



North Carolina
Clinical Antibiotic
Stewardship Partners

Disparities in Antibiotic Use Across the Continuum of Care

Chineme Enyioha, MD MPH

Department of Family Medicine

University of North Carolina at Chapel Hill

North Carolina Clinical Antibiotic Stewardship Partners (NC CLASP)

Disclosures

No conflict of interest

Outline

- Disparities in healthcare – general overview
- Disparities in antibiotic use specifically
- Examples
- Interventions to reduce disparities



Disparities in Healthcare

“ Health disparities are preventable differences in the burden of disease, injury, violence, or in opportunities to achieve optimal health experienced by socially disadvantaged racial, ethnic, and other population groups, and communities. Health disparities exist in all age groups, including older adults” .



Disparities in Healthcare

Differences in
healthcare, health
services

Health or health
risks are commonly
affected

Avoidable

Disadvantaged
groups

Usually systemic

Can be shaped by
policy

Some Key terms

Health Equity:

“The state in which everyone has a fair and just opportunity to attain their highest level of health. This requires focused and ongoing societal efforts to address historical and contemporary injustices; overcome economic, social, and other obstacles to health and healthcare; and eliminate preventable health disparities.”^a

^aCenters for Disease Control and Prevention. What is health equity? 2022. Available at: <https://www.cdc.gov/healthequity/whatis/index.html>.

^bEssien UR, Dusetzina SB, Gellad WF. A policy prescription for reducing health disparities—achieving pharmaco-equity. *JAMA* 2021; 326:1793–4.

Pharmaco-equity:

“..Individuals, regardless of race, ethnicity and socioeconomic status, have access to the highest quality medications required to manage their health”^b



Ways to think about disparities in antibiotic prescribing

- Overuse
- Underuse



Image by [Dmitriy](#) from [Pixabay](#)

Consequences of Disparities in Antibiotic Use

- Adverse outcomes/drug events
- Resistance
- Increase in healthcare costs

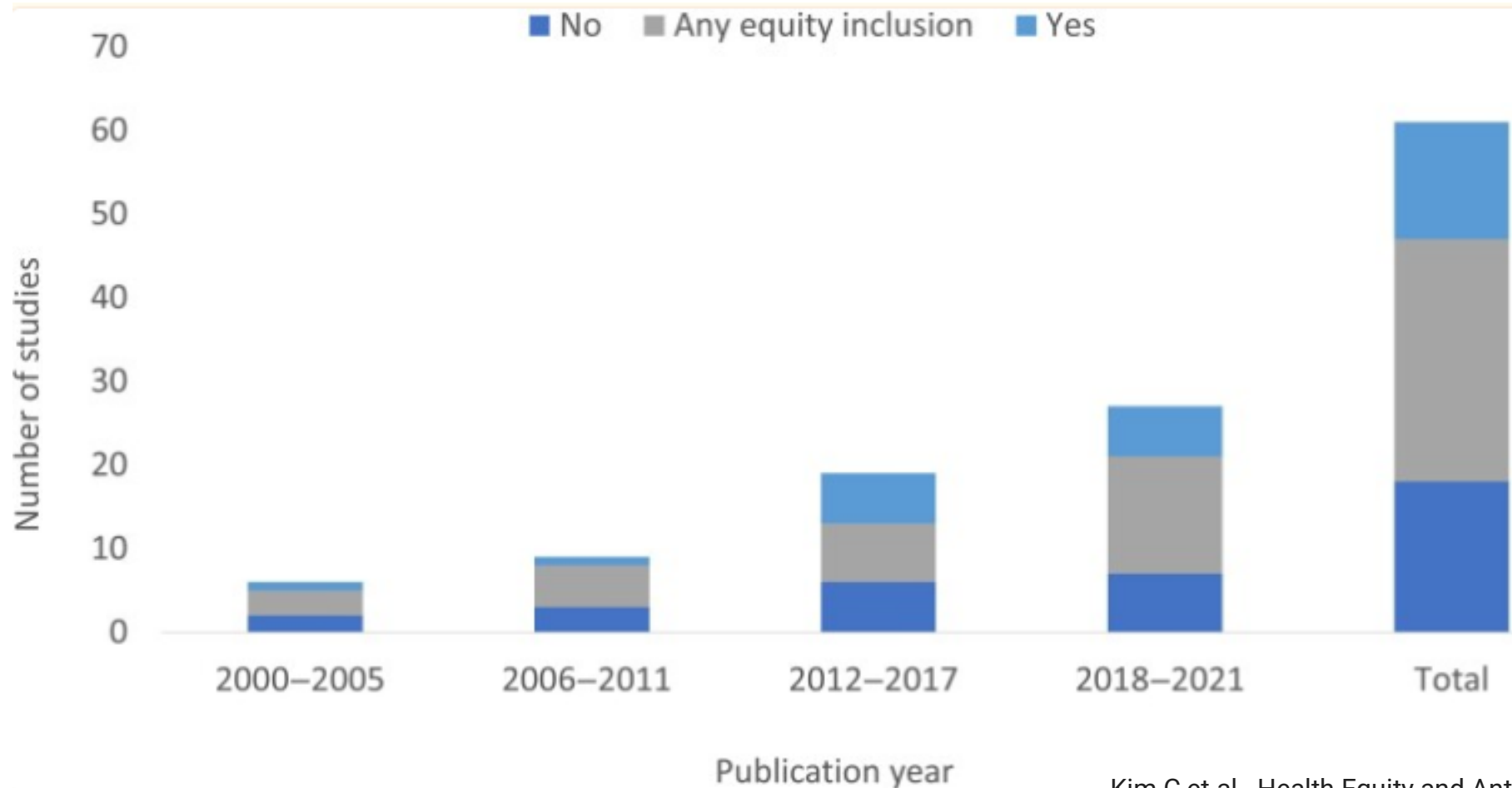


Centers for Disease Control and Prevention. Antibiotic resistance threats in the United States, 2013 . <http://www.cdc.gov/libproxy.lib.unc.edu/drugresistance/threat-report-2013/>.

