Arizona Health Workforce Profile: Critical Care

▶The purpose of this brief is to illustrate the distribution of the critical care infrastructure and critical care workforce in Arizona's 15 counties and compare the distribution between rural and non-rural counties.

BACKGROUND

- The COVID-19 pandemic strained the US hospital system infrastructure including workforce and other resources (e.g., ventilators).[1]
- Critical care infrastructure and the ability to increase capacity are essential to a public heath pandemic response.[2]

Intensive Care Unit (ICU)
"An ICU is an organized system for the provision of care to critically ill patients that provides intensive and specialized medical and nursing care."[3]

RURAL CRITICAL CARE CAPACITY

- Health care infrastructure and workforce are concentrated in metro areas.[4]
- Populations in rural areas tend to be older. Rural communities tend to have higher poverty, unemployment, and increased mortality risk from certain health conditions.[4,5]
- Some small metro counties (e.g., Yuma) and rural counties (e.g., Apache, Navajo) in Arizona have higher COVID-19 cases per 100,000 population compared to larger metro counties (e.g., Pima, Maricopa), but fewer health care resources.[2]

Intensive Care Team
The ICU or Critical Care team may include multiple healthcare and allied health professionals including physicians, nurses, pharmacists, respiratory therapists, physical therapists, occupational therapists, and others.[6]

FINDINGS

- Health care and critical care infrastructure and workforce are concentrated in Arizona's metro counties (Map, p. 2).
- The counties with the highest COVID-19 case rates (as of March 1, 2021) per 100,000 population are smaller rural counties (Navajo, Apache, Graham Counties) with less health care and critical care infrastructure and resources.
- Across Arizona's 15 counties, 14 have critical care physicians, 13 have critical care nurses, and 10 have respiratory therapists. The ratio of providers per 10,000 population varies across counties.

The ADHS Surge Line
ADHS launched the Surge Line in April 2020. The purpose is to act as a central system to effectively manage patient care and hospital capacity by transferring patients to higher or lower levels of care as appropriate for the patient. All 15 counties have facilities participating in the Surge Line, representing 132 hospitals, the majority of Arizona hospitals.[7,8]

ARIZONA'S CRITICAL CARE WORKFORCE [Note 1]

Hospitals	ICU Beds	Physicians	Critical Care Nurses	Respiratory Therapists
99	1,533	1,353	1,275	268

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Hospitals, ICU Beds, Critical Care Physicians, Critical Care Nurses & Respiratory Therapists

MOHAVE COUNTY	
# Hospitals	3
# ICU beds	40
Critical Care MDs per 10,000 pop	2.5
Critical Care Nurses per 10,000	1.4
Respiratory Therapists per 10,000	0.2

COCONINO COUNTY	
# Hospitals	4
# ICU beds	44
Critical Care MDs per 10,000 pop	3.4
Critical Care Nurses per 10,000	3.3
Respiratory Therapists per 10,000	2.6

ARIZONA	
# Hospitals	99
# ICU beds	1,533
Critical Care MDs per 10,000 pop	1.95
Critical Care Nurses per 10,000	1.8
Respiratory Therapists per 10,000	0.4

NAVAJO COUNTY	
# Hospitals	3
# ICU beds	12
Critical Care MDs per 10,000 pop	1.3
Critical Care Nurses per 10,000	1.4
Respiratory Therapists per 10,000	0.1

APACHE COUNTY	
# Hospitals	1
# ICU beds	0
Critical Care MDs per 10,000 pop	0.6
Critical Care Nurses per 10,000	0.7
Respiratory Therapists per 10,000	1.8

YAVAPAI COUNTY	
# Hospitals	5
# ICU beds	39
Critical Care MDs per 10,000 pop	1.6
Critical Care Nurses per 10,000	1.4
Respiratory Therapists per 10,000	0.4

