has a faster growth than the general population. (Figure 2)

Figure 2. Total practicing ARNPs in provider networks per 100,000 population: Washington, 2017-21

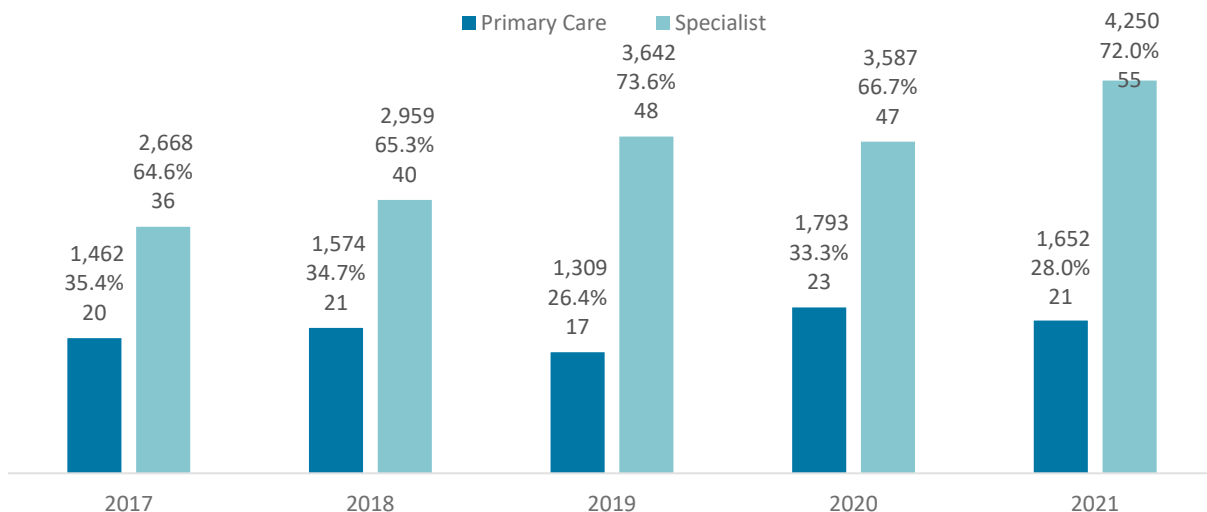


Supplies in primary care and specialist care

We can attribute the steady increase in the rate of the overall ARNP per 100,000 in the provider networks almost entirely to the growth in ARNPs practicing in specialist care. In filing the network adequacy reports (the chief data source for the current report), insurance carriers provided the designation of a provider’s status as a specialist or primary care provider, or both. While the numbers of primary care *and* specialist care ARNPs increased from 2017 to 2021, the rate of primary care ARNPs barely changed during that time, starting at 20 per 100,000 and ending with 21 per 100,000.

In contrast, the rate of specialist care ARNPs increased from 36 to 55 per 100,000 population. Specialist care ARNPs accounted for two-thirds of the total ARNP supply in the provider networks and that share was increasing. It increased from 64.6% in 2017 to 72% in 2021. At the same time, the share of primary care ARNPs decreased from 35.4% in 2017 to 28% in 2021. (Figure 3)

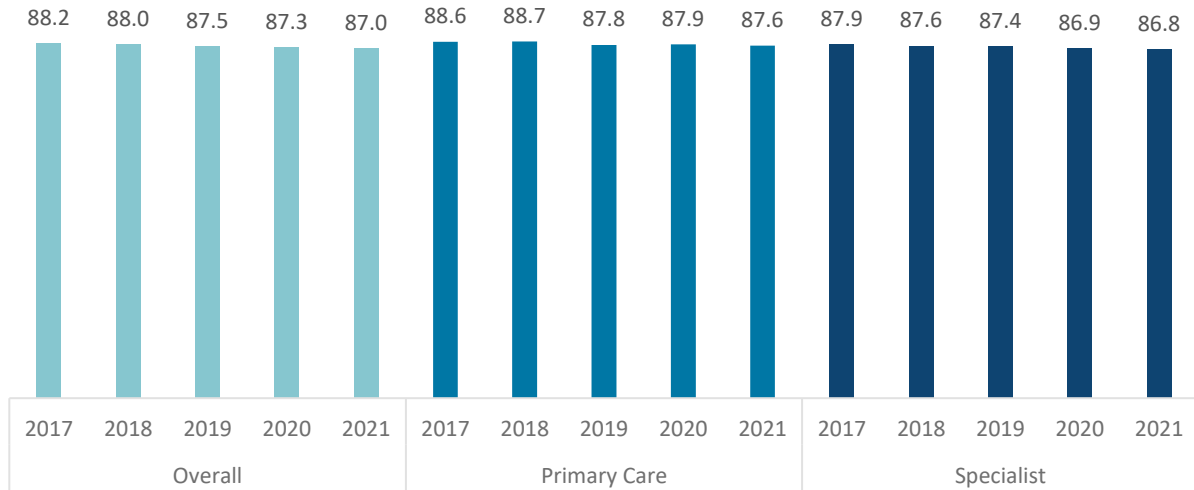
Figure 3. Number, percent and rate (per 100,000) of primary care and specialist care ARNPs in provider networks: Washington, 2017-21



Gender

Nearly 90% of the ARNPs in the provider networks were women in each of the five years between 2017 and 2021. This is true in the overall, primary care and specialist care supplies of ARNPs. There was, though, a small but steady decrease in women’s share from 2017 to 2021. Their overall share dropped from 88.2% to 87%. In primary care, their share dropped from 88.6% to 87.6%. In specialist care, it decreased from 87.9% to 86.8%. (Figure 4).

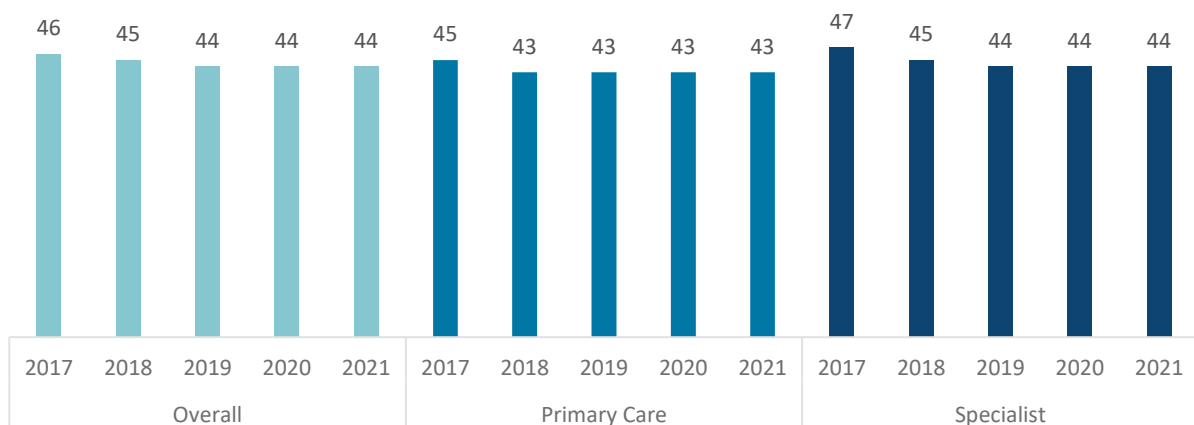
Figure 4. Percentage of females in overall, primary care and specialist care ARNPs in provider networks: Washington, 2017-21



Median age

There was a decline in the median age of ARNPs in the provider networks by about one year from 2017 to 2018. For the most recent three years, 2019 to 2021, the median age remained the same. This trend is the same for the primary care ARNPs and specialist care ARNPs, as well as the overall ARNPs. In 2021, the median age for both overall and specialist care ARNPs was 44 years while the median age of primary care ARNPs was one year younger, at 43 years. (Figure 5)

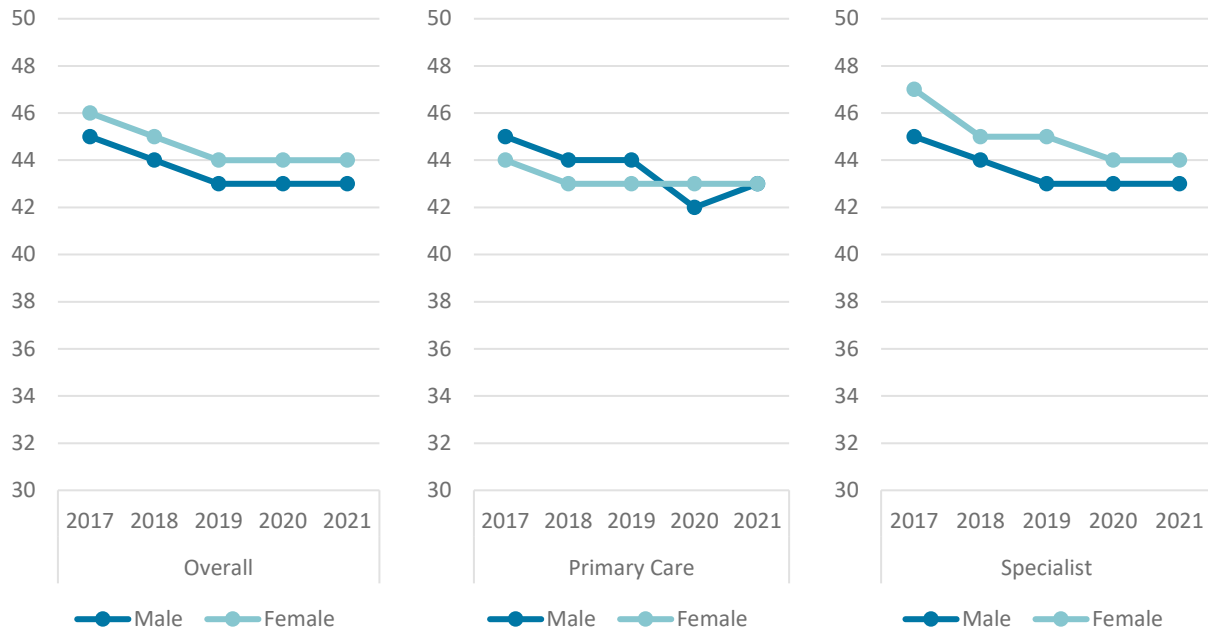
Figure 5. Median age of total, primary care and specialist care ARNPs in provider networks: Washington, 2017-21



Median age of female and male ARNPs

Overall, female ARNPs have a median age about one year older than that of male ARNPs in the provider networks. In 2021, female ARNPs' median age was 44 years and male ARNPs had a median age of 43 years. We observed the same difference among the specialist care ARNPs, with the median age in 2021 at 44 for females and 43 for males. Among the primary care ARNPs, males had a median age that was about one year older than females during 2017-2019. In 2021, though, both sexes of the primary care ARNPs had a median age of 43 years. (Figure 6)

Figure 6. Median age of overall, primary care and specialist care ARNPs in provider networks by gender: Washington, 2017-21