Costelloe C et al. Effect of antibiotic prescribing in primary care on antimicrobial resistance in individual patients: systematic review and meta-analysis. *BMJ* 2010; 340 :c2096

Huemer M et al. Antibiotic resistance and persistence-Implications for human health and treatment perspectives. *EMBO Rep.* 2020 Dec 3;21(12):e51034. doi: 10.15252/embr.202051034.

Health disparities and antibiotic prescribing

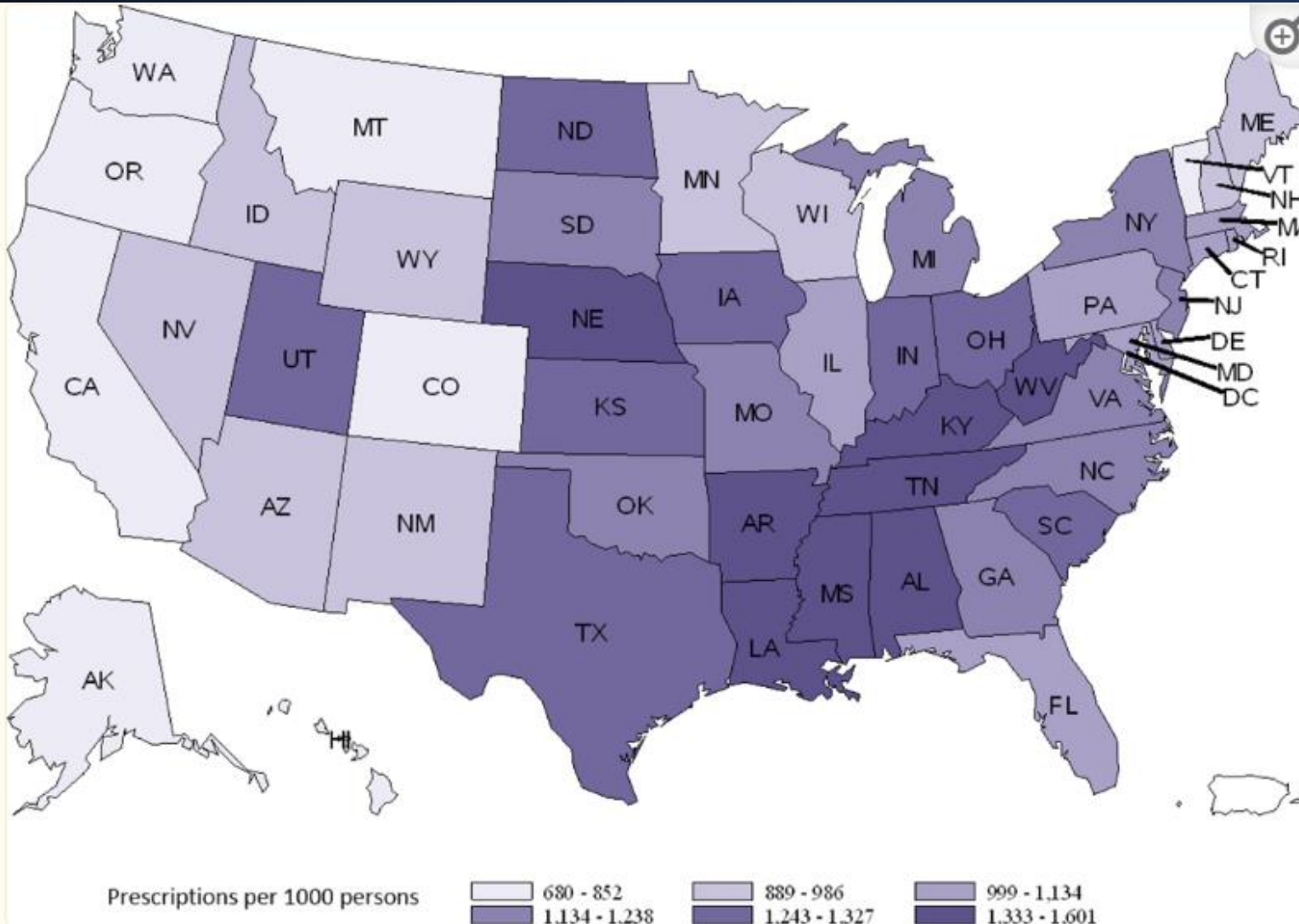


Kim C et al.. Health Equity and Antibiotic Prescribing in the United States: A Systematic Scoping Review. *Open Forum Infect Dis.* 2023 Aug 19;10(9):ofad440.

