

# HEALTH SYSTEM ANALYSIS

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# **ABOUT OUR DATA**

**2018 CHSP  
Compendium  
(2021 updated)  
637 health systems**

# LITERATURE REVIEW

“nearly 30 million Americans remain uninsured, and millions more are underinsured”

- *Crowley et al., 2020*

“analyzed the relationship between care system structures in ACOs and the quality and spending performance among patients in the Medicare Shared Savings Program”

- *Comfort et al., 2018*

“This 2016 report examines the states’ Medicaid disproportionate share hospital (DSH) payments to hospitals that serve Medicaid recipients and other low-income patients in reaction to the impacts of the Affordable Care Act. (ACA)”

- *2016 Report to Congress on Medicaid Disproportionate Share Hospital Payments*

# RESEARCH QUESTION

What type of characteristics do high quality health systems support?

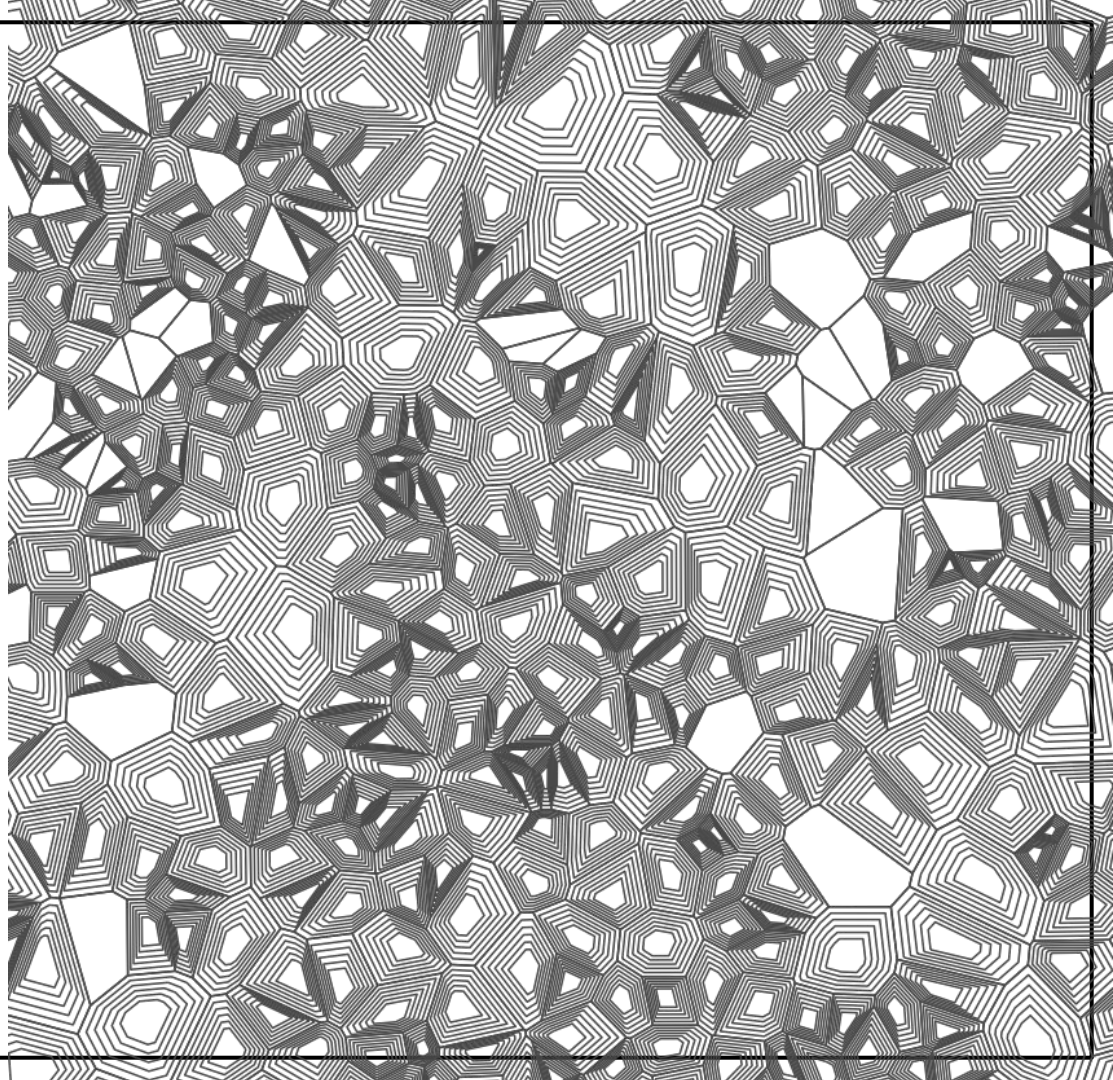
# HYPOTHESIS

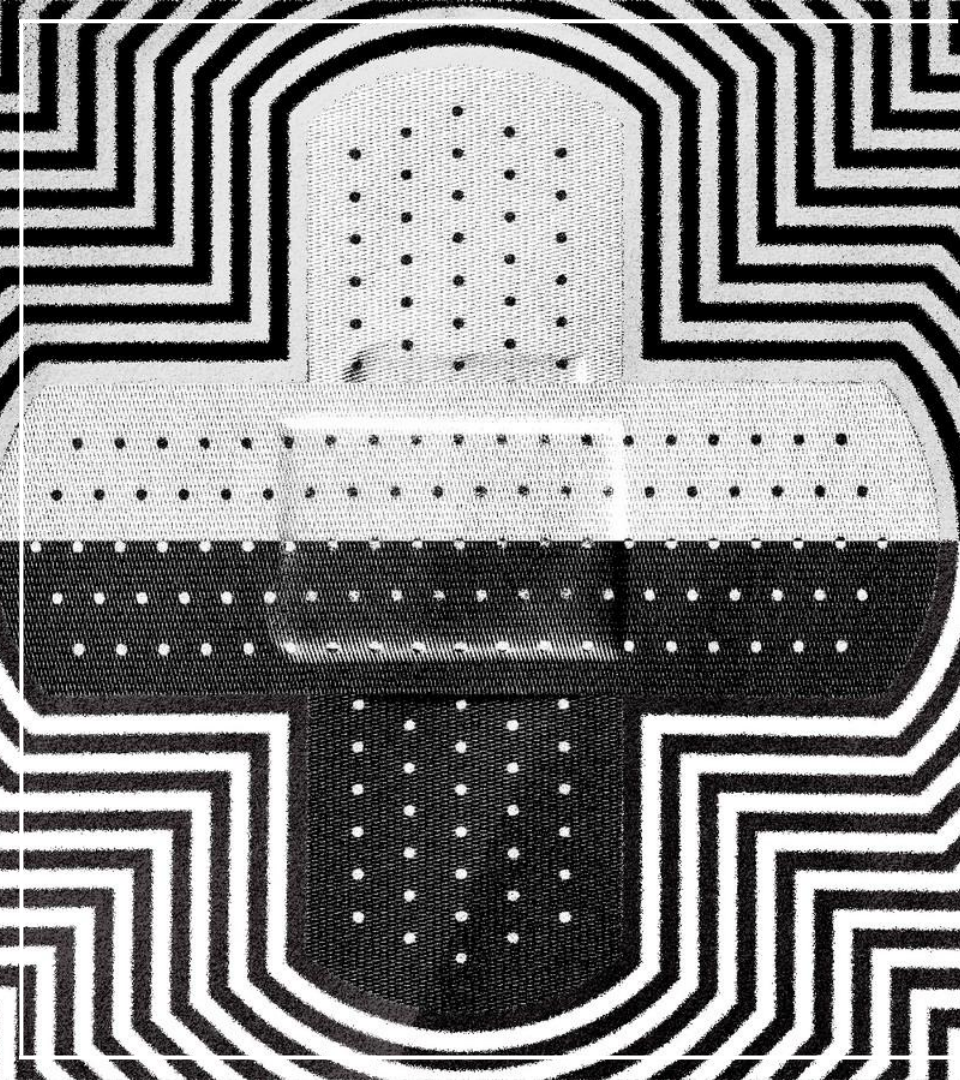
Health systems of high quality (**higher discharge per organizations in their system**) support the following characteristics:

- Higher teaching intensity
- Higher number of nurses per hospital
- No High Uncompensated Care Burden
- Have a high volume of resident and intern staff.