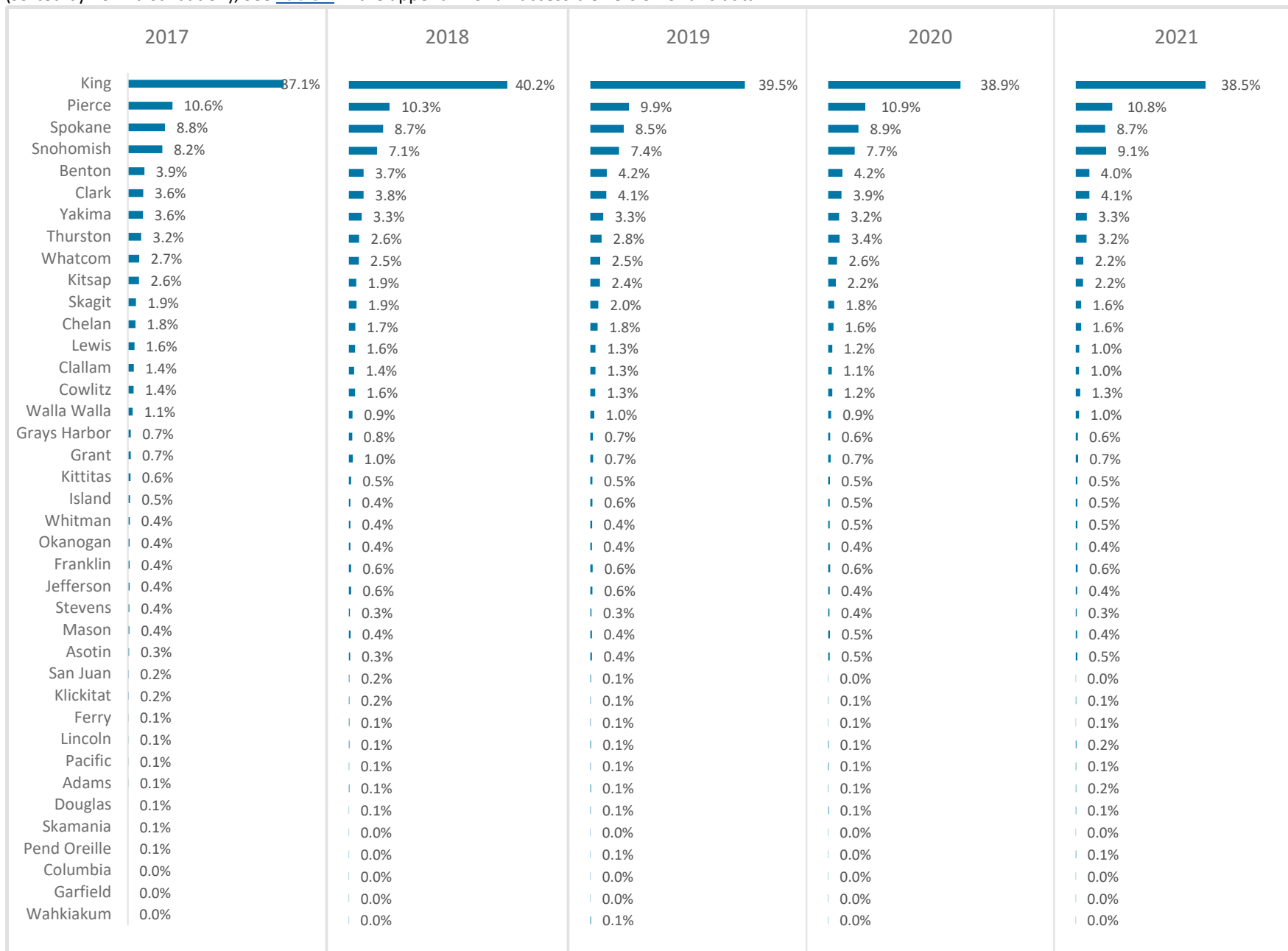


County supplies of ARNPs in provider networks

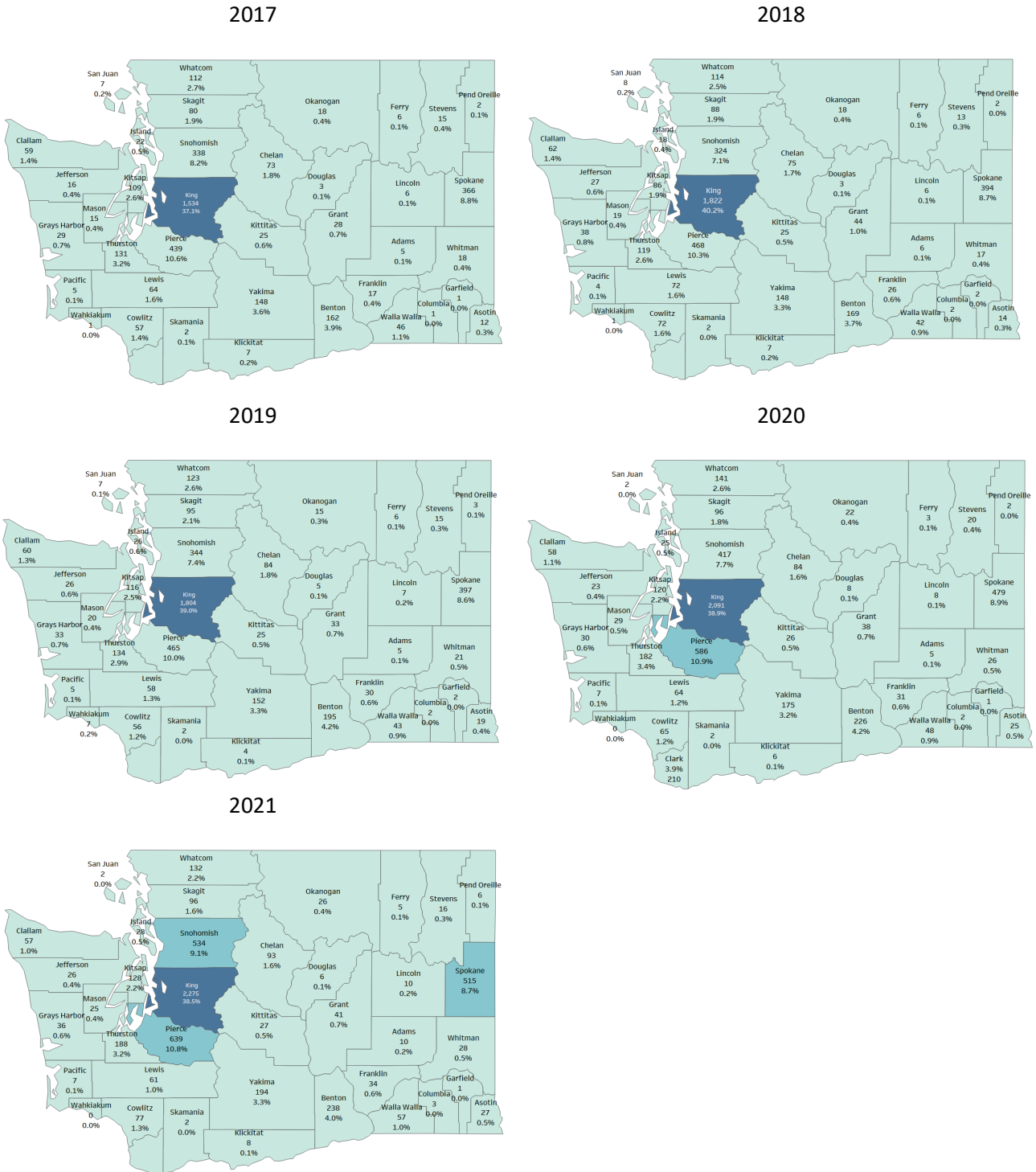
Overall supply

The distribution of the provider networks' supply of ARNPs among the counties did not change much from 2017 to 2021. King County maintained the largest share of the total ARNPs, around 40%, although it declined slightly. King County's share is nearly three times as large as the second largest share – about 10% in Pierce County. The third and fourth largest shares were those of the Spokane County and Snohomish County, between 7% and 9%, over the years. In the remaining 35 counties, the share was less than 5% in all years between 2017 and 2021. In 23 counties with the smallest shares, the share was always below 1% each. (Figure 7)

Figure 7. Percentage of state total ARNPs in provider networks: counties, 2017-21
 (sorted by 2017 distribution); See [Table 2](#) in the appendix for an accessible version of this data.



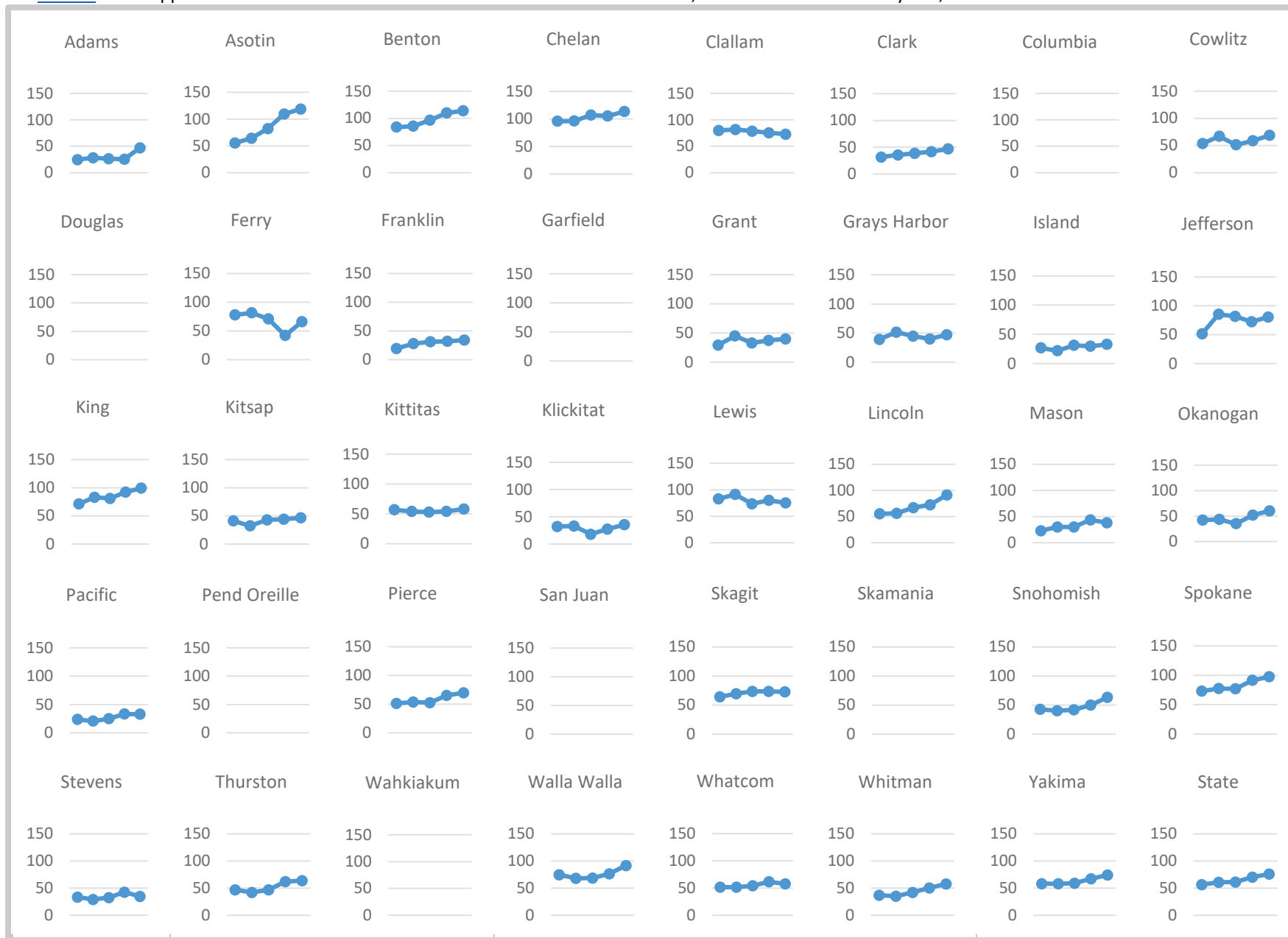
Map 1. Number and percent of ARNPs in provider networks: counties, 2017-21
 See [Table 2](#) in the appendix for an accessible version of this data.



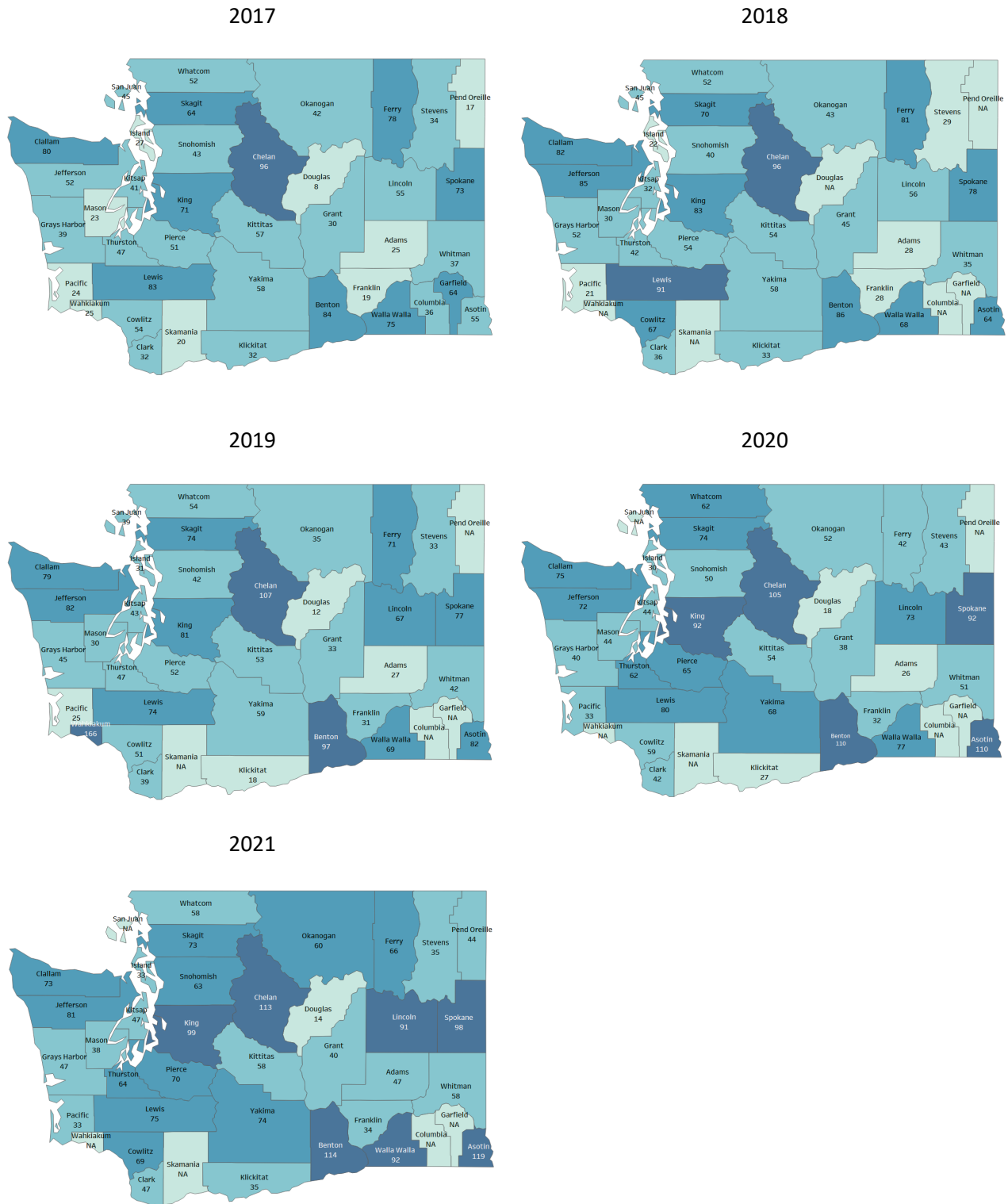
Number of overall ARNPs per 100,000 population

The number of overall ARNPs per 100,000 population in the provider networks increased at the state level. That was the case in most counties. The four counties with the largest shares of ARNPs (King, Pierce, Spokane and Snohomish) had steady increases in their ARNP rates. The most noticeable increase was, however, in Asotin County in which the rate increased from 55 to 119 ARNPs per 100,000 population. No county had an apparent downward trend in its overall ARNP rate. Benton County and Chelan County had high and increasing ARNP rates consistently, from below 100 to above 110 per 100,000.

Figure 8. Number of overall ARNPs in provider networks per 100,000 population: counties, 2017-21
 See [Table 3](#) in the appendix for an accessible version of this data. If no data are shown, it means in one or more years, the number of ARNPs is less than 3.



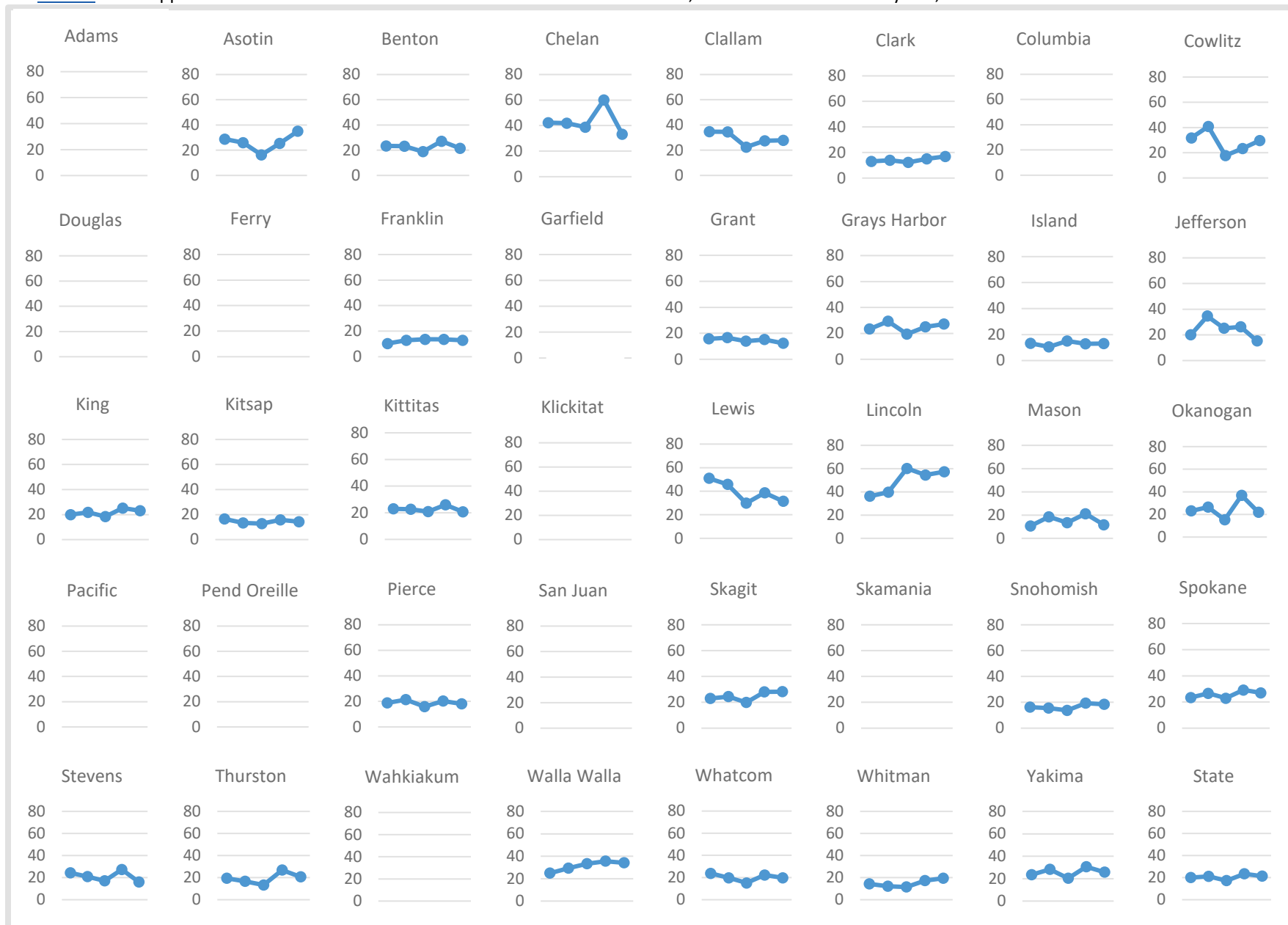
Map 2. Number of overall ARNPs in provider networks per 100,000 population: counties, 2017-21
 See [Table 3](#) in the appendix for an accessible version of this data.