Factors that influence disparities in antibiotic prescribing



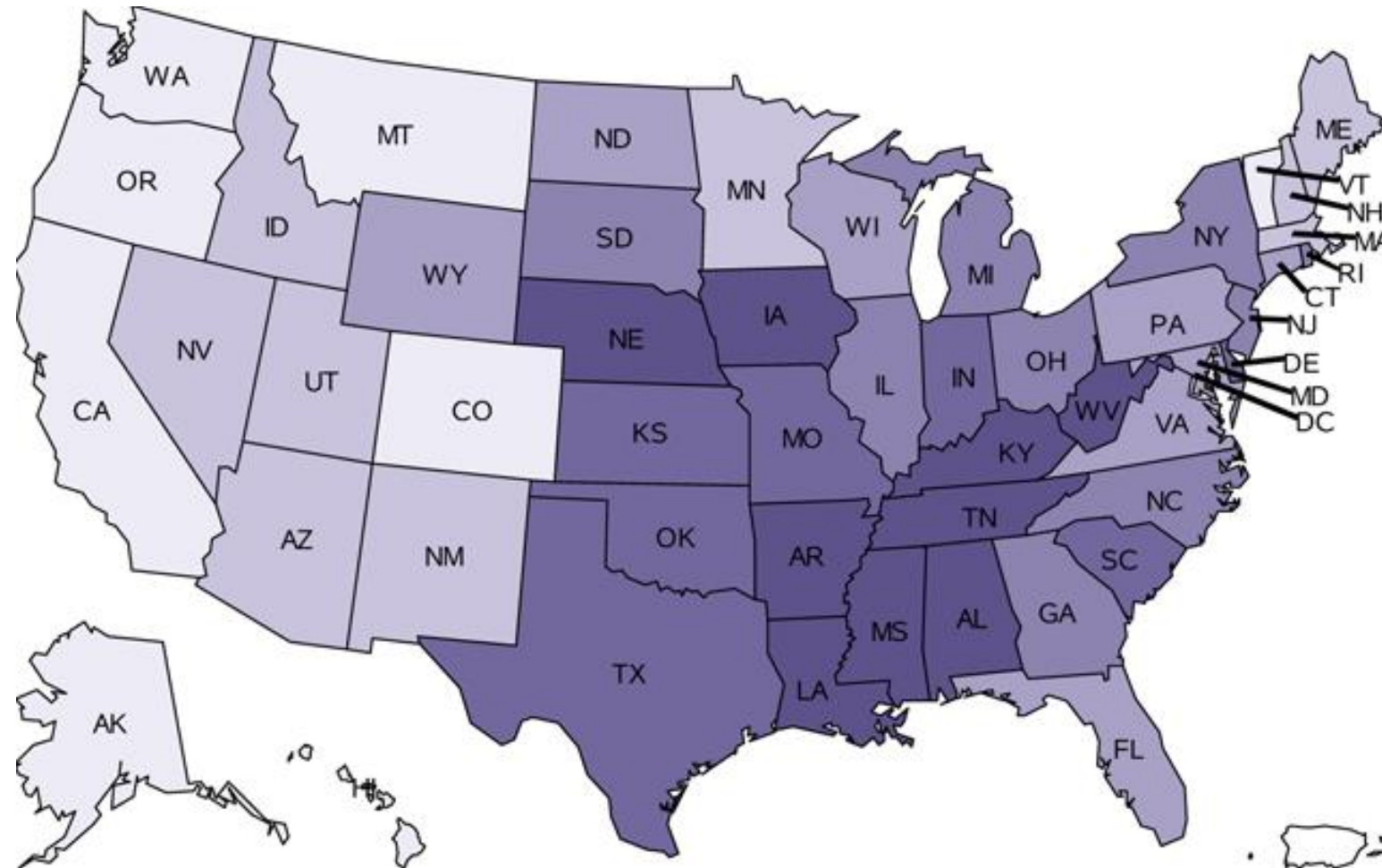
Community-level factors associated with disparities in antibiotic prescribing: Geographical location



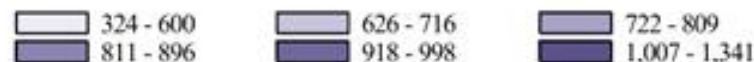
Antibiotic prescribing per 1000 persons by state (sextiles) in 2014 for **adults 65 or older**

Kabbani S, Palms D, Bartoces M, Stone N, Hicks LA. Outpatient Antibiotic Prescribing for Older Adults in the United States: 2011 to 2014. *J Am Geriatr Soc.* 2018 Oct;66(10):1998-2002.

Community-level factors associated with disparities in antibiotic prescribing: Geographical location