# METHODS

- Linear Regression Model
- Descriptive Statistics
- Exploratory analysis





# RESULTS

# HEALTH SYSTEM QUALITY

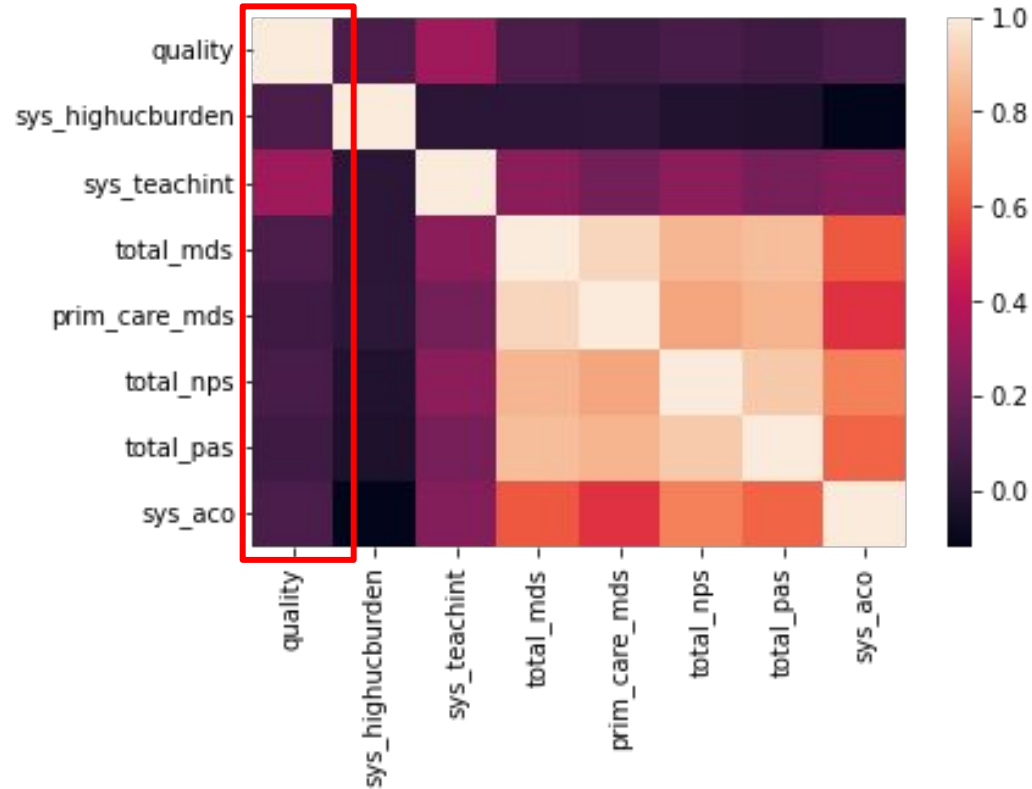
- Hospitals count
- Medical Groups count
- Discharges