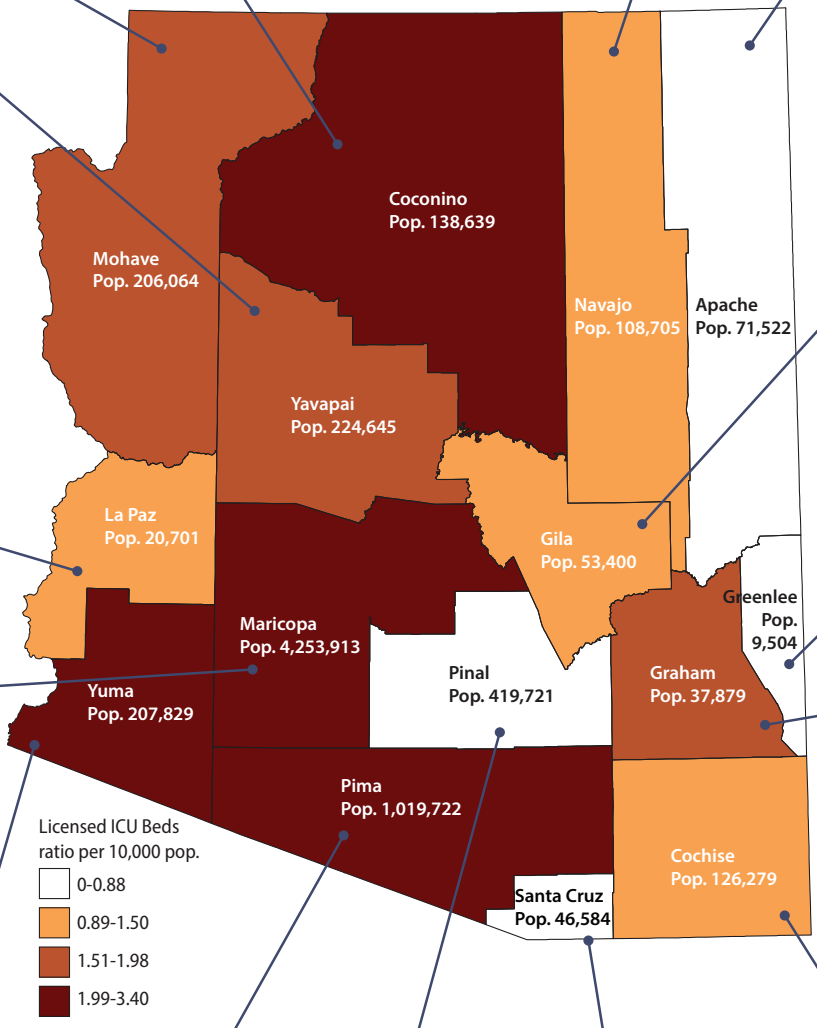
GILA COUNTY	
# Hospitals	2
# ICU beds	8
Critical Care MDs per 10,000 pop	1.9
Critical Care Nurses per 10,000	0.7
Respiratory Therapists per 10,000	0.2

LA PAZ COUNTY	
# Hospitals	1
# ICU beds	3
Critical Care MDs per 10,000 pop	1
Critical Care Nurses per 10,000	0
Respiratory Therapists per 10,000	0

GREENLEE COUNTY	
# Hospitals	0
# ICU beds	0
Critical Care MDs per 10,000 pop	0
Critical Care Nurses per 10,000	0
Respiratory Therapists per 10,000	0

MARICOPA COUNTY	
# Hospitals	54
# ICU beds	944
Critical Care MDs per 10,000 pop	2.0
Critical Care Nurses per 10,000	2.2
Respiratory Therapists per 10,000	0.2

GRAHAM COUNTY	
# Hospitals	1
# ICU beds	6
Critical Care MDs per 10,000 pop	1.1
Critical Care Nurses per 10,000	1.8
Respiratory Therapists per 10,000	0



YUMA COUNTY	
# Hospitals	2
# ICU beds	42
Critical Care MDs per 10,000 pop	1.1
Critical Care Nurses per 10,000	0.5
Respiratory Therapists per 10,000	0

PIMA COUNTY	
# Hospitals	15
# ICU beds	347
Critical Care MDs per 10,000 pop	2.6
Critical Care Nurses per 10,000	1.6
Respiratory Therapists per 10,000	1.2