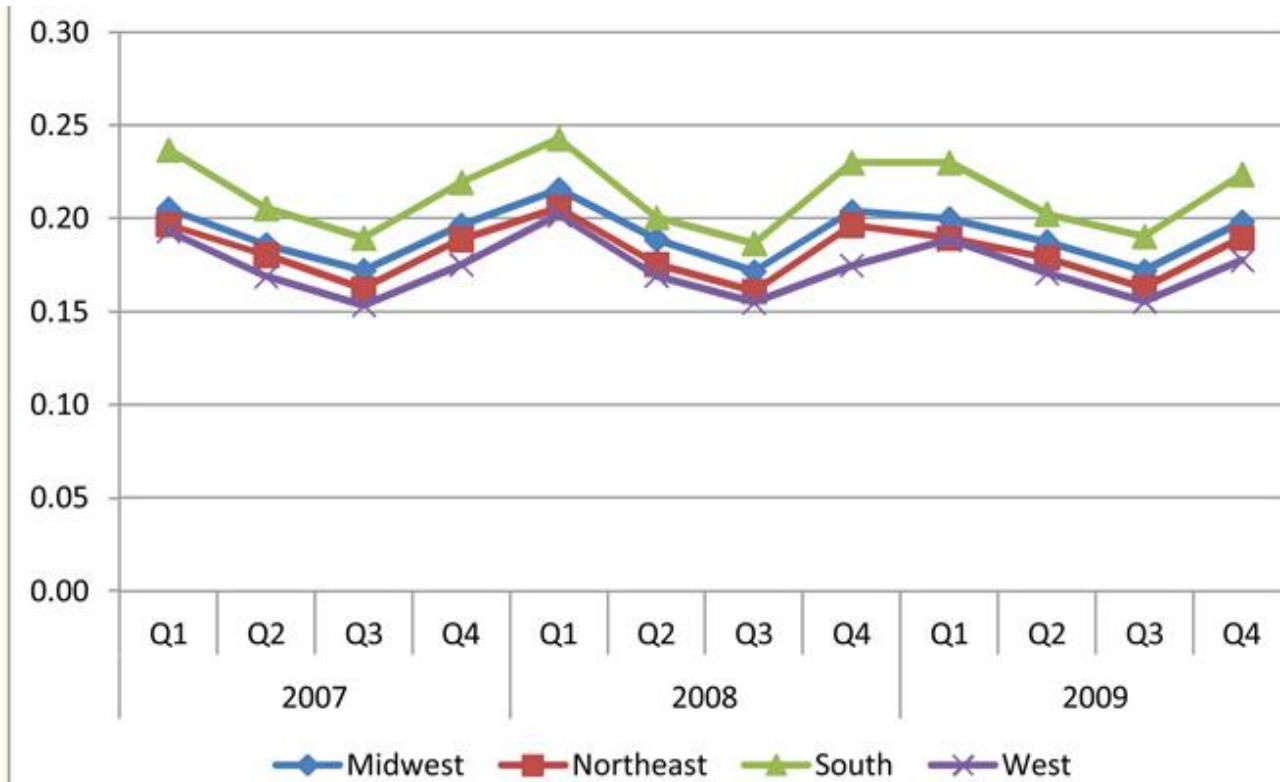


Antibiotic prescribing per 1000 persons by state (sextiles) in 2013, **ages 0 - 19**

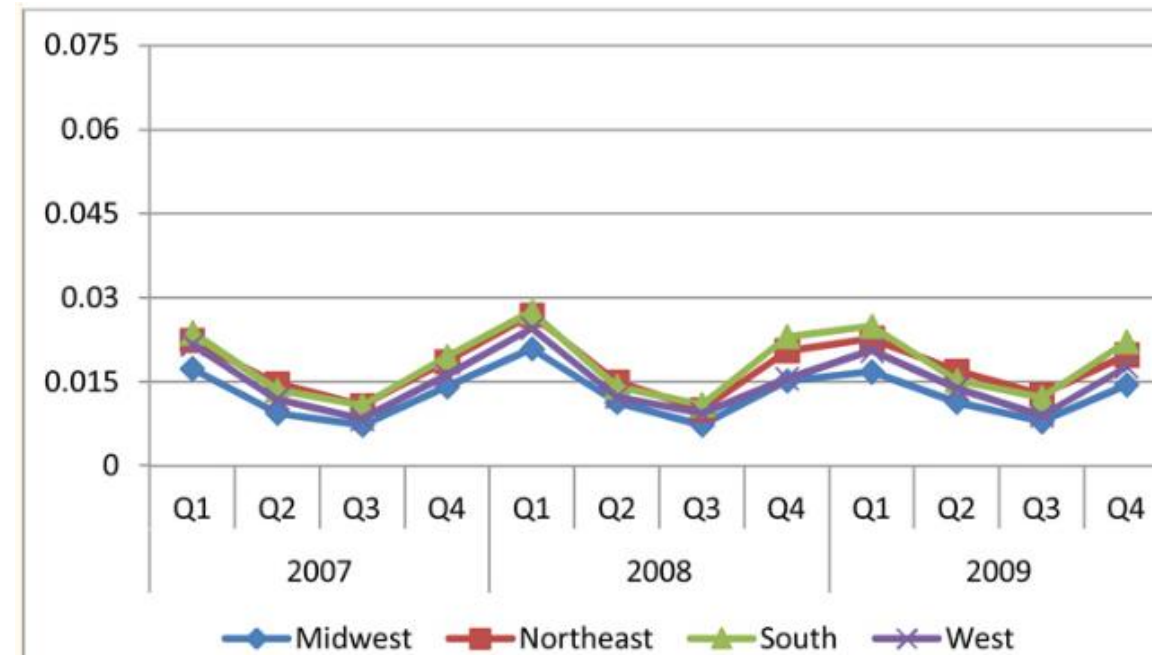


Fleming-Dutra KE, Demirjian A, Bartoces M, Roberts RM, Taylor TH Jr, Hicks LA. Variations in Antibiotic and Azithromycin Prescribing for Children by Geography and Specialty-United States, 2013. *Pediatr Infect Dis J.* 2018 Jan;37(1):52-58.

Community-level factors associated with disparities in antibiotic prescribing: Geographical location