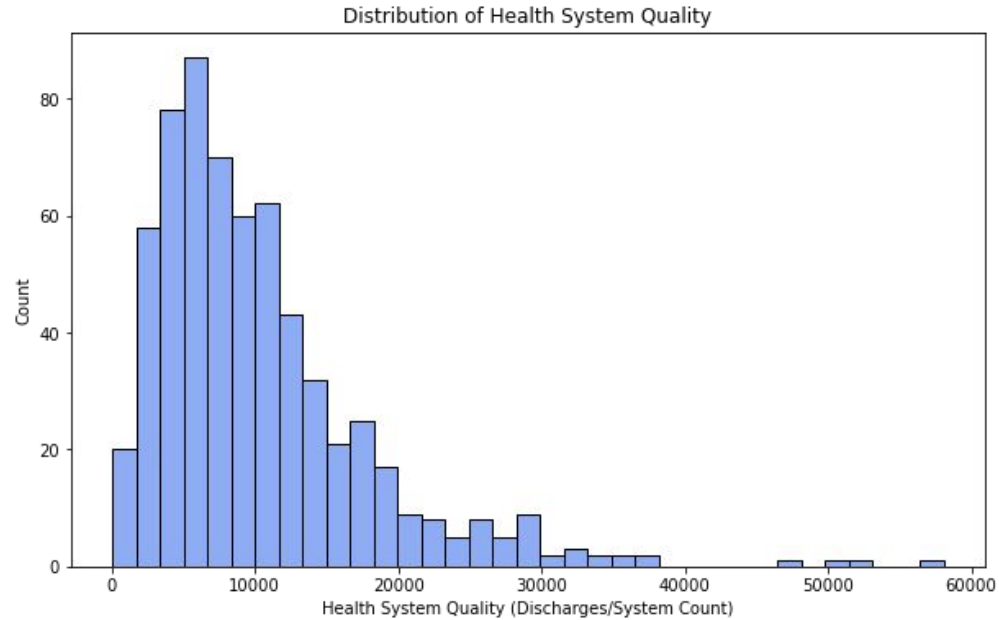
# CORRELATIONAL FINDINGS

	Health System Quality
Systemwide Teaching Intensity	0.317607
High Uncompensated Care Burden	0.102796
Total Physicians	0.105839
# of system-affiliated physicians participating in one or more Medicare accountable care organizations	0.101589
Total Primary Care Physicians	0.067521
Total Physician Assistant	0.064501
Total Nurse Practitioners	-0.1073