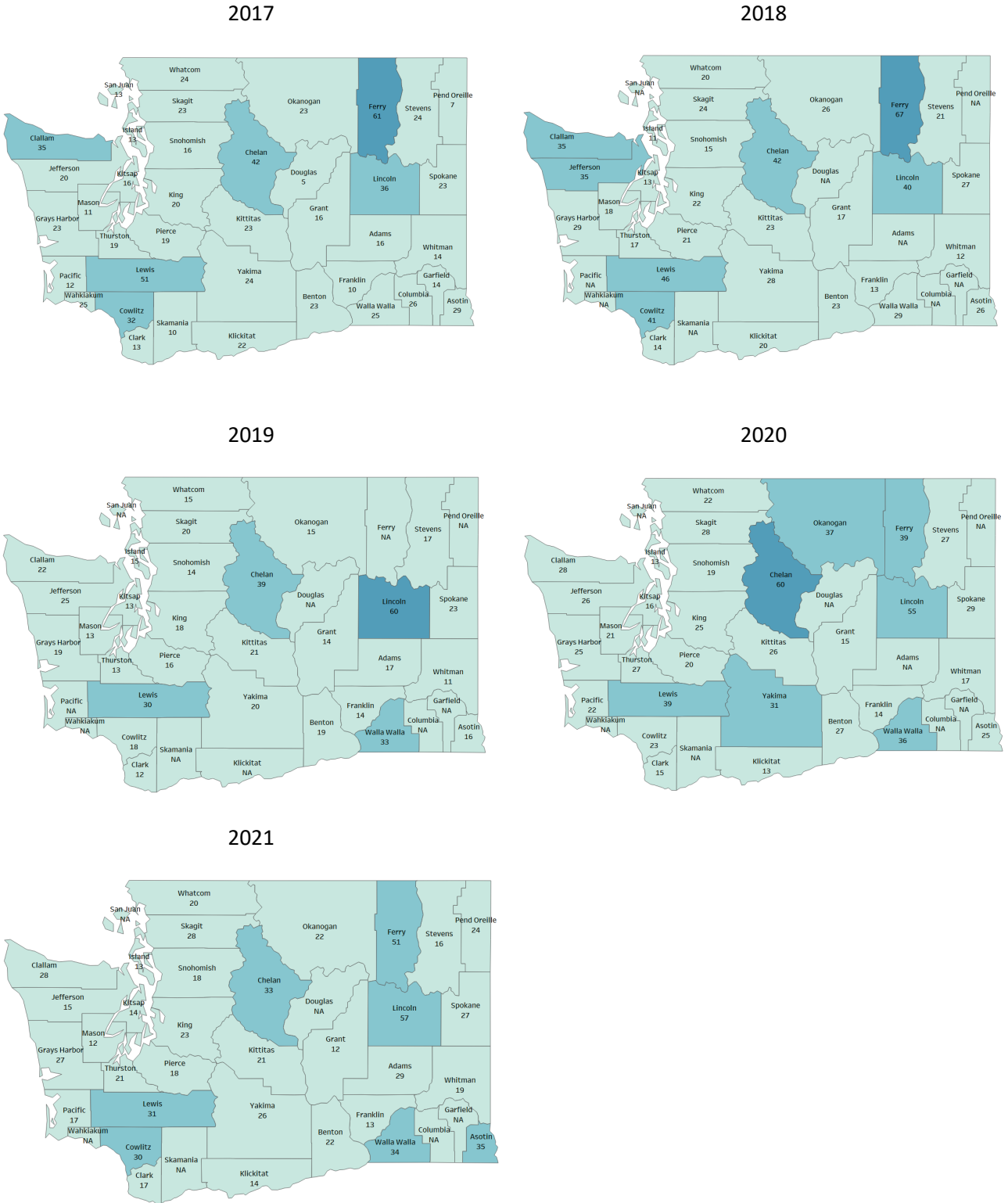
Number of primary care ARNPs per 100,000 population

The number of the provider networks' primary care ARNPs per 100,000 population in most counties had a trend like the state level – little change from 2017 to 2021 and hovering around 20 ARNPs per 100,000 population. Lewis County had the largest net decline in its rate, from 51 to 31 ARNPs per 100,000 population. Lincoln County had the largest net increase, from 36 to 57. These two counties were also among the three counties with rates at or above 30 ARNPs per 100,000 population in all years from 2017 to 2021. Chelan was the third county. (Figure 9)

Figure 9. Number of primary care ARNPs in provider networks per 100,000 population: counties, 2017-21
 See [Table 3](#) in the appendix for an accessible version of this data. If no data are shown, it means in one or more years, the number of ARNPs is less than 3.



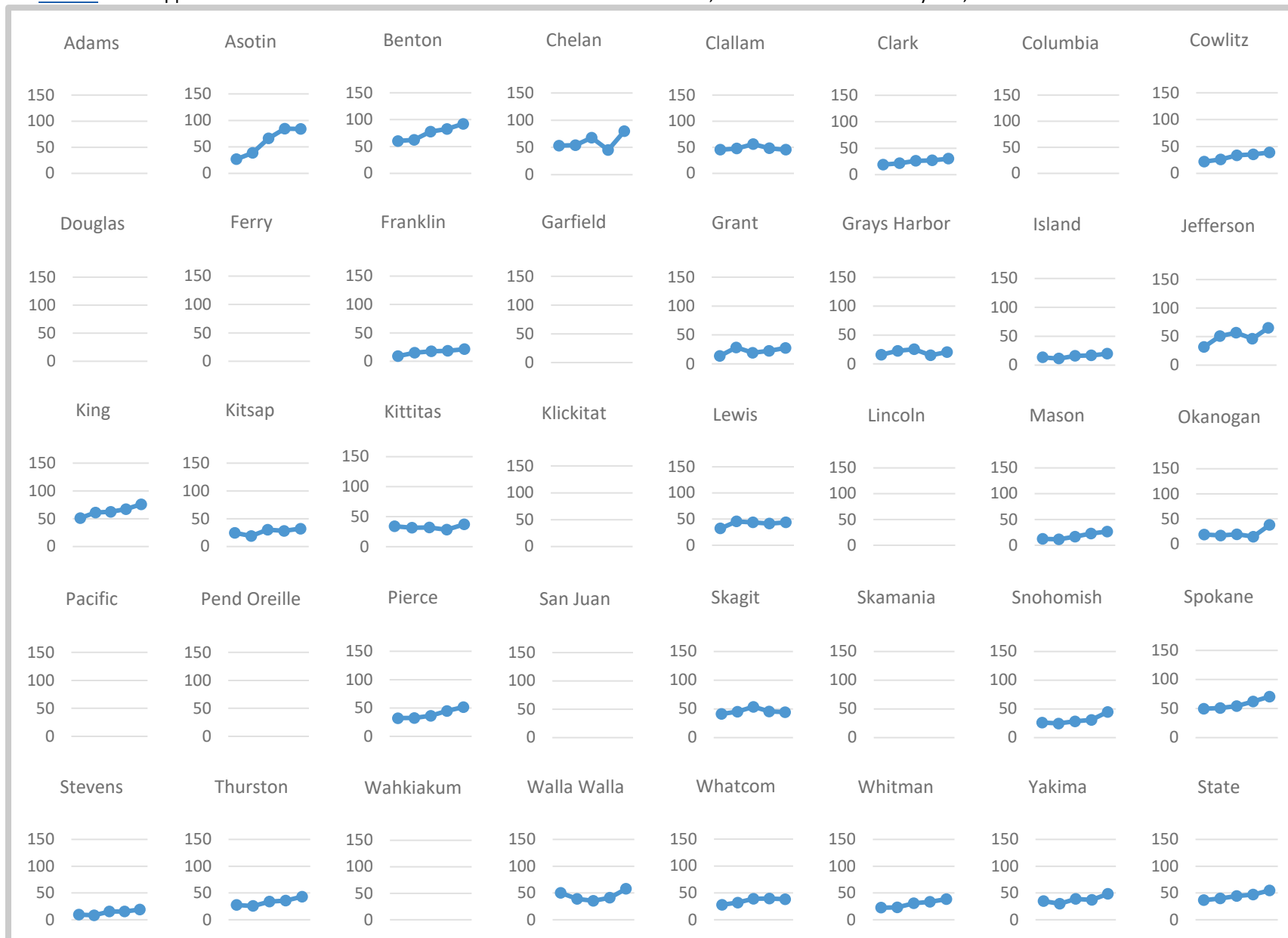
Map 3. Number of primary care ARNPs in provider networks per 100,000 population: counties, 2017-21
 See [Table 3](#) in the appendix for an accessible version of this data.



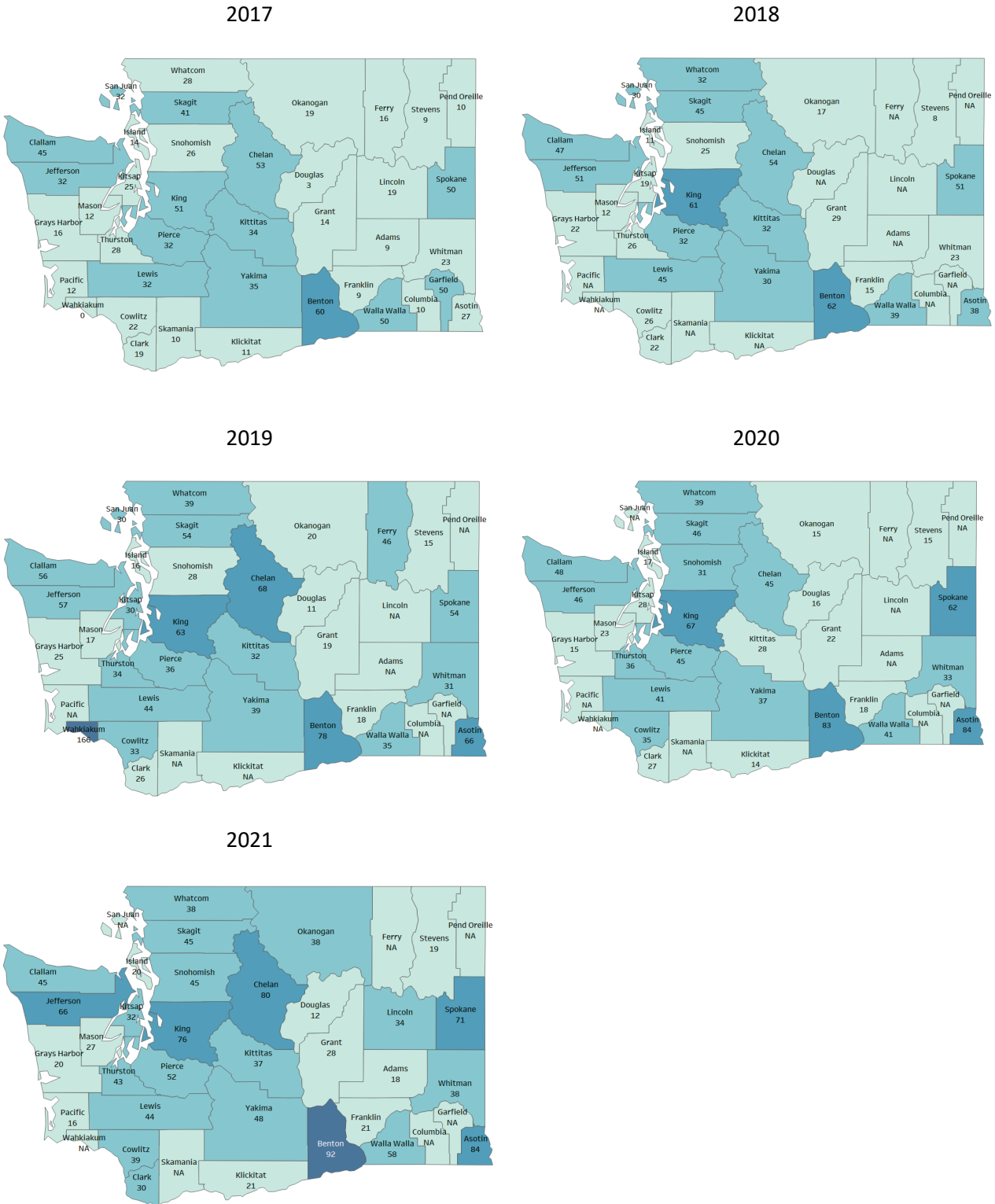
Number of specialist care ARNPs per 100,000 population

The numbers of the provider networks' specialist care ARNPs per 100,000 population among the counties were much higher in general than the rates of primary care ARNPs. Most counties also had an upward trend in their specialist care ARNP rates. No county had a clear downward trend. While in most counties the rates of specialist care ARNPs were below 50 per 100,000 population, three counties had rates greater than 50 in all years from 2017 to 2021. These were Benton, King and Spokane. The most noticeable change of all counties in the rate of specialist care ARNPs was the increase in Asotin County, where the rate increased by 57 from 27 per 100,000 in 2017 to 84 per 100,000 in 2021. (Figure 10)

Figure 10. Number of specialist care ARNPs in provider networks per 100,000 population: counties, 2017-21
 See [Table 3](#) in the appendix for an accessible version of this data. If no data are shown, it means in one or more years, the number of ARNPs is less than 3.



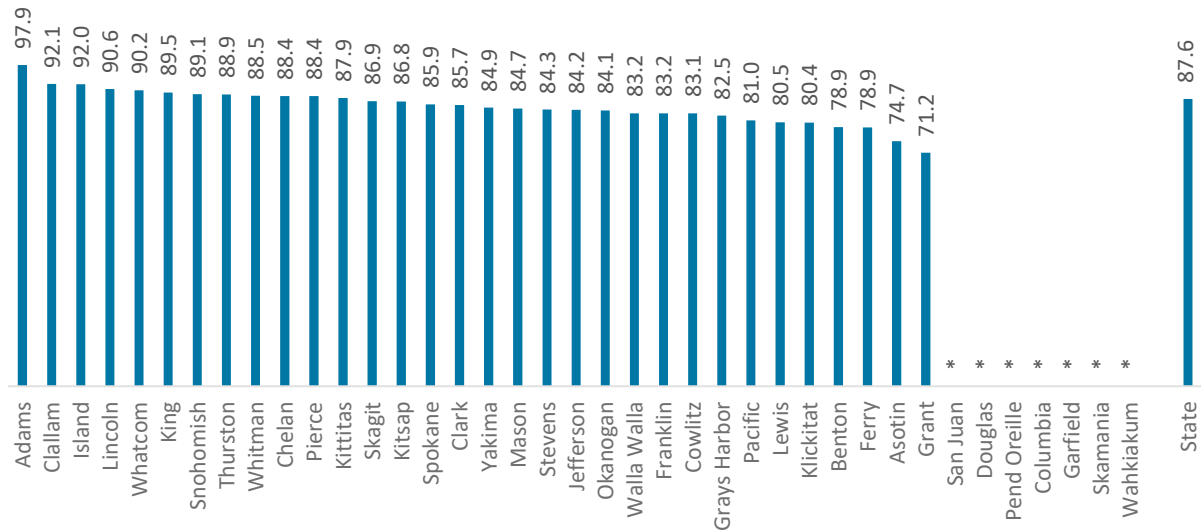
Map 4. Number of specialist care ARNPs in provider networks per 100,000 population: counties, 2017-21
 See [Table 3](#) in the appendix for an accessible version of this data.