Proportion of patients using any antibiotic



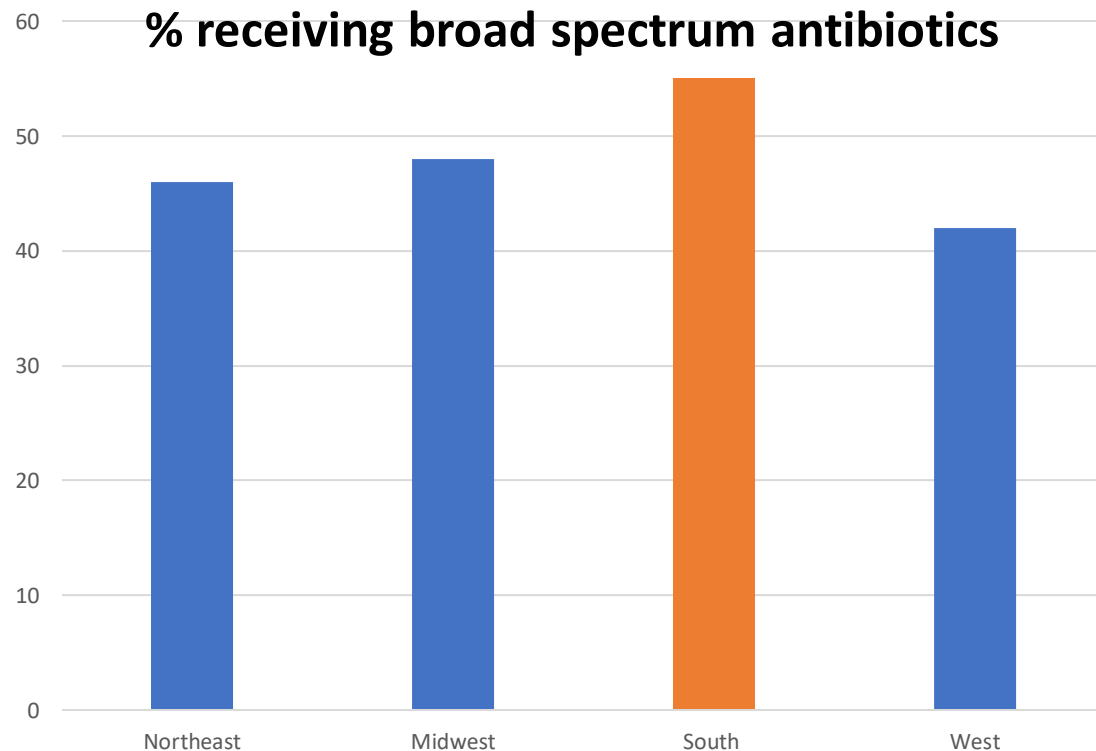
Proportion of patients with the common cold and non-specific upper respiratory infections

Community-level factors associated with disparities in antibiotic prescribing: Geographical location

> *Pediatrics*. 2011 Dec;128(6):1053-61. doi: 10.1542/peds.2011-1337. Epub 2011 Nov 7.

Antibiotic prescribing in ambulatory pediatrics in the United States

Adam L Hersh ¹, Daniel J Shapiro, Andrew T Pavia, Samir S Shah



| US Census region | Broad spectrum prescribing, AOR (95%CI) |
|------------------|---|
| West | 1.00 |
| Northeast | 1.23 (0.82-1.84) |
| Midwest | 1.30 (0.90-1.86) |
| South | 1.82 (1.30-2.55) |

Community-level factors associated with disparities in antibiotic prescribing: Locality

> N C Med J. 2003 Jul-Aug;64(4):148-56.

Antibiotic prescriptions associated with outpatient visits for acute upper respiratory tract infections among adult Medicaid recipients in North Carolina

David W Brown ¹, Renee Taylor, Anne Rogers, Robert Weiser, Meera Kelley

| | Patients with one outpatient visit with a physician (N = 19, 158) | |
|----------|--|--------------------------|
| Locality | n (%) | OR (95% CI) |
| Urban | 3419 (56.5) | 1.00 |
| Rural | 7811 (59.6) | 1.13 (1.06, 1.20) |

Community-level factors associated with disparities in antibiotic prescribing: Locality

› [Infect Control Hosp Epidemiol. 2022 May;43\(5\):582-588. doi: 10.1017/ice.2021.177.](#)

Epub 2021 May 12.

Inappropriate outpatient antibiotic use in children insured by Kentucky Medicaid

Bethany A Wattles ¹, Kahir S Jawad ¹, Yana Feygin ¹, Maiying Kong ², Navjyot K Vidwan ³,

| Locality | AOR (95%CI) |
|----------|-------------------|
| Urban | Reference |
| Rural | 1.09 (1.07 -1.10) |

Healthcare-level factors associated with disparities in antibiotic prescribing: Health coverage

| Source of payment | Encounters that identified any infection for which antibiotics could be prescribed (n=8307) | | Encounters that identified a respiratory tract related infection (n=4975) | |
|-------------------|---|--------------------------|---|--------------------------|
| | Rates, % | AOR (95% CI) | Rates, % | AOR (95% CI) |
| Private/Other | 53.0 | Ref | 54.9 | Ref |
| Medicaid | 40.9 | 0.61 (0.47, 0.79) | 39.0 | 0.54 (0.39, 0.77) |
| Self-pay | 46.4 | 1.00 (0.85, 1.17) | 47.8 | 0.99 (0.80, 1.23) |

Steinberg MB, Akincigil A, Kim EJ, Shallis R, Delnevo CD. Tobacco Smoking as a Risk Factor for Increased Antibiotic Prescription. Am J Prev Med. 2016 Jun;50(6):692-698

Healthcare-level factors associated with disparities in antibiotic prescribing: Clinical setting

| Clinical Setting | Antibiotics prescribed for ≥ 10 days , OR (95% CI) |
|-----------------------|---|
| Pediatric clinic | Reference |
| Non-pediatric clinic | 1.16 (0.81 -1.67) |
| Emergency/Urgent care | 1.73 (1.26 -2.38) |

Frost HM, Becker LF, Knepper BC, Shihadeh KC, Jenkins TC. Antibiotic Prescribing Patterns for Acute Otitis Media for Children 2 Years and Older. J Pediatr. 2020 May;220:109-115.e1.