# CORRELATION HEATMAP



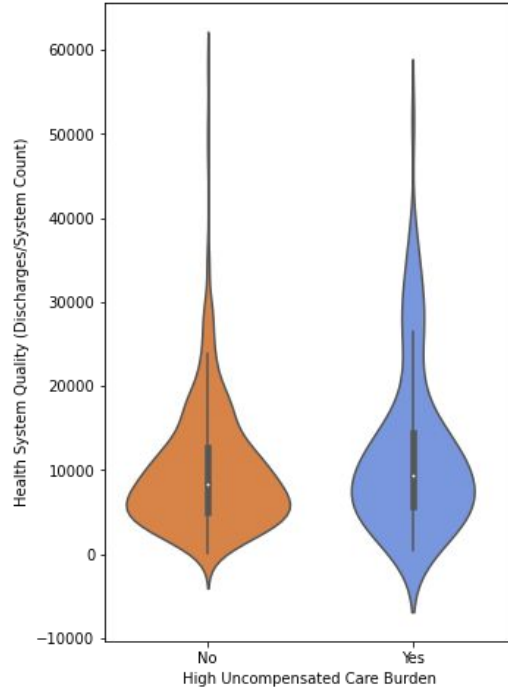
# HEALTH SYSTEM QUALITY



**FIGURE 1**

# HIGH UNCOMPENSATED CARE BURDEN

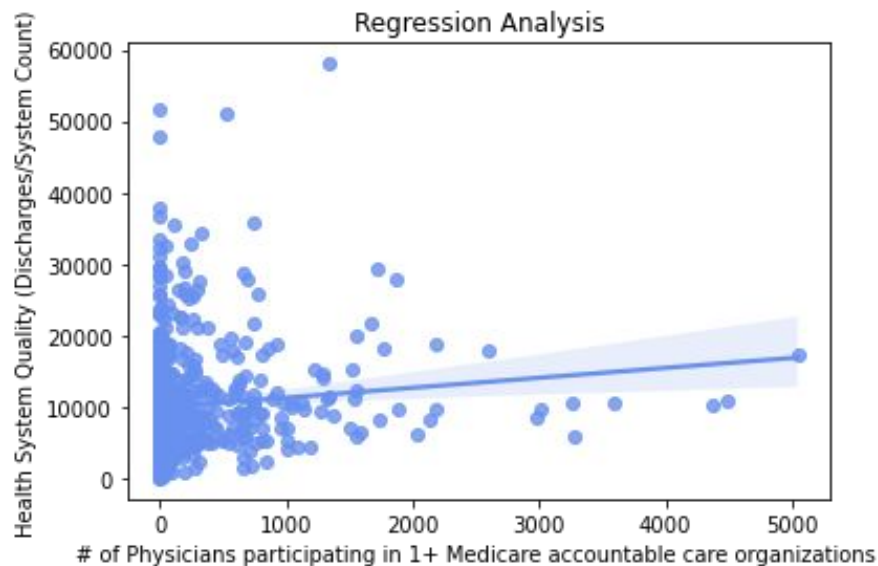
Violin Plot of System Quality and High Uncompensated Care Burden