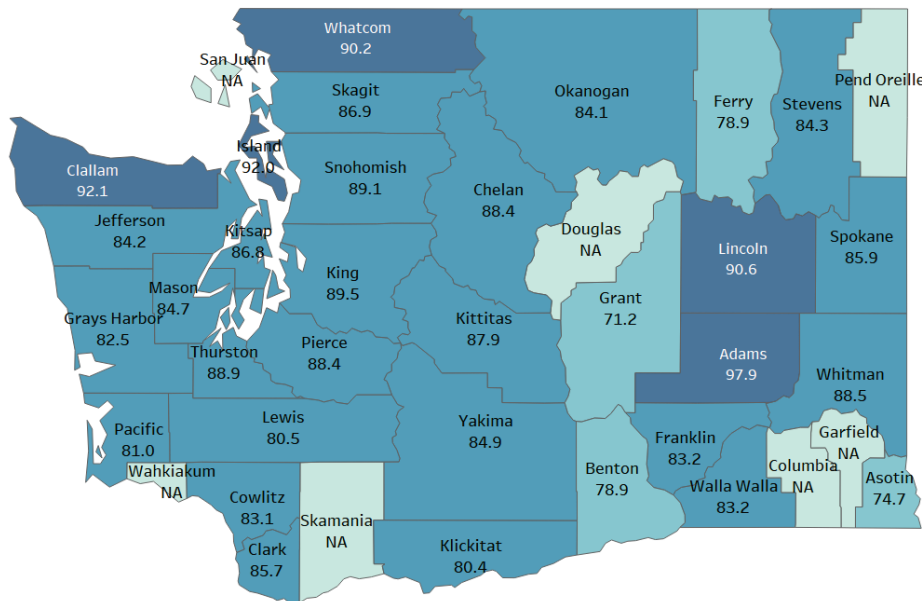
Percentage of female ARNPs

Women made up an average of 88% of total ARNPs between 2017 and 2021 in the provider networks. For all counties with at least three ARNPs, the 5-year average share of women was above 70%. There was, however, a notable variation in the shares of female ARNPs among the counties. It ranged from 71% in Grant County to 98% in Adams County. Additional data show there were slight declines in the shares of female ARNPs in most counties in 2021 compared with their shares in 2017. The counties with a decrease outnumbered the counties with an increase by two to one⁵. (Figure 11)

Figure 11. Average percentage of female ARNPs in provider networks: counties, 2017-21 (* denotes fewer than three ARNPs in the county in one or more years)



Map 5. Average percentage of female ARNPs in provider networks: counties, 2017-21
See [Table 4](#) in the appendix for an accessible version of this data.

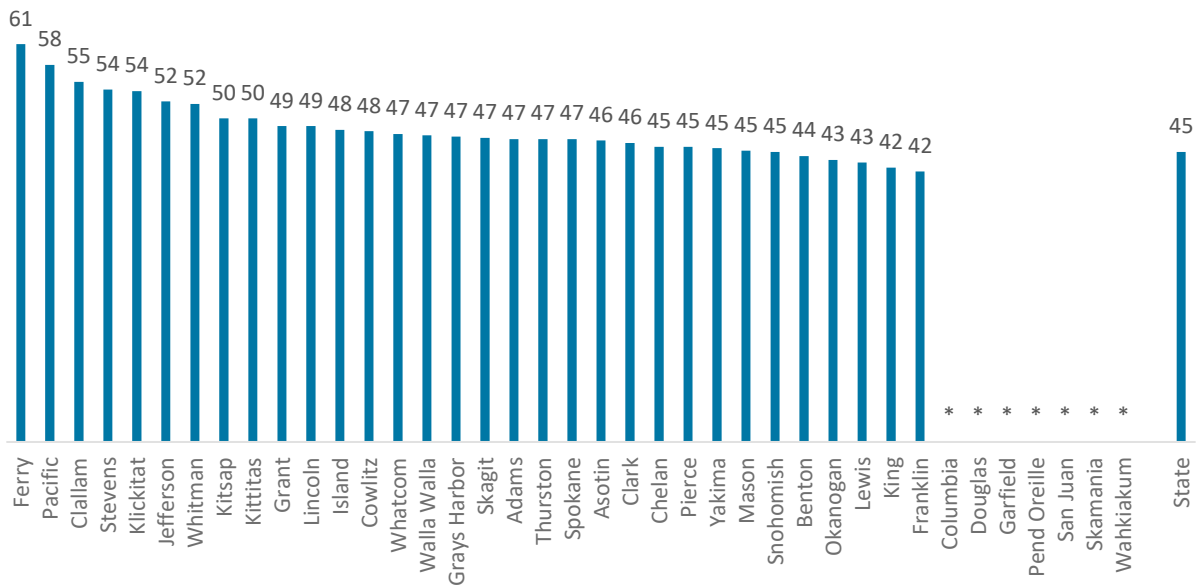


⁵ Twenty-one counties had a decrease while 11 counties had an increase. See Table 4 in the Appendix for details.

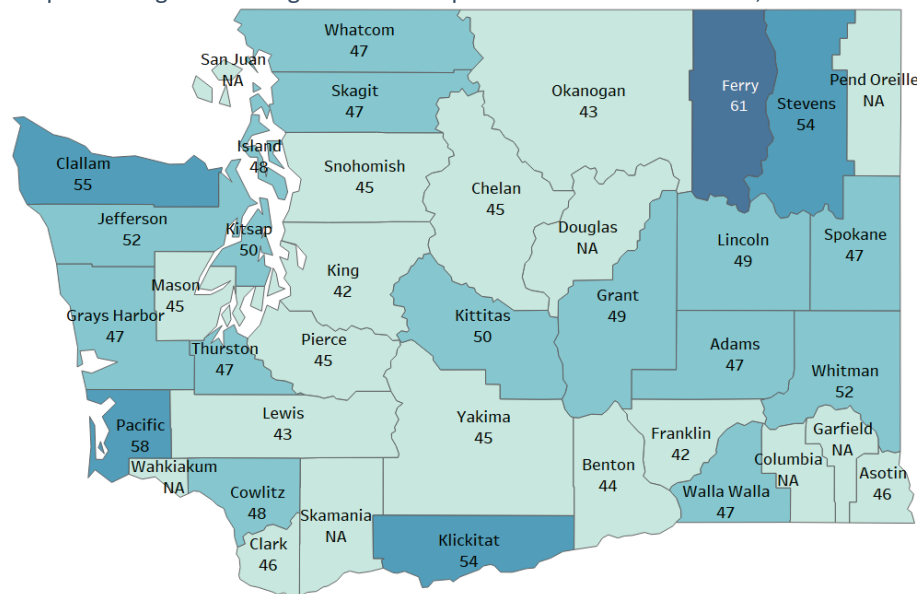
Median age of ARNPs

For overall ARNPs in the provider networks at the state level, the 5-year average of median age was 45 years. For most counties, however, the median age was above 45. In Ferry County and Pacific County, the median age was near retirement age, at 61 and 58, respectively. In only five counties, the ARNP median age was below 45, with the lowest of 42 in Franklin County. King County, which had the state’s largest share of ARNPs, was among the five. Table 4 data in the Appendix show that in most of the counties, 20 out of 30 that had at least three ARNPs, the ARNP workforce was younger in 2021 than in 2017.

Figure 12. Average median age of ARNPs in provider networks: counties, 2017-21



Map 6. Average median age of ARNPs in provider networks: counties, 2017-21



See [Table 4](#) in the appendix for an accessible version of this data.

ACH supplies of ARNPs in provider networks

An Accountable Community of Health or an ACH is a regional coalition consisting of representatives from a variety of sectors, working 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:⁶

1. Better Health Together (Adams, Ferry, Lincoln, Pend Oreille, Spokane and Stevens)
2. Cascade Pacific Action Alliance (Cowlitz, Grays Harbor, Lewis, Mason, Pacific, Thurston and Wahkiakum)
3. Elevate Health (Pierce)
4. Greater Columbia ACH (Asotin, Benton, Columbia, Garfield, Franklin, Kittitas, Walla Walla, Whitman and Yakima)
5. HealthierHere (King)
6. North Central ACH (Chelan, Douglas, Grant and Okanogan)
7. North Sound ACH (Island, San Juan, Skagit, Snohomish and Whatcom)
8. Olympic ACH (Clallam, Jefferson and Kitsap)
9. SWACH (Southwest Washington ACH) (Clark, Klickitat and Skamania)

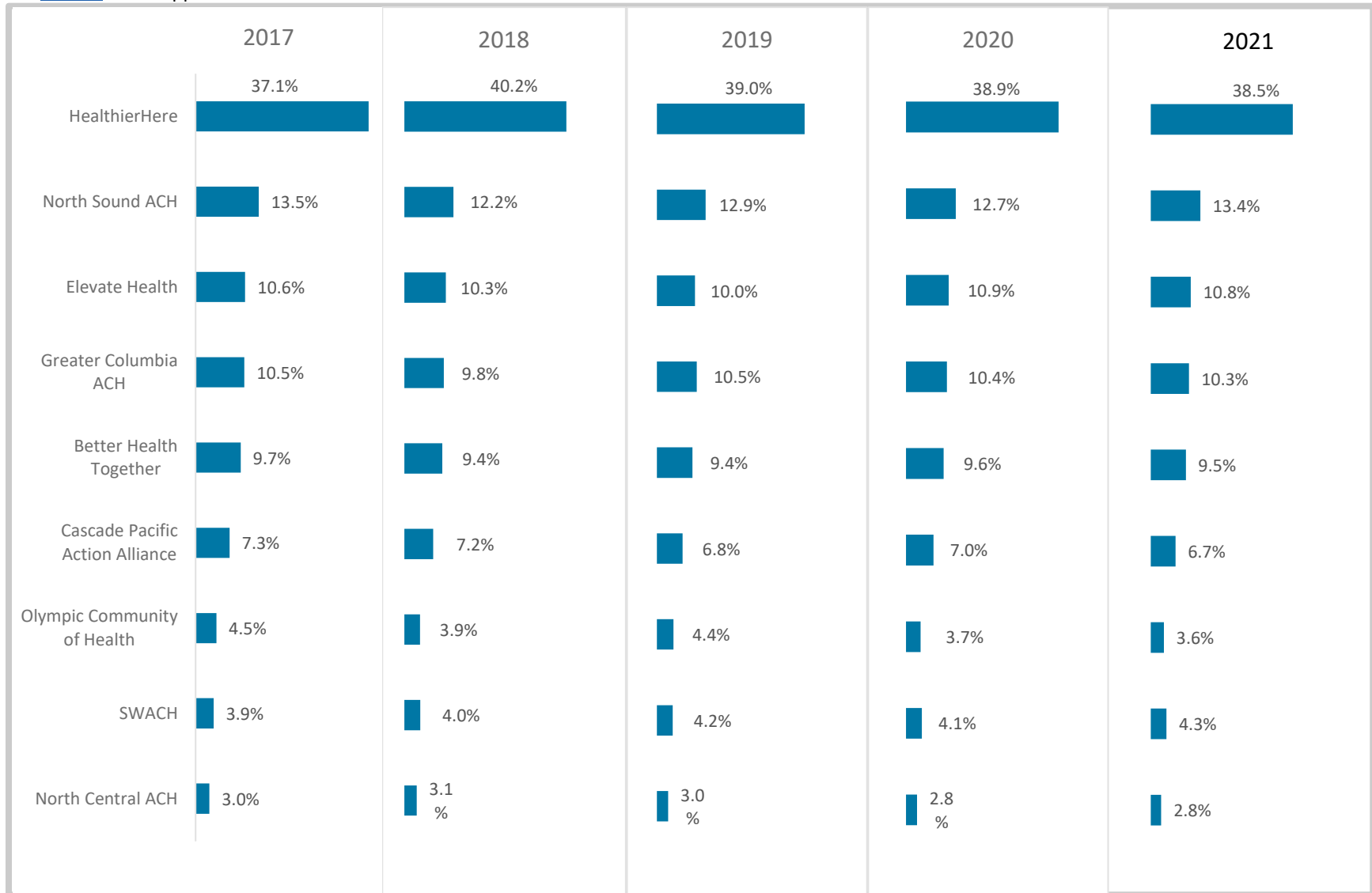
Overall supply

From 2017 to 2021, the distribution of the provider networks' ARNP supply among the Accountable Communities of Health remained relatively the same. The HealthierHere ACH had the largest share of more the one-third of the total ARNPs. On the lower end, Olympic Accountable Community Health, SWACH and North Central ACH each had a share less than 5% of the total. In the remaining ACHs, the share ranged from 7% to 14%. (Figure 13)

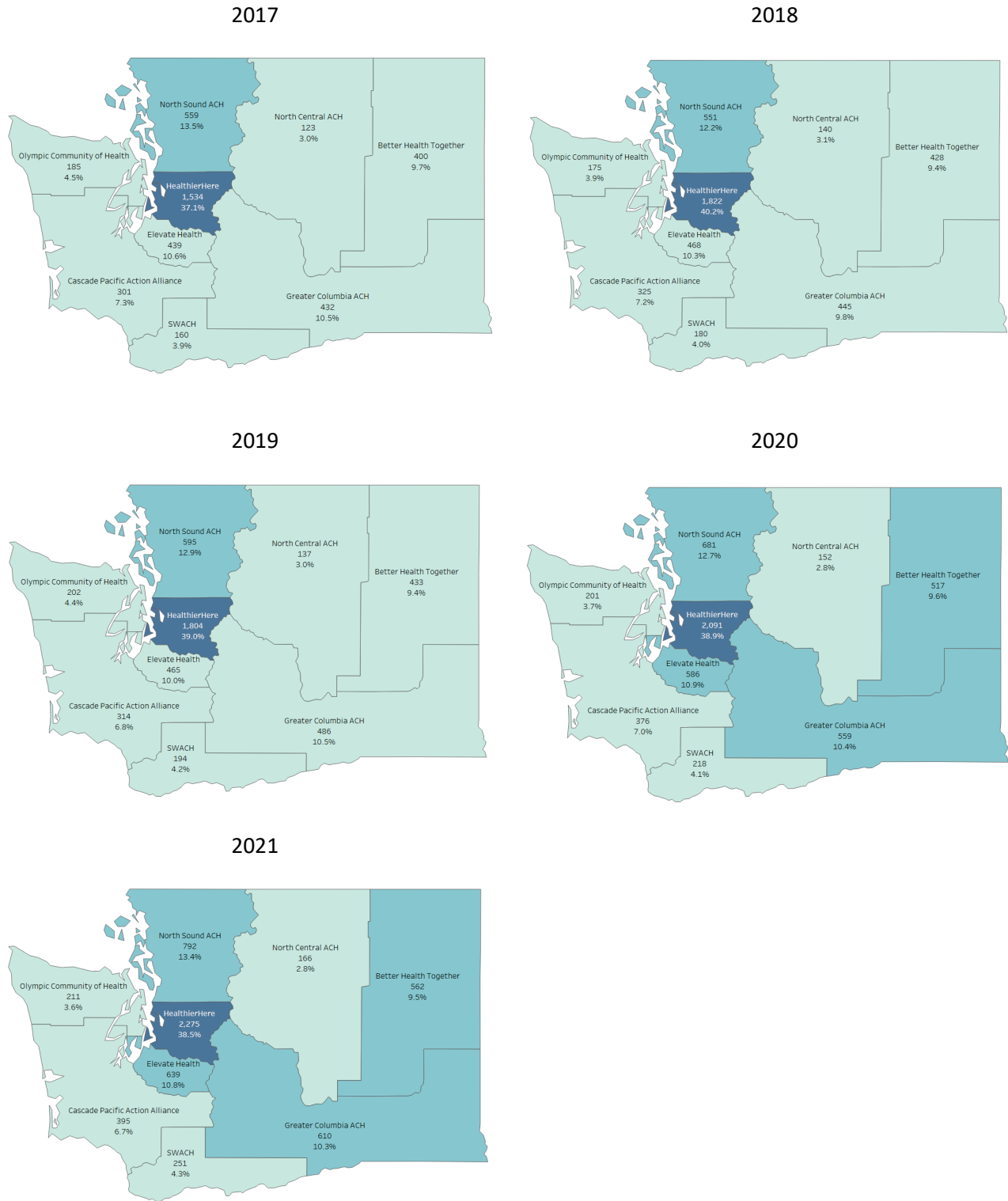
⁶ See <https://www.hca.wa.gov/assets/program/achfactsheet.pdf>.