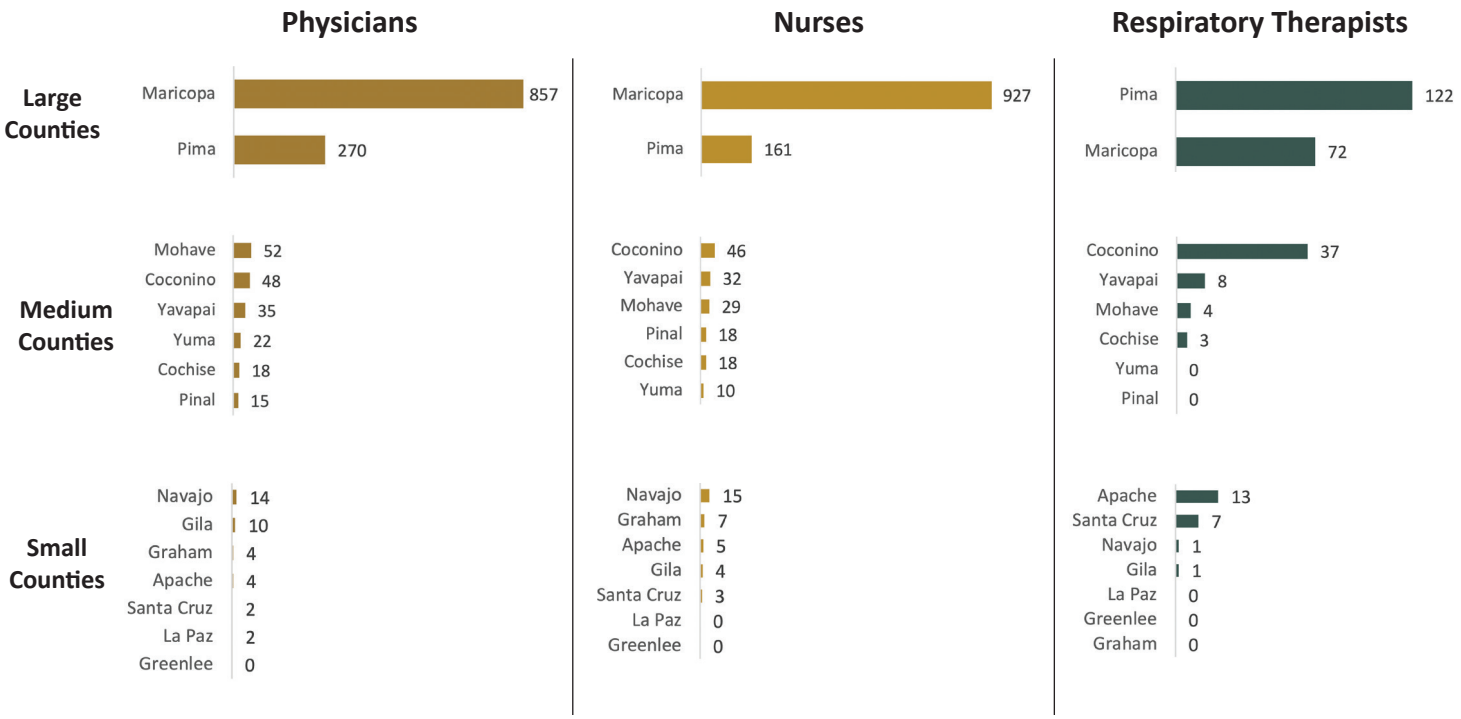
PINAL COUNTY	
# Hospitals	3
# ICU beds	34
Critical Care MDs per 10,000 pop	0.4
Critical Care Nurses per 10,000	0.4
Respiratory Therapists per 10,000	0

SANTA CRUZ COUNTY	
# Hospitals	1
# ICU beds	2
Critical Care MDs per 10,000 pop	0.4
Critical Care Nurses per 10,000	0.6
Respiratory Therapists per 10,000	1.5