**QUALITY OF HEALTH SYSTEMS  
THAT INCLUDES AT LEAST ONE  
HIGH UNCOMPENSATED CARE  
BURDEN HOSPITAL**

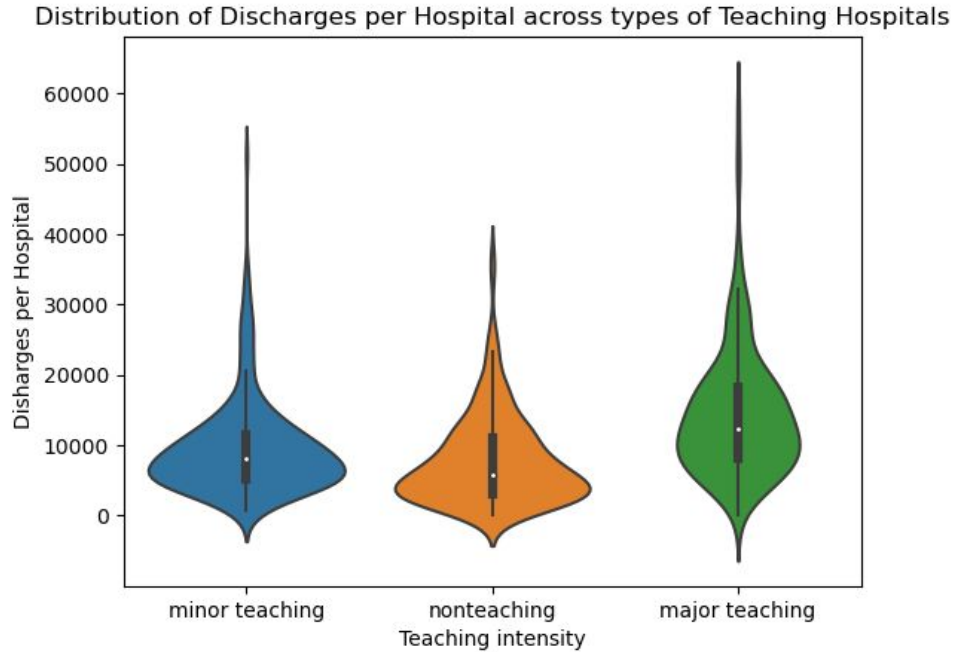
**FIGURE 2**

# # OF SYSTEM-AFFILIATED PHYSICIANS PARTICIPATING IN ONE OR MORE MEDICARE ACCOUNTABLE CARE ORGANIZATIONS



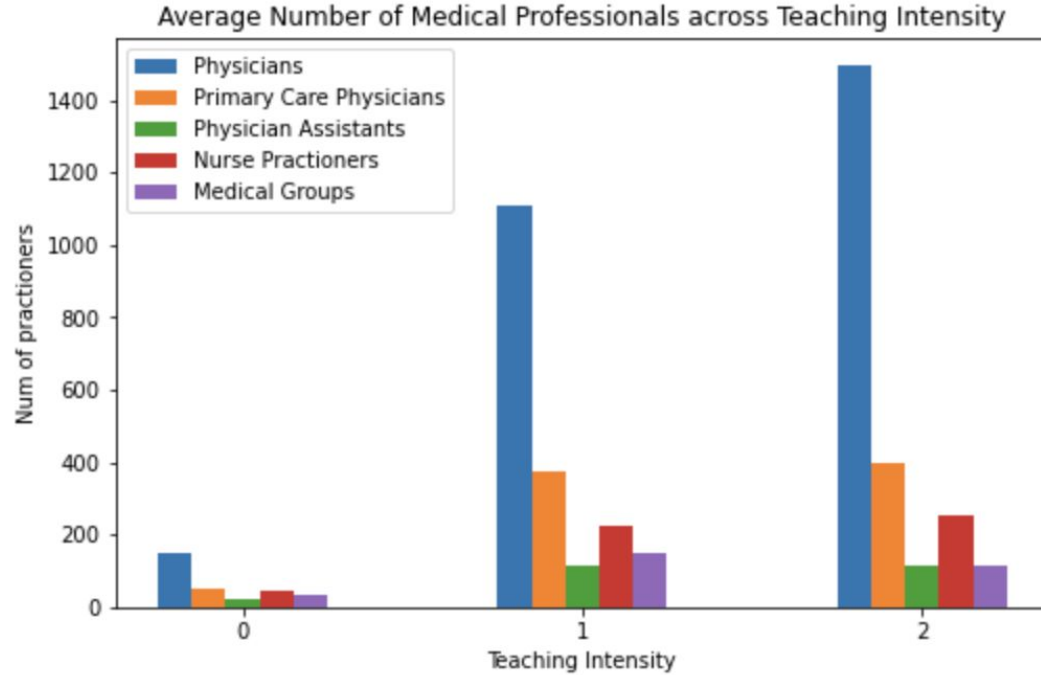
**FIGURE 3**

# TEACHING INTENSITY



**FIGURE 4**

# TEACHING INTENSITY



**FIGURE 5**

# MULTILINEAR REGRESSION MODEL

OLS Regression Results						
Dep. Variable:	quality_of_care	R-squared:	0.006			
Model:	OLS	Adj. R-squared:	-0.001			
Method:	Least Squares	F-statistic:	0.9153			
Date:	Mon, 05 Dec 2022	Prob (F-statistic):	0.455			
Time:	00:33:44	Log-Likelihood:	-4762.3			
No. Observations:	631	AIC:	9535.			
Df Residuals:	626	BIC:	9557.			
Df Model:	4					
Covariance Type:	nonrobust					
	coef	std err	t	P> t	[0.025	0.975]
const	527.4426	21.454	24.585	0.000	485.312	569.573
total_mds	-0.0064	0.032	-0.201	0.841	-0.069	0.056
prim_care_mds	0.0439	0.083	0.526	0.599	-0.120	0.208
total_nps	-0.1891	0.151	-1.254	0.210	-0.485	0.107
total_pas	0.0769	0.289	0.266	0.790	-0.490	0.644
Omnibus:	470.414	Durbin-Watson:	2.091			
Prob(Omnibus):	0.000	Jarque-Bera (JB):	6381.316			
Skew:	3.300	Prob(JB):	0.00			
Kurtosis:	17.112	Cond. No.	2.59e+03			