Individual-level factors associated with disparities in antibiotic prescribing

- Patient related factors
- Provider related factors



Image by [Stefan Schranz](#) from [Pixabay](#)

Individual-level factors associated with disparities in antibiotic prescribing:
Race/ethnicity

Racial or ethnicity minority groups = Low likelihood of

- Diagnosis with a condition that requires antibiotics
- Receiving a prescription for antibiotics
- Receiving broad spectrum antibiotics



Individual-level factors associated with disparities in antibiotic prescribing: Race/ethnicity

- JAMA, 2021 *Variation by Race in Antibiotics Prescribed for Hospitalized Patients With Skin and Soft Tissue Infections*

[Alysse G. Wurcel, MD, MS,^{1,2}](#) [Utibe R. Essien, MD, MPH,³](#) [Christina Ortiz, BS,²](#) [Xiaoqing Fu, MS,⁴](#) [Christian Mancini,](#)

- 1242 inpatient adults , 91 hospitals from Oct 2018 to Jan 2019
- 18% Black and 69% White patients

| | Whites (n=854) | Blacks (n=224) | Adjusted OR (95%CI) | P value |
|-------------|----------------|----------------|---------------------|---------|
| Cefazolin | 114 (13%) | 11(5%) | 2.82 (1.41-5.63) | 0.003 |
| Clindamycin | 67 (7%) | 27(12%) | 0.54 (0.30-0.96) | 0.04 |

Individual-level factors associated with disparities in antibiotic prescribing: Race/ethnicity

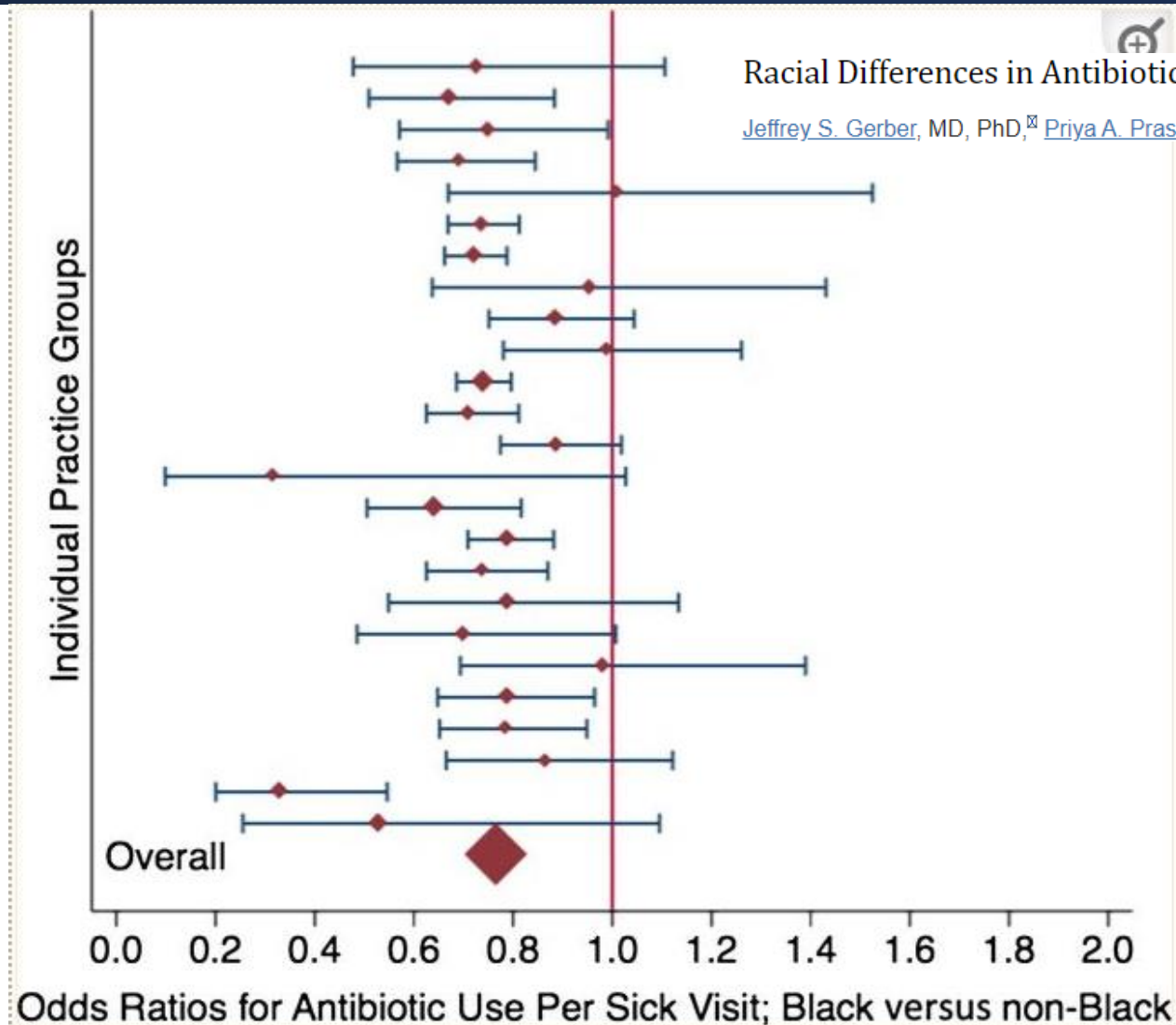
Pediatrics 2013 Racial Differences in Antibiotic Prescribing by Primary Care Pediatricians