Figure 13. Share of state total ARNP supply in provider networks: ACHs, 2017-21
(sorted by 2017 distribution)

See [Table 5](#) in the appendix for an accessible version of this data.



Map 7. Number and percent of ARNPs in provider networks: ACHs, 2017-21
 See [Table 5](#) in the appendix for an accessible version of this data.

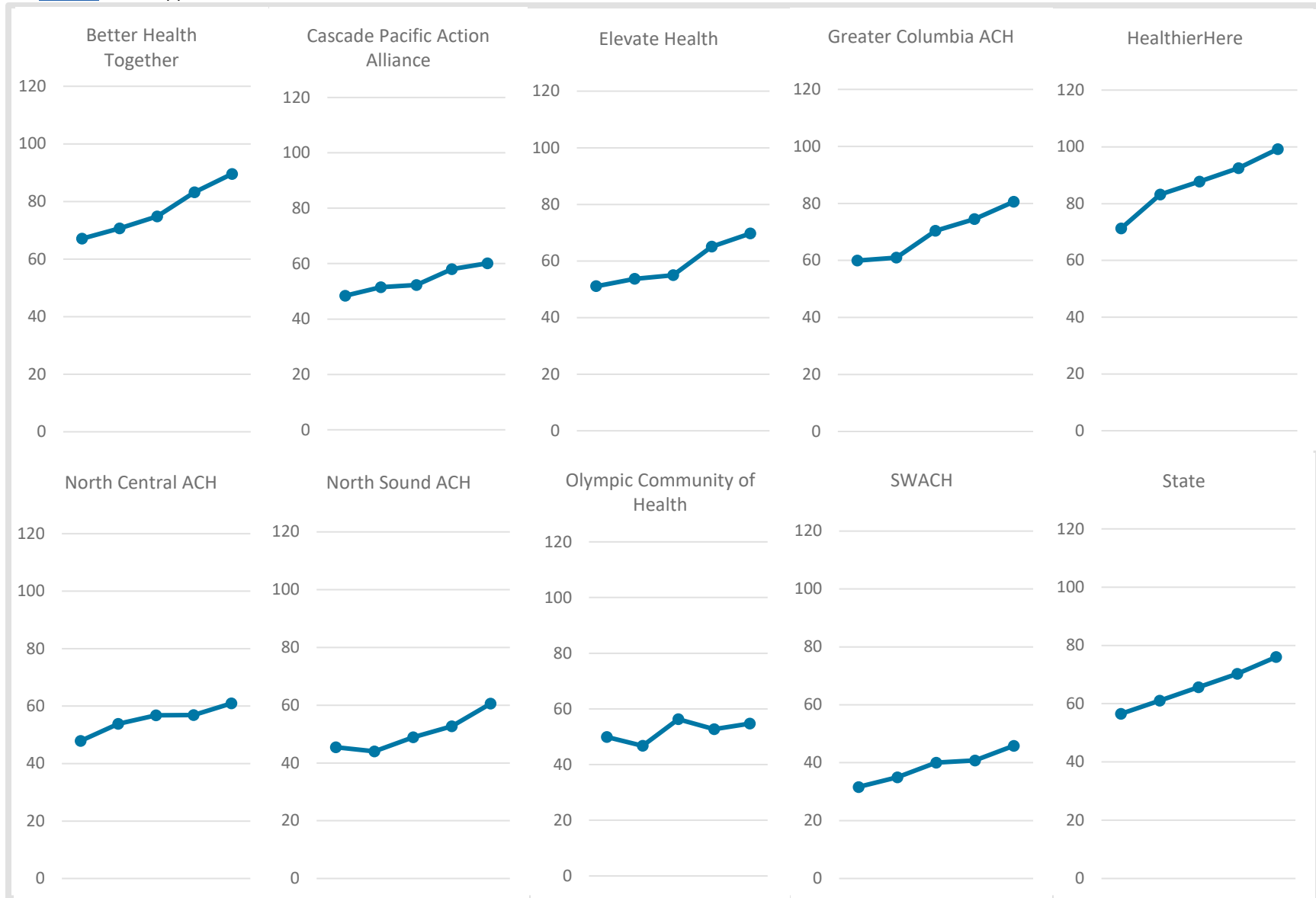


Number of overall ARNPs per 100,000 population

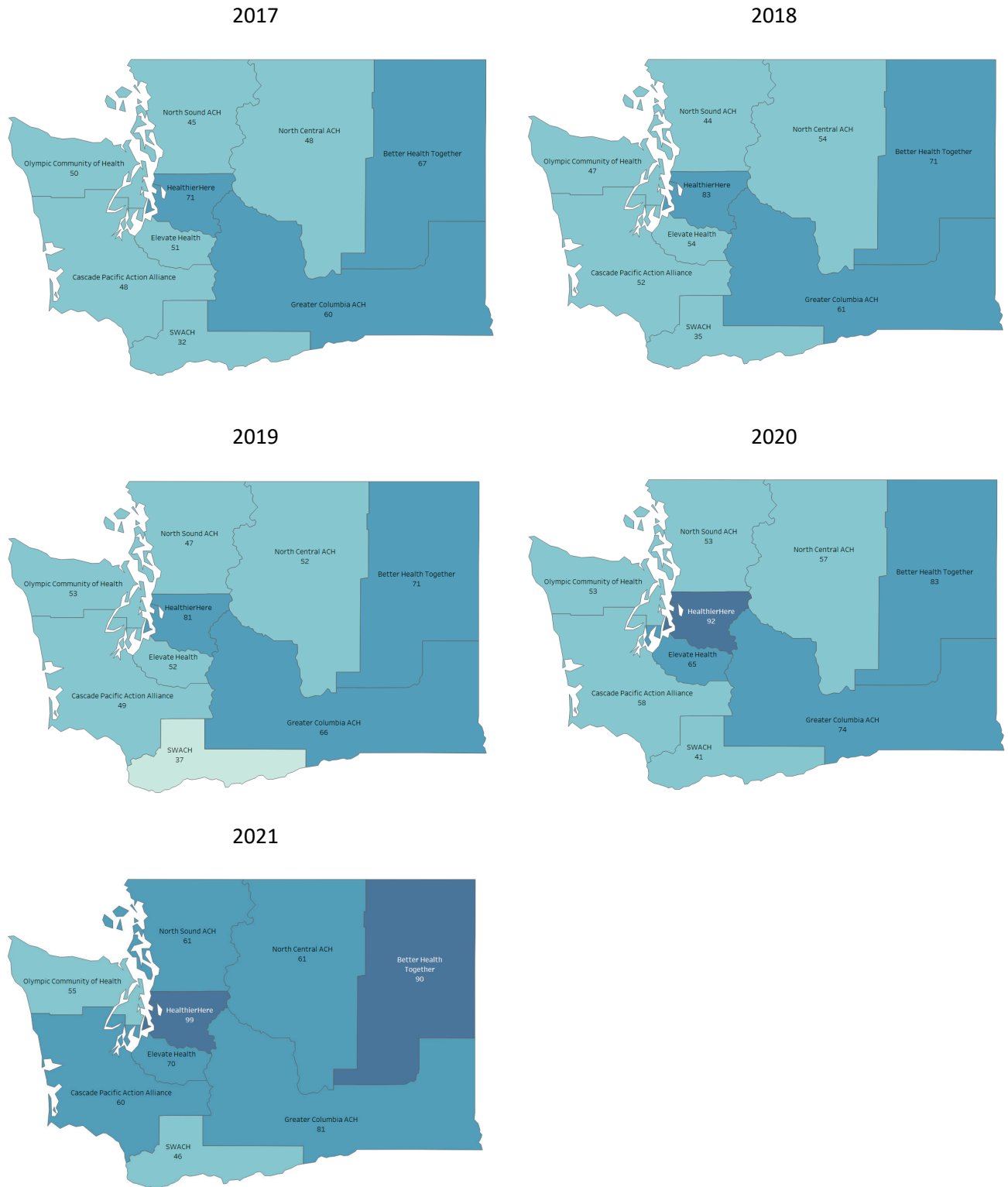
The number of overall ARNPs per 100,000 population in the provider networks increased in all nine ACHs from 2017 to 2021. The increase of 28 ARNPs in HealthierHere was largest, from 71 to 99 per 100,000 population. The Olympic Community of Health had the smallest net increase of five from 50 to 55 ARNPs per 100,000 population, with small ups and downs between 2017 and 2021. HealthierHere was also the ACH with the highest rate of ARNPs in five years between 2017 and 2021. SWACH's rate was the lowest in all five years. Even its highest rate of 46 ARNPs in 2021 was lower than the lowest rates of all ACHs in all five years (except North Sound ACH in 2017).

The low rates of ARNPs in SWACH most likely reflect that many residents in SWACH seek medical care in the greater Portland, Oregon area. Health care providers in Oregon who provided services to Washington residents were not accounted for in our analysis. (Figure 14)

Figure 14. Number of overall ARNPs in provider networks per 100,000 population: ACHs, 2017-21
 See [Table 6](#) in the appendix for an accessible version of this data.



Map 8. Number of overall ARNPs in provider networks per 100,000 population: ACHs, 2017-21
 See [Table 6](#) in the appendix for an accessible version of this data