OLS Regression Results						
=====						
Dep. Variable:	quality_of_care		R-squared:	0.041		
Model:	OLS		Adj. R-squared:	0.038		
Method:	Least Squares		F-statistic:	13.36		
Date:	Mon, 05 Dec 2022		Prob (F-statistic):	2.08e-06		
Time:	00:26:36		Log-Likelihood:	-4751.0		
No. Observations:	631		AIC:	9508.		
Df Residuals:	628		BIC:	9521.		
Df Model:	2					
Covariance Type:	nonrobust					
=====						
	coef	std err	t	P> t	[0.025	0.975]
-----						
const	542.0015	21.235	25.524	0.000	500.302	583.701
total_nps	-0.6278	0.123	-5.093	0.000	-0.870	-0.386
sys_beds	0.0794	0.016	4.862	0.000	0.047	0.111
=====						
Omnibus:	472.389		Durbin-Watson:	2.096		
Prob(Omnibus):	0.000		Jarque-Bera (JB):	6610.562		
Skew:	3.305		Prob(JB):	0.00		
Kurtosis:	17.413		Cond. No.	2.88e+03		
=====						



# DISCUSSION

## LIMITATIONS

- Subjective definition of “quality of care”
- Not enough “meaningful” data

## FUTURE WORK

- Collect other variables (down to individual hospital)
- Collect data in a timespan (changes in quality)
- More Patient data (visit, satisfaction)

# CONCLUSION

- Although there was positive correlation between factors like High Uncompensated Care Burden and Quality of the healthcare system it was quite weak; this correlation is likely due to outliers which have shifted the coefficient.
- Overall, besides Teaching Intensity, there is no significant relation between quality of health system and our studied characteristics.

# REFERENCES

- Ackermann, R. J., & Kemle, K. A. (1998). The Effect of a Physician Assistant on the Hospitalization of Nursing Home Residents. *Journal of the American Geriatrics Society*, 46(5), 610–614. <https://doi.org/10.1111/j.1532-5415.1998.tb01078.x>
- Comfort, L. N., Shortell, S. M., Rodriguez, H. P., & Colla, C. H. (2018). Medicare Accountable Care Organizations of Diverse Structures Achieve Comparable Quality and Cost Performance. *Health Services Research*, 53(4), 2303–2323. <https://doi-org.proxy2.library.illinois.edu/10.1111/1475-6773.12829>
- Crowley, R., Daniel, H., Cooney, T. G., & Engel, L. S. (2020). Envisioning a better U.S. Health care system for all: Coverage and cost of care. *Annals of Internal Medicine*, 172(2\_Supplement), S7–S32. <https://doi.org/10.7326/M19-2415>
- Lovink, M. H., Persoon, A., Koopmans, R. T. C. M., Van Vught, A. J. A. H., Schoonhoven, L., & Laurant, M. G. H. (2017). Effects of substituting nurse practitioners, physician assistants or nurses for physicians concerning healthcare for the aging population: A systematic literature review. *Journal of Advanced Nursing*, 73(9), 2084–2102. <https://doi.org/10.1111/jan.13299>
- Nelb, R., Teisl, J., Dobson, A., DaVanzo, J. E., & Koenig, L. (2016). For Disproportionate-Share Hospitals, Taxes And Fees Curtail Medicaid Payments. *Health Affairs*, 35(12), 2277–2281. <https://doi-org.proxy2.library.illinois.edu/10.1377/hlthaff.2016.0602>
- West, C. P., Dyrbye, L. N., & Shanafelt, T. D. (2018). Physician burnout: Contributors, consequences and solutions. *Journal of Internal Medicine*, 283(6), 516–529. <https://doi.org/10.1111/joim.12752>

# REFERENCES

- <https://www.ahrq.gov/sites/default/files/wysiwyg/chsp/compendium/2018-Compendium-TechDoc-update.pdf>
- <https://www.ahrq.gov/chsp/data-resources/compendium-2018.html>
- <https://www.ahrq.gov/sites/default/files/wysiwyg/chsp/compendium/chsp-compendium-2018-updated-2021.xlsx>

# THANKS

CREDITS: This presentation template was created by **Slidesgo**, including icons by **Flaticon**, and infographics & images by **Freepik**.