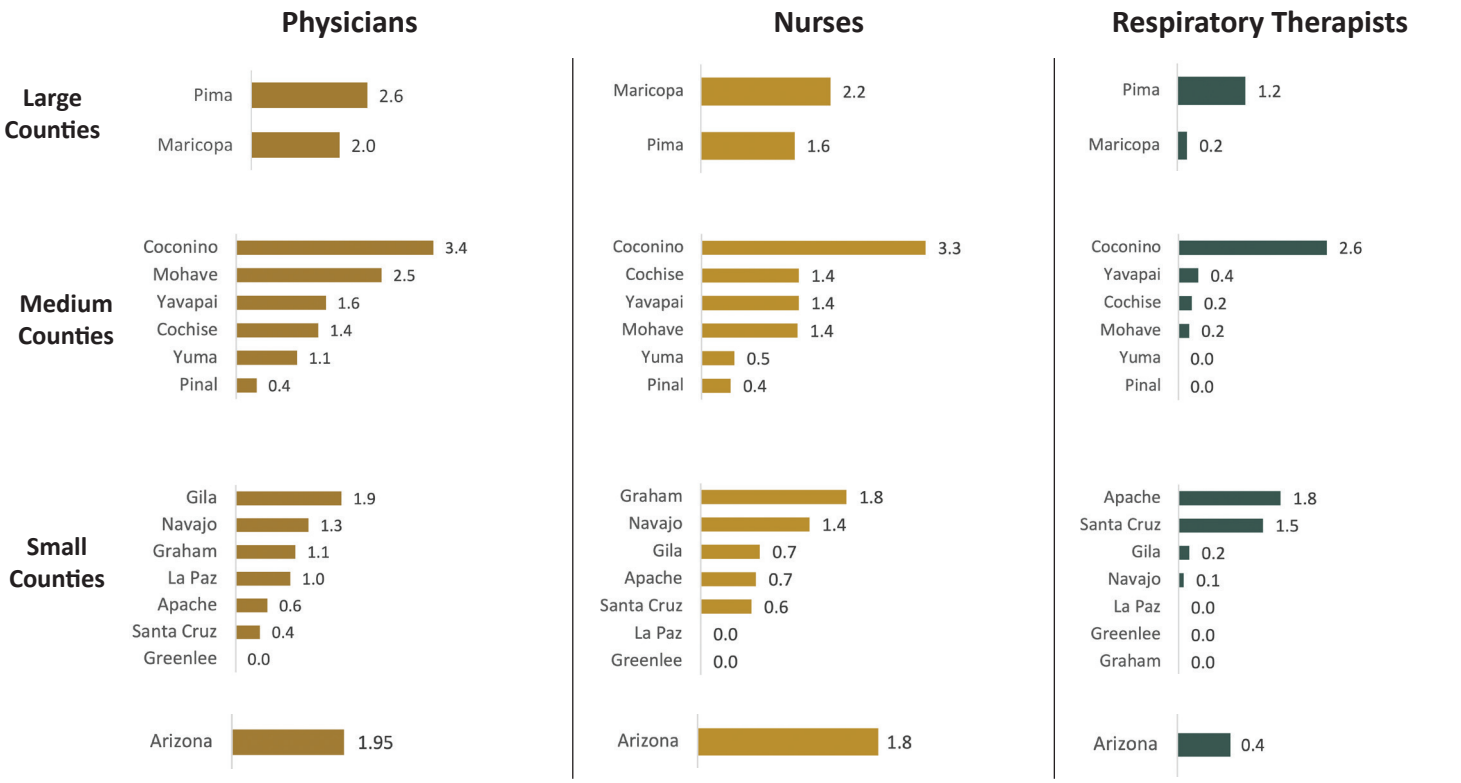
COCHISE COUNTY	
# Hospitals	4
# ICU beds	12
Critical Care MDs per 10,000 pop	1.4
Critical Care Nurses per 10,000	1.4
Respiratory Therapists per 10,000	0.2

Note 1: In this brief, critical care refers to hospitals , ICU beds, and the healthcare workforce of critical care physicians and nurses, and respiratory therapists. The hospital and ICU data for the table on p. 1 and this map are from the ADHS Uniform Accounting Report (UAR) data 2018. Not all hospitals submit this report, so this data does not include federal, Indian Health Service, or PL-638 tribal facilities. There are 3 additional hospitals of these types in Apache, Maricopa, and Navajo counties; 2 in Pima county; and 1 in Cochise, Coconino, Gila, La Paz, Pinal, Yavapai, and Yuma counties. Some of these facilities may have ICU beds that are not included in this data because they are not reported in the UAR. This data is likely an undercount of total hospitals and available ICU beds and inquiries regarding the most up to date data should be made to ADHS.