[Jeffrey S. Gerber, MD, PhD](#),[✉] [Priya A. Prasad, MPH](#), [A. Russell Localio, PhD](#), [Alexander G. Fiks, MD, MSCE](#),

Within-Clinician Diagnosis Rate of Common Pediatric Conditions, by Patient Race

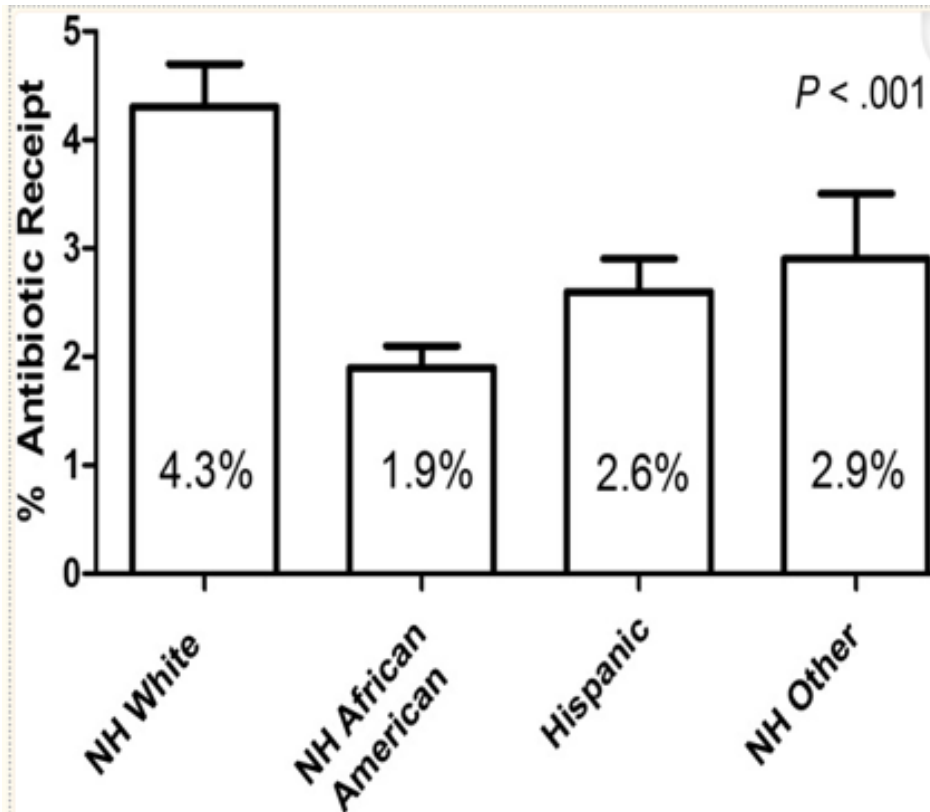
| Diagnosis ^a | OR, Black versus Nonblack (95% CI) ^b | P Value | Standardized Probability, % (95% CI) ^c | |
|------------------------|---|---------|---|------------------|
| | | | Black | Nonblack |
| AOM | 0.79 (0.75–0.82) | <.001 | 8.7 (8.2–9.2) | 10.7 (10.3–11.2) |
| Sinusitis | 0.79 (0.73–0.86) | <.001 | 3.6 (3.1–4.0) | 4.4 (4.1–4.8) |
| GAS pharyngitis | 0.60 (0.55–0.66) | <.001 | 2.3 (2.1–2.5) | 3.7 (3.5–3.8) |
| Pneumonia | 1.0 (0.89–1.1) | .808 | 1.3 (1.1–1.4) | 1.3 (1.1–1.4) |
| UTI | 1.0 (0.93–1.1) | .725 | 1.7 (1.7–1.8) | 1.7 (1.6–1.8) |

Individual-level factors associated with disparities in antibiotic prescribing: Race/ethnicity



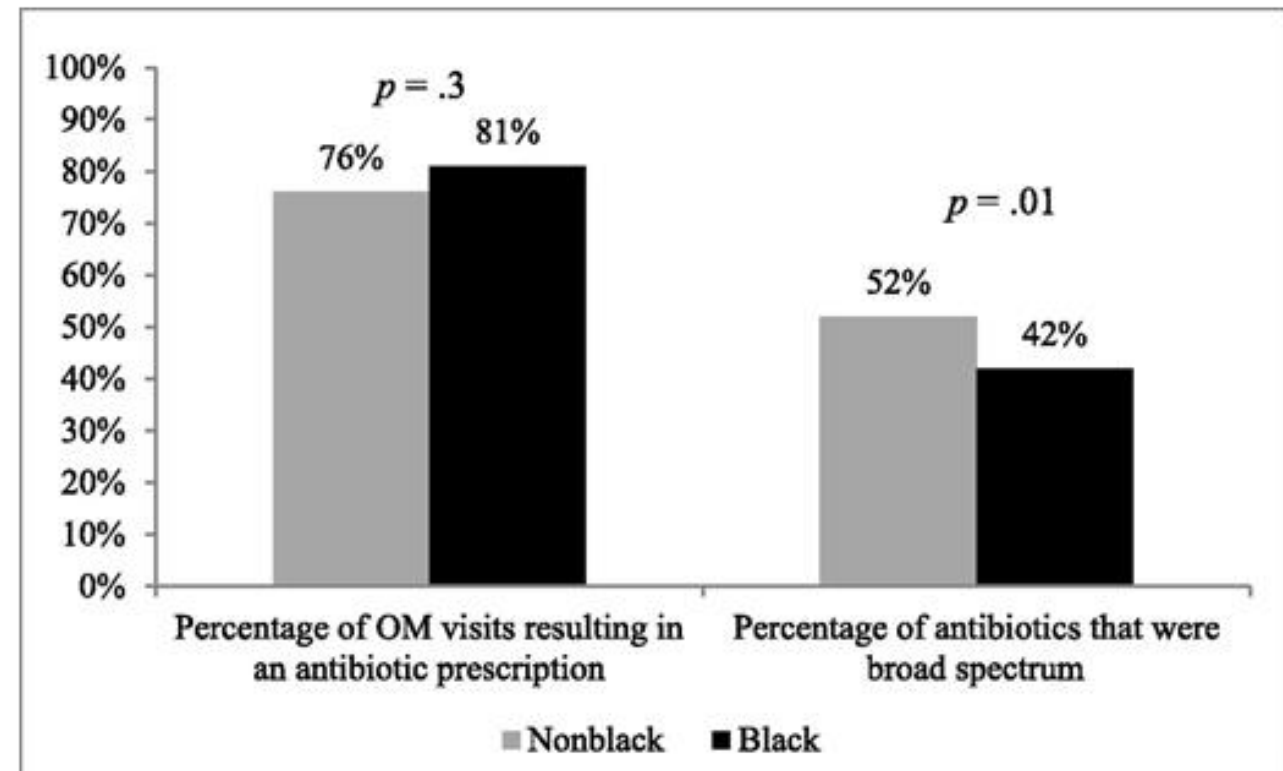
Racial Differences in Antibiotic Prescribing by Primary Care Pediatricians
Jeffrey S. Gerber, MD, PhD, [✉] Priya A. Prasad, MPH, A. Russell Localio, PhD, Alexander G. Fiks, MD, MSc
Pediatrics 2013