# DATA DICTIONARY

## Appendix F. Data Dictionary

Variable name	Variable Type	Description
health_sys_id	Character	Unique system ID (assigned by Mathematica; links to 2016 Compendium of U.S. Health Systems*)
health_sys_name	Character	Health system name
health_sys_city	Character	Health system city
health_sys_state	Character	Health system State
in_onekey	Numeric	Flag for whether the system appears in the OneKey data
in_aha	Numeric	Flag for whether the system appears in the AHA data
onekey_id	Character	OneKey system ID
aha_sysid	Character	AHA system ID
total_mds	Numeric	Total number of physicians
prim_care_mds	Numeric	Total number of primary care physicians
total_nps	Numeric	Total number of nurse practitioners
total_pas	Numeric	Total number of physician assistants
grp_cnt	Numeric	Total number of medical groups
hosp_cnt	Numeric	Total number of hospitals
acutehosp_cnt	Numeric	Total number of non-Federal general acute care hospitals
nh_cnt	Numeric	Total number of system-affiliated nursing homes
sys_multistate	Numeric	Multistate system flag: 1=system hospitals located in one State, 2=system hospitals located in two States, 3=system hospitals located in three or more States
sys_beds	Numeric	Number of beds per system
sys_dsched	Numeric	Number of discharges per system
sys_res	Numeric	Number of interns and residents per system in non-Federal general acute care hospitals
maj_inv_owned	Numeric	Predominantly investor-owned hospitals flag: 1=yes, 0=no
deg_children	Numeric	Degree to which health system serves children: 0=no children's hospitals, 1=at least one children's hospital but not predominantly delivering care at children's hospitals, 2=predominantly delivering care at children's hospitals
sys_incl_majteachhosp	Numeric	System includes at least one major teaching hospital: 1=yes, 0=no
sys_incl_vmajteachhosp	Numeric	System includes at least one very major teaching hospital: 1=yes, 0=no
sys_teachint	Numeric	Systemwide teaching intensity: 0=nonteaching, 1=minor teaching, 2=major teaching
sys_incl_highdpphosp	Numeric	System includes at least one high DSH patient percentage hospital: 1=yes, 0=no

# DATA DICTIONARY

Variable name	Variable Type	Description
sys_highburden	Numeric	Systemwide uncompensated care burden flag: 1=yes, 0=no
sys_incl_highchosp	Numeric	System includes at least one high uncompensated care burden hospital: 1=yes, 0=no
sys_anyins_product	Numeric	System includes at least one non-Federal general acute care hospital that reported in the AHA data that the hospital or its system owns or jointly owns a health plan, or that the hospital or its system has a joint venture or significant partnership with an insurer: 1=yes, 0=no
sys_mcare_adv	Numeric	System includes at least one non-Federal general acute care hospital that reported in the AHA data that the hospital or its system offers an MA plan via ownership or joint venture: 1=yes, 0=no
sys_mcaid_mngcare	Numeric	System includes at least one non-Federal general acute care hospital that reported in the AHA data that the hospital or its system offers a Medicaid managed care plan via ownership or joint venture: 1=yes, 0=no
sys_healthins_mktplc	Numeric	System includes at least one non-Federal general acute care hospital that reported in the AHA data that the hospital or its system offers a Health Insurance Marketplace plan via ownership or joint venture: 1=yes, 0=no
sys_ma_plan_contracts	Character	MA contract numbers offered by the system according to matches between systems or subsystems and MA data from CMS
sys_ma_plan_enroll	Numeric	Aggregate MA enrollment across all MA contracts offered by the system according to matches between systems or subsystems and MA data from CMS
sys_apm	Numeric	System has affiliated physicians who are participating in one or more Medicare alternative payment models: 1=yes, 0=no
sys_aco	Numeric	Number of system-affiliated physicians who are participating in one or more Medicare accountable care organizations
sys_ebpm	Numeric	Number of system-affiliated physicians who are participating in one or more Medicare episode-based payment models
sys_pctm	Numeric	Number of system-affiliated physicians who are participating in one or more Medicare primary care transformation models

<sup>a</sup> If a 2018 system had the same HCOS and/or AHA identification number as a 2016 system, then we assigned the 2018 system the same unique system identification number as 2016.