Total Critical Care Workforce by County



Critical Care Workforce Ratio per 10,000 Population by County



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METHODS & DATA

- This brief relies on multiple data sources to understand the number of hospitals, ICU beds, and the critical care workforce. Numbers cited here may differ from those reported in other publications because of variation in definitions, sources, and time frames.
- The workforce data is from state sources, the Arizona Medical Board (2019) and the Arizona Nursing Board (2020). Physicians who reported their first Area of Interest (AOI) as critical care followed by a second AOI of emergency medicine, pulmonary medicine, internal medicine etc. were included. The critical care nurse workforce represented in this brief includes Advanced Practice Registered Nurses (APRN) with critical or acute care specialty and APRN-CRNAs (Ceritified Registerd Nurse Anesthetist).
- The data for respiratory therapists is from a federal source, the National Plan and Provider Enumeration System (NPPES) (2020). Respiratory therapists were identified using the NPPES taxonomies of registered or certified respiratory therapists.
- The hospital facility data is from the ADHS Uniform Accounting Reports (UAR) (2018), it is important to know that this data does not include data from federal or tribal facilities so may represent an undercount.
- County population data is from the U.S. Census, American Community Survey (2019). Counties are grouped according to their National Center for Health Statistics urban-rural classification for counties. We make two changes we group Pima county with the large size counties and Pinal county with the medium size counties. Large indicates the large central metro and medium metro counties (NHSC = 1,3); Medium indicates the small metro counties (NHSC=4) and the large fringe metro county, and small indicates the large and small rural counties (NHSC = 5,6).

County Name	NCHSURC	NCHSURC Code Description	Designation in Brief
Apache	6	Non-Core (small rural)	Small
Cochise	4	Small metro	Medium
Coconino	4	Small metro	Medium
Gila	5	Micropolitan (large rural)	Small
Graham	5	Micropolitan (large rural)	Small
Greenlee	6	Non-Core (small rural)	Small
La Paz	6	Non-Core (small rural)	Small
Maricopa	1	Large central metro	Large
Mohave	4	Small metro	Medium
Navajo	5	Micropolitan (large rural)	Small
Pima	3	Medium metro	Large
Pinal	2	Large fringe metro	Medium
Santa Cruz	5	Micropolitan (large rural)	Small
Yavapai	4	Small metro	Medium
Yuma	4	Small metro	Medium

References

1. Abir, Mahshid, Christopher Nelson, Edward W. Chan, Hamad Al-Ibrahim, Christina Cutter, Karishma Patel, and Andy Bogart. "Critical Care Surge Response Strategies for the 2020 COVID-19 Outbreak in the United States," April 3, 2020. https://www.rand.org/pubs/research_reports/RRA164-1.html.
2. Barbisch, Donna F., and Kristi L. Koenig. "Understanding Surge Capacity: Essential Elements." Academic Emergency Medicine 13, no. 11 (2006): 1098–1102. https://doi.org/10.1197/j.aem.2006.06.041.
3. Marshall, John C., Laura Bosco, Neill K. Adhikari, Bronwen Connolly, Janet V. Diaz, Todd Dorman, Robert A. Fowler, et al. "What Is an Intensive Care Unit? A Report of the Task Force of the World Federation of Societies of Intensive and Critical Care Medicine." Journal of Critical Care 37 (February 2017): 270–76. https://doi.org/10.1016/j.jcrc.2016.07.015.
4. Henning-Smith, Carrie. "The Unique Impact of COVID-19 on Older Adults in Rural Areas." Journal of Aging & Social Policy 32, no. 4–5 (July 3, 2020): 396–402. https://doi.org/10.1080/08959420.2020.1770036.
5. Centers for Disease Control and Prevention. (2021). "About Rural Health | CSELS | OPHSS | CDC." About Rural Health, March 25, 2020. https://www.cdc.gov/ruralhealth/about.html.
6. Society of Critical Care Medicine (SCCM). "SCCM | Meet the Critical Care Team." Accessed February 10, 2021. https://sccm.org/MyICUCare/About-Critical-Care/Team.
7. Villarroel, Lisa, Cara Christ, Luke Smith, Charles Larsen, StaabR Staab, Michael White, Keith Frey, et al. "Collaboration on the Arizona Surge Line: How Covid-19 Became the Impetus for Public, Private, and Federal Hospitals to Function as One System." NEJM Catalyst Innovations in Care Delivery, January 22, 2021. https://catalyst.nejm.org/doi/full/10.1056/CAT.20.0595.
8. Feldman, Sharon L., and Patricia A. Mayer. "Arizona Health Care Systems' Coordinated Response to COVID-19—'In It Together.'" JAMA Health Forum 1, no. 8 (August 24, 2020): e201064–e201064. https://doi.org/10.1001/jamahealthforum.2020.1064.