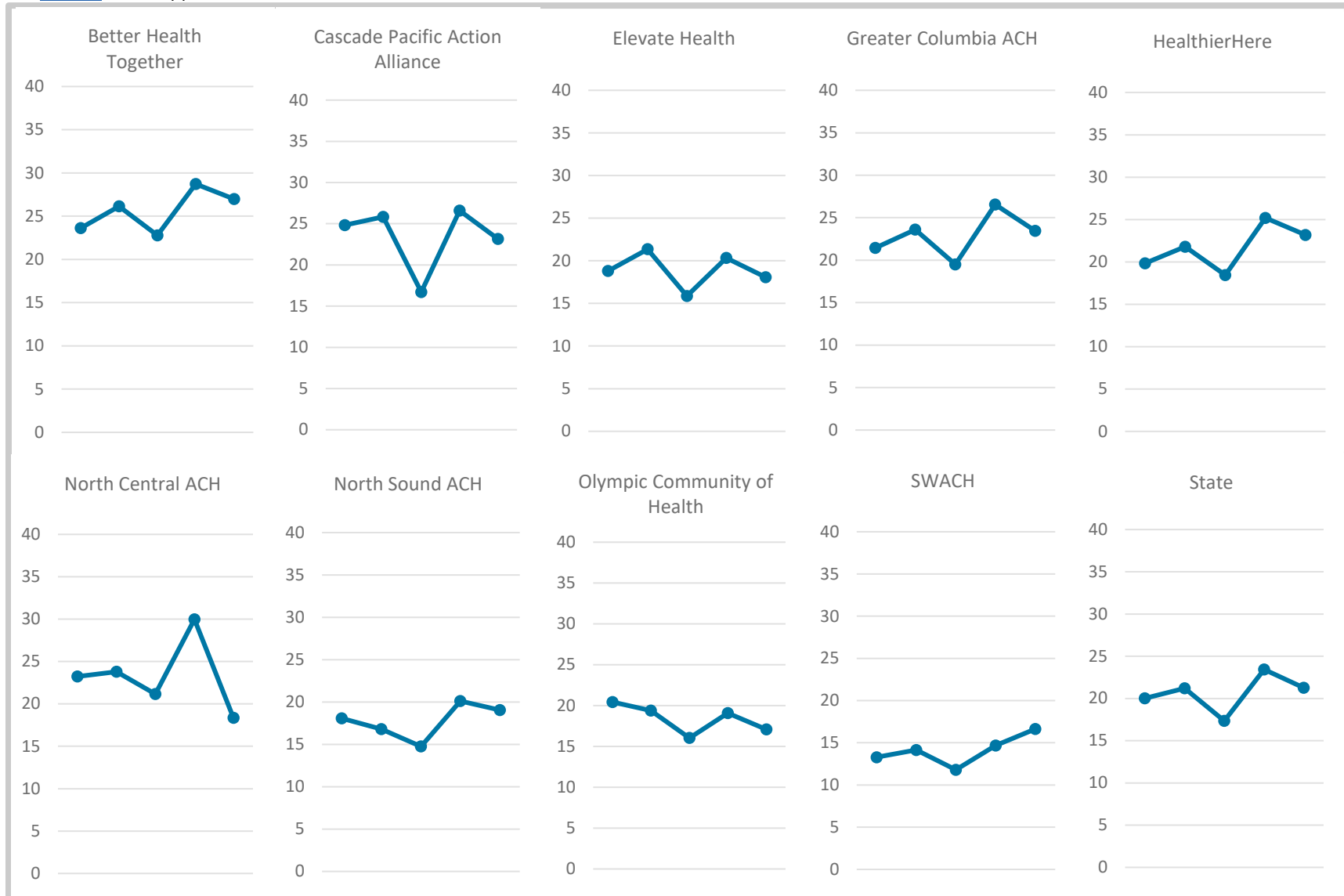


Number of primary care ARNPs per 100,000 population

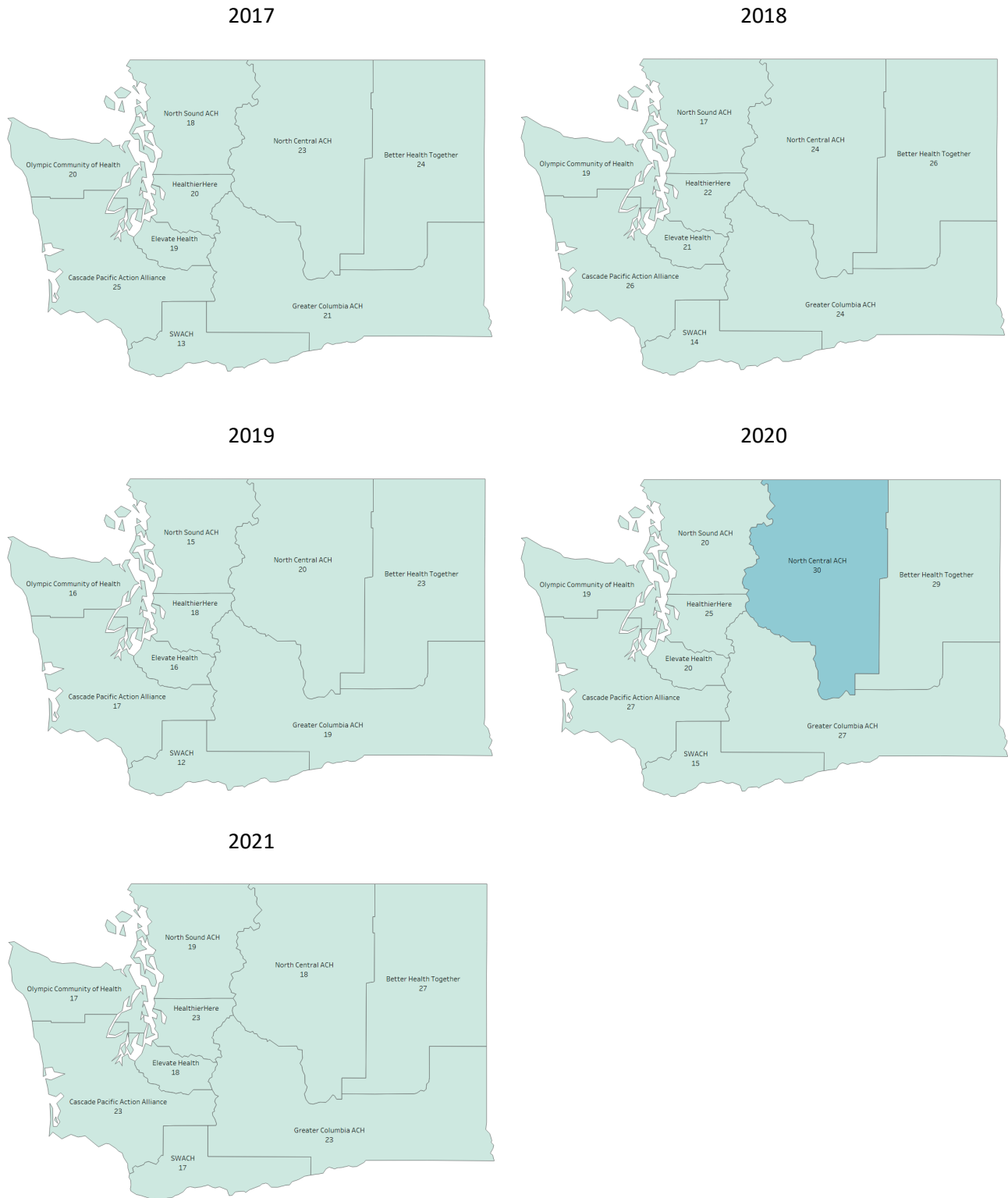
The number of the provider networks' primary care ARNPs per 100,000 population was below 30 for the ACHs in all five years between 2017 and 2021. The primary care ARNP rates in all nine ACHs went through ups and downs during the five years with the rates in 2021 being higher in some ACHs and lower in other ACHs than their respective rates in 2017. While patterns of ups and downs during the five years were not the same with all nine ACHs, all ACHs experienced a decline from 2018 to 2019 and then an increase from 2019 to 2020.

Better Health Together had the highest rates of primary care ARNPs in every year except in 2017. SWACH had the lowest rates in all five years. Again, SWACH's low rates were most likely due to reduced need for providers practicing in SWACH as some of the ACH's residents sought care across the state border to the greater Portland, Oregon area. (Figure 15)

Figure 15. Number of primary care ARNPs in provider networks per 100,000 population: ACHs, 2017-21
 See [Table 6](#) in the appendix for an accessible version of this data



Map 9. Number of primary care ARNPs in provider networks per 100,000 population: ACHs, 2017-21
 See [Table 6](#) in the appendix for an accessible version of this data.

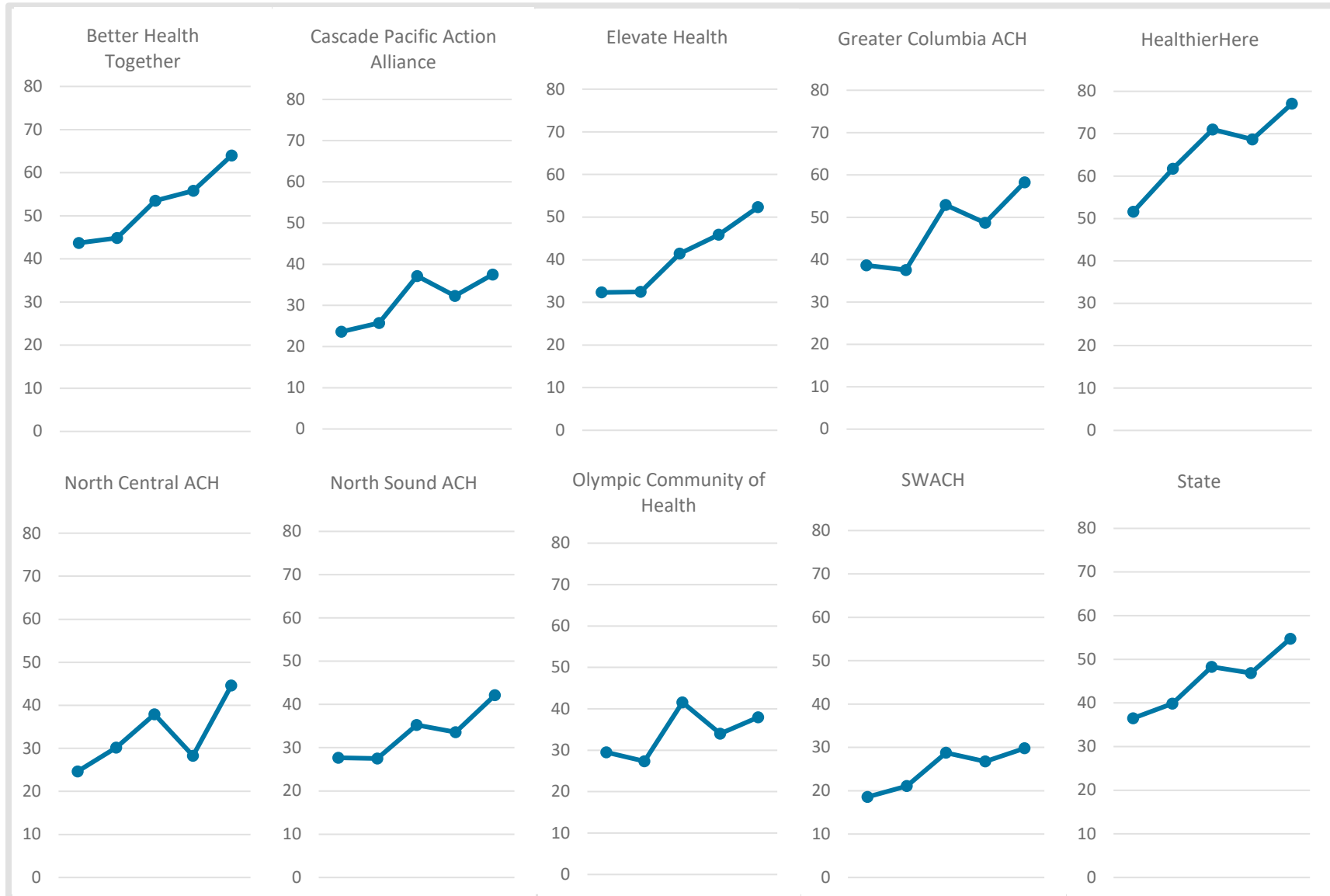


Number of specialist care ARNPs per 100,000 population

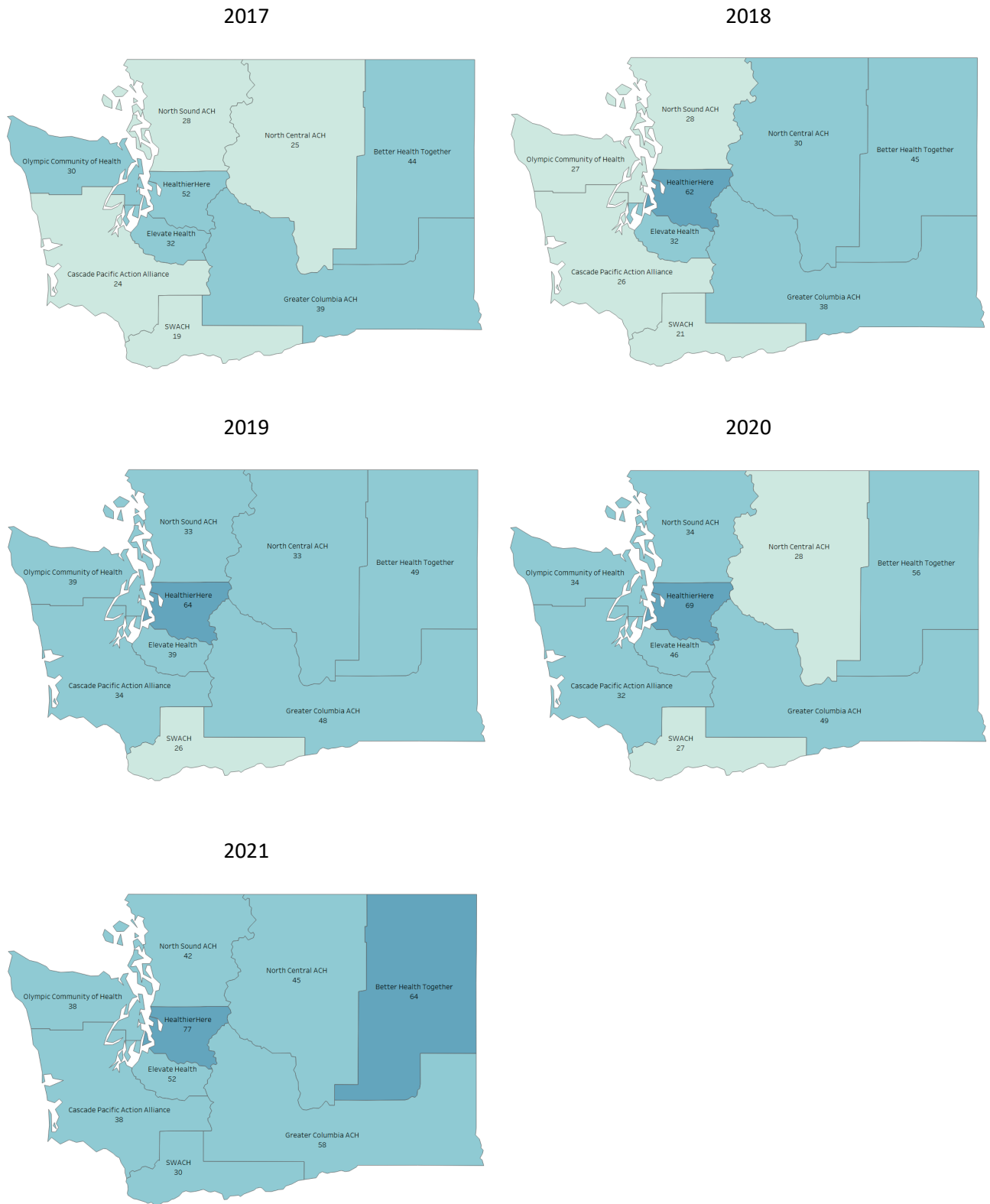
The rates of the provider networks' specialist care ARNPs per 100,000 population varied a great deal among the ACHs. Representing the opposite ends of the variations were the rates of HealthierHere and SWACH. HealthierHere had the highest rates while SWACH had the lowest rates in all five years from 2017 and 2021.

Both ACHs, as the other ACHs, had a net increase in specialist care ARNP rates from 2017 to 2021. HealthierHere's rate increased from 52 to 77 per 100,000 while SWACH's rate increased from 19 to 30 per 100,000. We believe the low rate in SWACH is associated with health services provided in greater Portland area to SWACH's residents. The services in the greater Portland area reduced the need for SWACH-based providers. HealthierHere and Better Health Together were the two ACHs, which had higher than the state average rates of specialist care ARNPs in all five years. In remaining ACHs, the specialist care ARNP rates were lower than the state average in nearly all five years between 2017 and 2021. (Figure 16)

Figure 16. Number of specialist care ARNPs in provider networks per 100,000 population: ACHs, 2017-21
 See [Table 6](#) in the appendix for an accessible version of this data.



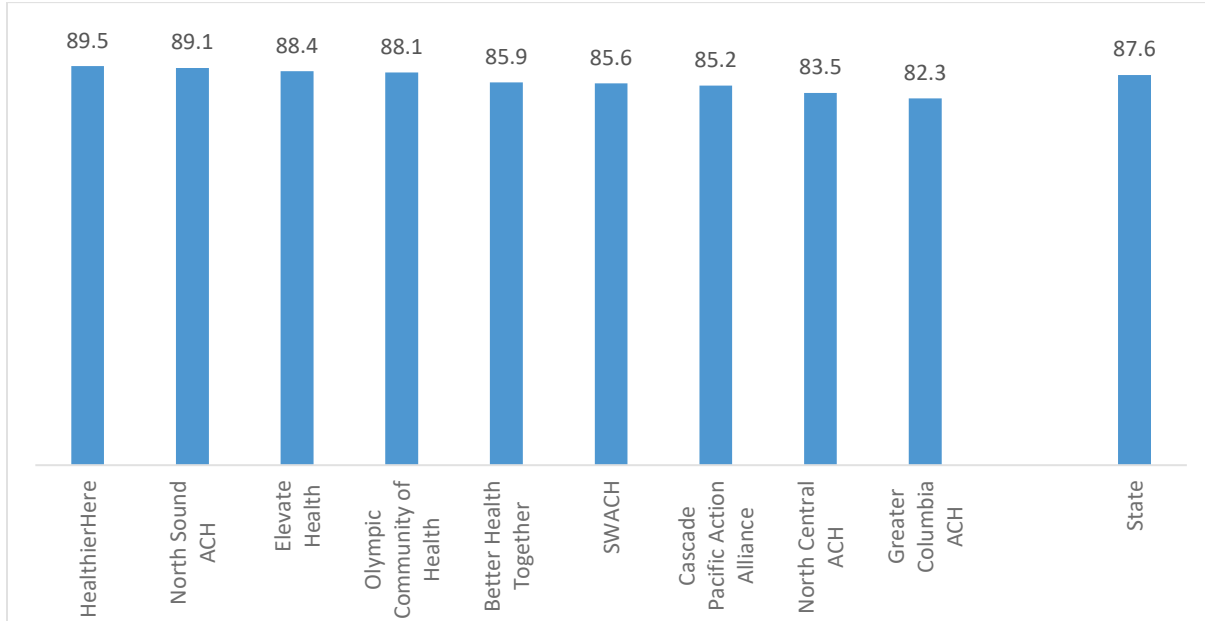
Map 10. Number of specialist care ARNPs in provider networks per 100,000 population: ACHs, 2017-21
 See [Table 6](#) in the appendix for an accessible version of this data



Percentage of female ARNPs

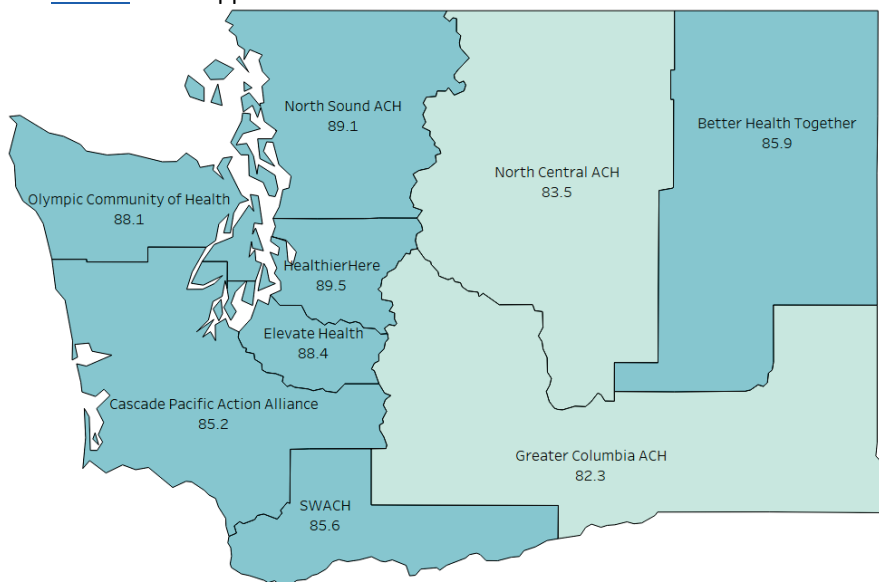
The average percentage of female ARNPs for 2017-21 in the provider networks was in the 80s in all ACHs. The individual ACHs' 5-year average shares of female ARNPs had a relatively small range, from 82.3% in Greater Columbia ACH to 89.5% in HealthierHere. Four of the nine ACHs had a share of female ARNPs above the state average of 87.6%. All four of these ACHs are located next to Puget Sound. Estimates in Table 7 in the Appendix show that in all ACHs except Greater Columbia ACH, the share of female ARNPs declined from 2017 to 2021. (Figure 17)

Figure 17. Average percentage of female ARNPs in provider networks: ACHs, 2017-21



Map 11. Average percentage of female ARNPs in provider networks: ACHs, 2017-21

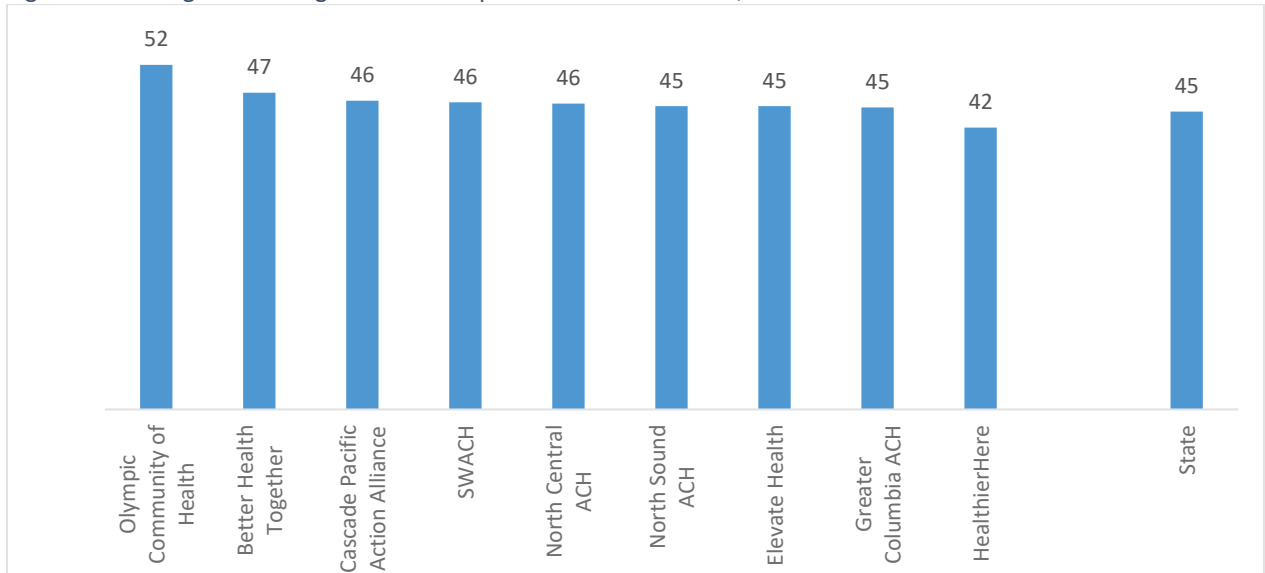
See [Table 7](#) in the appendix for an accessible version of this data



Median age of ARNPs

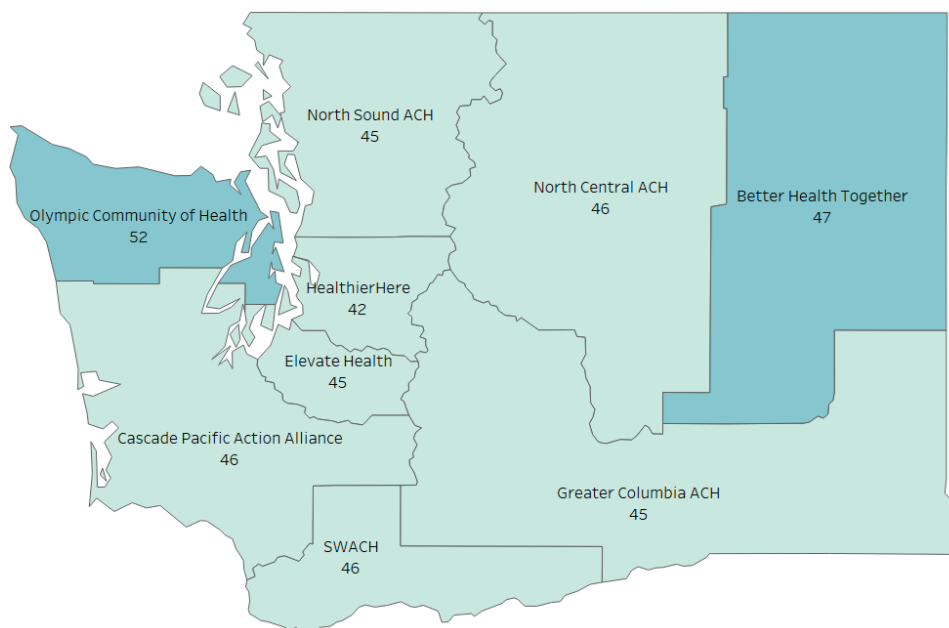
The average 5-year median age of ARNPs in the provider networks ranged from 42 years in HealthierHere to 52 years in Olympic Community of Health. HealthierHere had the youngest ARNP workforce because it was the only ACH where the average ARNP median age was below the statewide ARNP average of 45 years. The median age of ARNPs declined in all ACHs from 2017 to 2021 except for North Central ACH in which the ARNPs' median remained unchanged at 46 years, according to data in Table 7 in Appendix. (Figure 18)

Figure 18. Average median age of ARNPs in provider network: ACHs, 2017-21



Map 12. Average median age of ARNPs in provider network: ACHs, 2017-21

See [Table 7](#) in the appendix for an accessible version of this data



Data Sources and Method

Data Sources

Network Access Report. Health insurance companies conducting business in Washington must file a monthly Network Access Report (NAR) to the Office of the Insurance Commissioner. 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, Washington state's NARs discontinued the previous provider specialty categories and replaced them with Health Care Provider Taxonomy code 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 & Provider Enumeration System (NPPES), created by the federal Centers for Medicare and Medicaid Services (CMS). The NPI is a 10-digit unique number assigned to an individual or organizational provider in the U.S. 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. We used the public NPI data 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. For advanced registered nurse practitioners (ARNPs), renewal is 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 can be searched as public information on the department's website. However, for this study, we used an extract file from the license database.

Method

a. Processing the June Network Access Reports for 2017-21

The NARs for June 2017-21 were downloaded from OIC's website. Once all insurance companies' reports were collected, the reports were combined by year and each year's data were processed separately. The NARs are structured in such a way that there are five blocks of rows of data. 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 the next step was to "rectangularize" the data records by transforming the blocks of data rows into blocks of data columns so that each row is a record for an individual provider. The final step was to remove non-ARNP records and retain only ARNP records.

b. Matching ARNP records from the Network Access Reports with records in the National Provider Identifier registry and the DOH provider license database

We then matched processed ARNP 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 health insurance carriers also use it for all health services they provide. 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 ARNP's credential number. In this step, we only retained matched records with non-expired licenses as of June of the selected year.

c. Provider specialty (primary care/specialist care)

Unlike the taxonomy used for physicians, the taxonomy for ARNP in the NARs did not identify the provider's specialty area. Instead, the prevailing taxonomy codes for ARNPs were 363LF0000X or 363L00000X ("Nurse Practitioners"). That's why we did not include 'ARNP specialty' in this report. This report does, however, contain estimates for primary care ARNPs and specialist care ARNPs. The primary/specialist care status was assigned by the health insurance carriers in their NARs. The designation of primary/specialist care ARNPs in this report differs from the designation we used in our report for physician supply, where we used physicians' taxonomy codes to determine primary care and specialist care statuses.

d. 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, practice geo-coordinates and practice name. In addition, a small number of records that had missing data on the state of the practice location, ARNP's last name or NPI were excluded from the final selection.

e. Constructing ARNP record weights

The processed NAR data included multiple records for some ARNPs who had multiple practice locations. ARNP supply analyses in this study required counting each ARNP as no more than one person. To meet this requirement while remembering that an ARNP may practice at multiple locations, we constructed data weights and applied the weights to the ARNP records. Below is a description of the weight construction.

Initial weight. Each ARNP was assigned the weight of 1 initially.

ZIP Code level weight. After the construction of initial weights, the next step was to redistribute initial weights to a ARNP's records for different ZIP codes. To construct the ZIP code level weight, we first counted the number of ZIP codes associated with an ARNP. We then summed up the populations of the associated ZIP codes.⁷ Then 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 an ARNP.

For example, suppose an ARNP was associated with three ZIP codes that accounted for 70%, 20% and 10% of the total population of the three combined ZIP codes. The ZIP code with 70% of the population would receive 0.7 of the initial weight, the 20% ZIP code would receive a weight of 0.2 and the 10-percent ZIP would receive a weight of 0.1.

⁷ 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.

In some cases, an ARNP 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. Extending the ARNP example above, suppose the ARNP was associated with three locations in the 70% ZIP code area. Then the final weight for each location record for this ZIP code associated with this physician would be 0.2333 ($0.7/3$).

From this process, the sum of weights of all records associated with an ARNP should equal 1 and the sum of weights of all ARNPs should equal the unique count of ARNPs without the weights. The ZIP code level weights can be used for analyses involving a single ZIP code, clusters of ZIP codes and the state.

County level weight. For county-level analyses, we needed an additional step to further distribute the ARNP record weight at the ZIP code-level for ZIP codes that cross county boundaries. We decided to use a county's fraction of that ZIP code's population as the county's fraction of the weight for that ZIP code.

Using the same ARNP 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 ARNP record weight of 0.2 is redistributed into 0.14 ($0.2*0.7$) to County A and 0.06 ($0.2*0.3$) 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 an ARNP should sum to 1 and the sum of weights of all ARNPs should equal the unique count of ARNPs without weights. The county-level weights can be used for analyses for counties, regions consisting of counties and the state.

f. Definitions

ARNP count: The weighting of ARNP records takes into consideration that an ARNP may practice at multiple locations. This weighting essentially assumes each ARNP identified in the NARs as working 100% full time equivalency (FTE). The ARNP's "FTE" is distributed into practice locations in different ZIP code areas and into different counties when a ZIP code area crosses county boundaries. Therefore, one ARNP FTE in a specific area can sometimes mean several ARNPs each contributing a fraction to the FTE. The ARNP count then is a sum of the total fractions.

ARNP rate: For this study, the ARNP rate is calculated as number of ARNPs per 100,000 population for the state, counties or Accountable Communities of Health (each consisting of one or more counties).

g. Limitations

The Network Access Report is the main data source for ARNP supply estimates in this study, which mean by default the ARNPs included in this study are those who practice in provider networks. ARNPs who practice outside the provider networks are therefore not included. Often, those are provider who practice as solo practitioners, in small practice groups or as public employees in federal or state institutions exclusively (e.g., [VA](#) hospitals, military hospitals and state hospitals).

One possible error in the data may result in overestimate of ARNPs in provider networks. This error occurs when insurance companies failed to promptly remove records from NARs for providers who no longer practice in Washington (due to retirement, moving to another state, switching to a practice setting outside the provider networks, for example), although they maintain a Washington state license.

Another potential error is related to the weighting method we used. As you remember, when constructing the ZIP code level weights for the records, if an ARNP had practice locations in multiple ZIP code areas, we split the initial record weight based on each ZIP code area's population fraction of the total population from all ZIP code areas in question. Or, similarly, in constructing county-level weight, if an ARNP record had a ZIP code area that crosses county boundaries, we assigned the county's fraction of the ZIP code level weight based on each county's population fraction of the ZIP code area's total population. We believe these record weighting techniques offered a better geographic representation of the ARNPs than commonly used techniques of provider supply estimation that do not consider a provider's multiple practice locations. However, the degree of improvement in estimate precision from our weighting schemes remains unknown.

Another limitation, though not necessarily a source of error, is that this study's method does not consider ARNPs in bordering states who 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 ARNP services in the Portland area. That means the actual ARNP supply in Washington's provider networks could have been larger than we estimated in this report if we had included the ARNPs in neighboring states that serve Washington residents.

Appendixes – data tables

Table 1. Provider network ARNP supply and characteristics: Washington, 2017-21

	2017	2018	2019	2020	2021
Total licenses	8,005	8,445	9,322	10,216	11,476
Number and percent of ARNPs providing direct care in Washington	4,130 (51.6%)	4,533 (53.7%)	4,951 (53.1%)	5,380 (52.7%)	5,902 (51.4%)
Number of ARNPs per 100,000 Population	56	61	66	70	76
Primary care ARNPs					
Number	1462	1574	1309	1793	1652
Per 100,000 Population	20	21	17	23	21
Percent	35.4%	34.7%	26.4%	33.3%	28.0%
Specialist care ARNPs					
Number	2,668	2,959	3,642	3,587	4,250
Per 100,000 Population	36	40	48	47	55
Percent	65%	65%	74%	67%	72%
Percent of Women in					
Total ARNPs	88.2%	88.0%	87.5%	87.3%	87.0%
Primary care ARNPs	88.6%	88.7%	87.8%	87.9%	87.6%
Specialist care ARNPs	87.9%	87.6%	87.4%	86.9%	86.8%
Median Age					
Total ARNPs	46	45	44	44	44
Primary care ARNPs	44	45	43	43	43
Specialist care ARNPs	47	45	44	44	44
Median Age of Men					
Total ARNPs	45	44	43	43	43
Primary care ARNPs	45	44	44	42	43
Specialist care ARNPs	45	44	43	43	43
Median Age of Women					
Total ARNPs	46	45	44	44	44
Primary care ARNPs	44	43	43	43	43
Specialist care ARNPs	47	45	45	44	44

Table 2. Number and percent of ARNPs in provider networks: counties, 2017-21

County	Number of ARNPs					Percent of ARNPs				
	2017	2018	2019	2020	2021	2017	2018	2019	2020	2021
Adams	5	6	7	5	10	0.1%	0.1%	0.1%	0.1%	0.2%
Asotin	12	14	20	25	27	0.3%	0.3%	0.4%	0.5%	0.5%
Benton	162	169	208	226	238	3.9%	3.7%	4.2%	4.2%	4.0%
Chelan	73	75	91	84	93	1.8%	1.7%	1.8%	1.6%	1.6%
Clallam	59	62	65	58	57	1.4%	1.4%	1.3%	1.1%	1.0%
Clark	150	170	201	210	241	3.6%	3.8%	4.1%	3.9%	4.1%
Columbia	1	2	2	2	3	0.0%	0.0%	0.0%	0.0%	0.0%
Cowlitz	57	72	62	65	77	1.4%	1.6%	1.3%	1.2%	1.3%
Douglas	3	3	5	8	6	0.1%	0.1%	0.1%	0.1%	0.1%
Ferry	6	6	6	3	5	0.1%	0.1%	0.1%	0.1%	0.1%
Franklin	17	26	30	31	34	0.4%	0.6%	0.6%	0.6%	0.6%
Garfield	1	2	2	1	1	0.0%	0.0%	0.0%	0.0%	0.0%
Grant	28	44	34	38	41	0.7%	1.0%	0.7%	0.7%	0.7%
Grays Harbor	29	38	33	30	36	0.7%	0.8%	0.7%	0.6%	0.6%
Island	22	18	27	25	28	0.5%	0.4%	0.6%	0.5%	0.5%
Jefferson	16	27	27	23	26	0.4%	0.6%	0.6%	0.4%	0.4%
King	1,534	1,822	1,954	2,091	2,275	37.1%	40.2%	39.5%	38.9%	38.5%
Kitsap	109	86	120	120	128	2.6%	1.9%	2.4%	2.2%	2.2%
Kittitas	25	25	25	26	27	0.6%	0.5%	0.5%	0.5%	0.5%
Klickitat	7	7	6	6	8	0.2%	0.2%	0.1%	0.1%	0.1%
Lewis	64	72	66	64	61	1.6%	1.6%	1.3%	1.2%	1.0%
Lincoln	6	6	7	8	10	0.1%	0.1%	0.1%	0.1%	0.2%
Mason	15	19	20	29	25	0.4%	0.4%	0.4%	0.5%	0.4%
Okanogan	18	18	19	22	26	0.4%	0.4%	0.4%	0.4%	0.4%
Pacific	5	4	5	7	7	0.1%	0.1%	0.1%	0.1%	0.1%
Pend Oreille	2	2	3	2	6	0.1%	0.0%	0.1%	0.0%	0.1%
Pierce	439	468	488	586	639	10.6%	10.3%	9.9%	10.9%	10.8%
San Juan	7	8	7	2	2	0.2%	0.2%	0.1%	0.0%	0.0%
Skagit	80	88	101	96	96	1.9%	1.9%	2.0%	1.8%	1.6%
Skamania	2	2	2	2	2	0.1%	0.0%	0.0%	0.0%	0.0%
Snohomish	338	324	364	417	534	8.2%	7.1%	7.4%	7.7%	9.1%
Spokane	366	394	422	479	515	8.8%	8.7%	8.5%	8.9%	8.7%
Stevens	15	13	15	20	16	0.4%	0.3%	0.3%	0.4%	0.3%
Thurston	131	119	141	182	188	3.2%	2.6%	2.8%	3.4%	3.2%
Wahkiakum	1	1	7	0	0	0.0%	0.0%	0.1%	0.0%	0.0%
Walla Walla	46	42	50	48	57	1.1%	0.9%	1.0%	0.9%	1.0%
Whatcom	112	114	125	141	132	2.7%	2.5%	2.5%	2.6%	2.2%
Whitman	18	17	22	26	28	0.4%	0.4%	0.4%	0.5%	0.5%
Yakima	148	148	163	175	194	3.6%	3.3%	3.3%	3.2%	3.3%
Total	4,131	4,533	4,951	5,381	5,903	100%	100%	100%	100%	100%

Table 3. Number of ARNPs per 100,000 population in provider networks – total, primary care and specialist care: counties, 2017-21

County	Total ARNPs					Primary Care ARNPs					Specialist ARNPs				
	2017	2018	2019	2020	2021	2017	2018	2019	2020	2021	2017	2018	2019	2020	2021
Adams	25	28	27	26	47	16		17		29				18	
Asotin	55	64	82	110	119	29	26	16	25	35	27	38	66	84	84
Benton	84	86	97	110	114	23	23	19	27	22	60	62	78	83	92
Chelan	96	96	107	105	113	42	42	39	60	33	53	54	68	45	80
Clallam	80	82	79	75	73	35	35	22	28	28	45	47	56	48	45
Clark	32	36	39	42	47	13	14	12	15	17	19	22	26	27	30
Columbia															
Cowlitz	54	67	51	59	69	32	41	18	23	30	22	26	33	35	39
Douglas	8		12	18	14								11	16	12
Ferry	78	81	71	42	66	61	67		39	51			46		
Franklin	19	28	31	32	34	10	13	14	14	13	9	15	18	18	21
Garfield															
Grant	30	45	33	38	40	16	17	14	15	12	14	29	19	22	28
Grays Harbor	39	52	45	40	47	23	29	19	25	27	16	22	25	15	20
Island	27	22	31	30	33	13	11	15	13	13	14	11	16	17	20
Jefferson	52	85	82	72	81	20	35	25	26	15	32	51	57	46	66
King	71	83	81	92	99	20	22	18	25	23	51	61	63	67	76
Kitsap	41	32	43	44	47	16	13	13	16	14	25	19	30	28	32
Kittitas	57	54	53	54	58	23	23	21	26	21	34	32	32	28	37
Klickitat	32	33	18	27	35	22	20		13	14				14	21
Lewis	83	91	74	80	75	51	46	30	39	31	32	45	44	41	44
Lincoln	55	56	67	73	91	36	40	60	55	57					34
Mason	23	30	30	44	38	11	18	13	21	12	12	12	17	23	27
Okanogan	42	43	35	52	60	23	26	15	37	22	19	17	20	15	38
Pacific	24	21	25	33	33				22	17					16
Pend Oreille					44					24					
Pierce	51	54	52	65	70	19	21	16	20	18	32	32	36	45	52
San Juan	45	45	39								32	30	30		
Skagit	64	70	74	74	73	23	24	20	28	28	41	45	54	46	45
Skamania															
Snohomish	43	40	42	50	63	16	15	14	19	18	26	25	28	31	45
Spokane	73	78	77	92	98	23	27	23	29	27	50	51	54	62	71
Stevens	34	29	33	43	35	24	21	17	27	16	9	8	15	15	19
Thurston	47	42	47	62	64	19	17	13	27	21	28	26	34	36	43
Wahkiakum			166										166		
Walla Walla	75	68	69	77	92	25	29	33	36	34	50	39	35	41	58
Whatcom	52	52	54	62	58	24	20	15	22	20	28	32	39	39	38
Whitman	37	35	42	51	58	14	12	11	17	19	23	23	31	33	38
Yakima	58	58	59	68	74	24	28	20	31	26	35	30	39	37	48
State	57	61	61	70	76	20	21	17	23	21	36	40	44	47	55

Table 4. Percentage of women and median age of ARNPs in provider networks: counties, 2017-21

County	Percentage of Female NPs						Median Age					
	2017	2018	2019	2020	2021	5-year Average	2017	2018	2019	2020	2021	5-year Average
Franklin	80.9	82.4	84.1	77.9	90.5	83.2	55	55	56	55	56	55
Okanogan	93.1	86.7	83.0	80.5	77.1	84.1	56	57	51	46	52	52
Stevens	84.2	86.8	89.0	78.2	83.3	84.3	44	45	44	45	46	45
Kitsap	89.1	86.3	86.0	85.7	86.9	86.8	48	47	46	46	46	47
Walla Walla	82.4	83.2	84.6	85.3	80.5	83.2	60	48	44	45	46	49
Snohomish	89.2	90.8	89.5	89.1	86.7	89.1	45	45	44	42	41	43
San Juan	100.0	100.0	100.0	*	*	*	*	*	*	*	*	*
King	89.8	89.7	89.9	89.3	89.0	89.5	44	45	46	49	48	46
Spokane	86.7	85.6	85.0	85.7	86.3	85.9	48	46	45	44	44	45
Douglas	96.4	*	87.0	89.5	86.5	*	42	*	46	48	48	*
Grant	79.8	76.0	69.3	65.1	65.8	71.2	48	47	46	45	44	46
Pend Oreille	*	*	*	*	80.7	*	*	*	*	*	*	*
Ferry	94.3	93.5	71.9	62.2	72.5	78.9	49	50	51	50	49	50
Cowlitz	87.3	83.7	82.5	83.9	78.3	83.1	43	42	42	42	42	42
Clallam	89.7	89.7	93.3	94.9	93.0	92.1	49	50	48	52	50	50
Lincoln	82.4	82.1	99.2	99.6	89.9	90.6	57	58	51	52	53	54
Island	89.4	88.2	92.2	93.9	96.5	92.0	46	45	44	44	44	45
Yakima	83.2	83.9	86.1	85.6	85.7	84.9	45	54	64	58	49	54
Grays Harbor	85.9	85.5	84.0	82.3	74.5	82.5	53	49	48	44	45	48
Benton	77.9	78.8	77.6	79.9	80.5	78.9	49	46	48	49	45	47
Whitman	93.2	93.1	89.3	79.8	87.2	88.5	40	42	40	41	45	42
Columbia	*	*	*	*	*	*	*	*	*	*	52	*
Lewis	83.2	83.7	75.8	77.9	81.8	80.5	42	42	43	43	45	43
Pacific	60.1	77.3	81.5	86.2	100.0	81.0	59	52	50	52	47	52
Garfield	*	*	*	*	*	*	63	54	65	*	*	*
Asotin	83.8	72.3	75.3	71.8	70.2	74.7	50	47	47	48	44	47
Kittitas	87.8	88.7	86.6	90.2	86.1	87.9	45	45	46	46	44	45
Adams	100.0	100.0	100.0	100.0	89.6	97.9	61	62	60	61	62	61
Thurston	88.0	89.0	90.2	88.6	88.8	88.9	54	52	50	40	44	48
Skamania	*	*	*	*	*	*	*	*	*	*	*	*
Chelan	89.0	87.4	88.6	88.9	88.4	88.4	45	45	45	45	47	45
Jefferson	80.7	84.3	84.3	85.9	86.0	84.2	49	48	48	46	44	47
Clark	87.5	87.5	82.5	85.9	85.0	85.7	58	59	60	61	52	58
Mason	77.0	81.8	84.4	90.0	90.1	84.7	49	49	48	48	49	49
Wahkiakum	*	*	67.3	*	*	*	*	*	48	*	*	*
Klickitat	84.7	83.7	79.4	75.6	78.4	80.4	43	43	44	45	45	44
Whatcom	91.8	90.5	88.7	89.6	90.5	90.2	49	48	45	45	46	47
Pierce	90.2	90.0	88.5	86.9	86.5	88.4	49	45	45	47	47	47
Skagit	85.4	84.3	86.7	87.6	90.4	86.9	48	47	47	46	46	47
State	88.2	88.0	87.5	87.3	87.0	87.6	46	45	44	44	44	45

*The underlying number is too small for this calculation.

Table 5. Number and percent of ARNPs in provider networks: ACHs, 2017-21

ACH	Number of ARNPs					Percent of ARNPs				
	2017	2018	2019	2020	2021	2017	2018	2019	2020	2021
HealthierHere	1,534	1,822	1,804	2,091	2,275	37.1%	40.2%	39.0%	38.9%	38.5%
North Sound ACH	559	551	595	681	792	13.5%	12.2%	12.9%	12.7%	13.4%
Elevate Health	439	468	465	586	639	10.6%	10.3%	10.0%	10.9%	10.8%
Greater Columbia ACH	432	445	486	559	610	10.5%	9.8%	10.5%	10.4%	10.3%
Better Health Together	400	428	433	517	562	9.7%	9.4%	9.4%	9.6%	9.5%
Cascade Pacific Action Alliance	301	325	314	376	395	7.3%	7.2%	6.8%	7.0%	6.7%
Olympic Community of Health	185	175	202	201	211	4.5%	3.9%	4.4%	3.7%	3.6%
SWACH	160	180	194	218	251	3.9%	4.0%	4.2%	4.1%	4.3%
North Central ACH	123	140	137	152	166	3.0%	3.1%	3.0%	2.8%	2.8%
Total	4,131	4,533	4,630	5,381	5,903	100%	100%	100%	100%	100%

Table 6. Number of ARNPs per 100,000 population in provider networks – total, primary care and specialist care: ACHs, 2017-21

ACH	Total ARNPs					Primary care ARNPs					Specialist care ARNPs				
	'17	'18	'19	'20	'21	'17	'18	'19	'20	'21	'17	'18	'19	'20	'21
Better Health Together	67	71	75	83	90	24	26	23	29	27	44	45	53	56	64
Cascade Pacific Action Alliance	48	52	52	58	60	25	26	17	27	23	24	26	37	32	38
Elevate Health	51	54	55	65	70	19	21	16	20	18	32	32	41	46	52
Greater Columbia ACH	60	61	70	74	81	21	24	20	27	23	39	38	53	49	58
HealthierHere	71	83	88	92	99	20	22	18	25	23	52	62	71	69	77
North Central ACH	48	54	57	57	61	23	24	21	30	18	25	30	38	28	45
North Sound ACH	45	44	49	53	61	18	17	15	20	19	28	28	35	34	42
Olympic Community of Health	50	47	56	53	55	20	19	16	19	17	30	27	42	34	38
SWACH	32	35	40	41	46	13	14	12	15	17	19	21	29	27	30
State	57	61	66	70	76	20	21	17	23	21	36	40	48	47	55

Table 7. Percentage of women and median age of ARNPs in provider networks: ACHs, 2017-21

ACH	Percentage of Female ARNPs						Median Age					
	2017	2018	2019	2020	2021	Avg	2017	2018	2019	2020	2021	Avg
North Central ACH	87.7	83.8	83.4	81.8	80.9	83.5	49	48	47	46	47	47
Better Health Together	86.7	85.7	85.5	85.5	86.2	85.9	48	47	46	44	46	46
Olympic Community of Health	88.6	87.2	88.0	88.4	88.4	88.1	48	46	45	44	44	45
Cascade Pacific Action Alliance	85.7	85.7	84.4	85.6	84.7	85.2	46	45	45	45	45	45
HealthierHere	89.8	89.7	89.9	89.3	89.0	89.5	43	42	42	42	42	42
Greater Columbia ACH	81.8	82.2	82.3	82.3	83.0	82.3	46	46	46	45	46	46
North Sound ACH	89.3	89.7	89.1	89.2	88.2	89.1	47	46	45	45	44	45
SWACH	87.5	87.5	82.6	85.7	84.9	85.6	52	53	52	51	50	52
Elevate Health	90.2	90.0	88.5	86.9	86.5	88.4	48	47	46	45	44	46
State	88.2	88.0	87.5	87.3	87.0	87.6	46	45	44	44	44	45