Individual-level factors associated with disparities in antibiotic prescribing: Race/Ethnicity



Proportion of visits by children diagnosed with acute viral URI and receiving antibiotic by race and ethnicity

Goyal MK et al. Pediatric Care Applied Research Network (PECARN). Racial and Ethnic Differences in Antibiotic Use for Viral Illness in Emergency Departments. *Pediatrics*. 2017 Oct;140(4):e20170203



Otitis media visits vs broad-spectrum antibiotic prescription

Fleming-Dutra et al. Race, Otitis media and antibiotic selection . *Pediatrics* (2014) 134 (6): 1059–1066

Individual-level factors associated with disparities in antibiotic prescribing: Age

> Am J Obstet Gynecol. 2021 Sep;225(3):272.e1-272.e11. doi: 10.1016/j.ajog.2021.04.218.
Epub 2021 Apr 20.

Current prescribing practices and guideline concordance for the treatment of uncomplicated urinary tract infections in women

Joanna L Langner ¹, Kim F Chiang ², Randall S Stafford ²

| Subgroup | Multivariate Logistic Regression | | |
|----------------|----------------------------------|---------------|-------|
| | OR | 95% CI for OR | |
| | | Lower | Upper |
| Patient age, y | | | |
| 18–29 | 1.60 ^b | 1.36 | 1.88 |
| 30–44 | 1.21 ^b | 1.03 | 1.42 |
| 45–75 | Referent | | |

Individual-level factors associated with disparities in antibiotic prescribing: Age

› [Infect Control Hosp Epidemiol. 2022 May;43\(5\):582-588. doi: 10.1017/ice.2021.177.](#)

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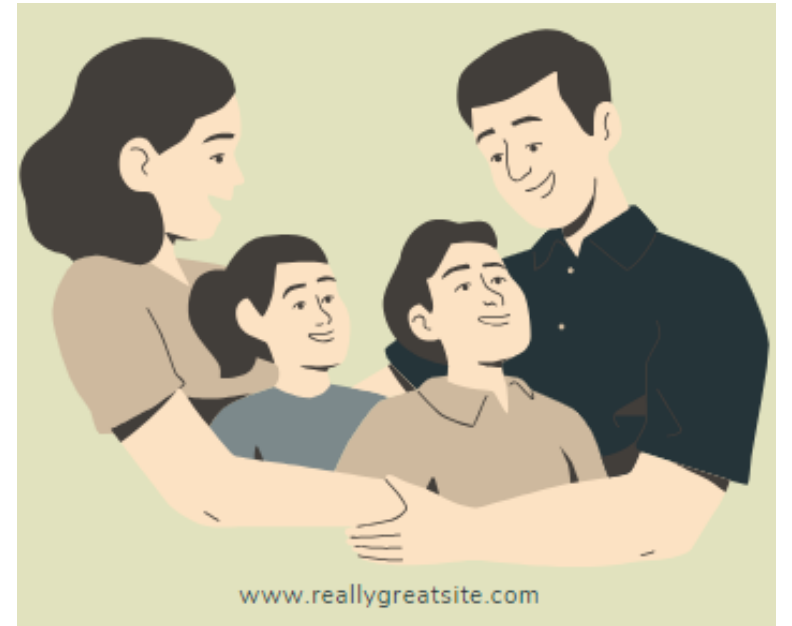
Bethany A Wattles ¹, Kahir S Jawad ¹, Yana Feygin ¹, Maiying Kong ², Navjyot K Vidwan ³,

| Age | |
|---------|------------------|
| 10–19 y | Reference |
| 3–9 y | 1.05 (1.03–1.07) |
| 0–2 y | 1.39 (1.37–1.41) |

Individual level
factors
associated with
disparities in
antibiotic
prescribing

Suggested reasons for patient-related disparities

- Physician perception of differential in parental pressure
- Racial/Ethnic differences in expectations
- Concern for antibiotic allergies or multidrug-resistant infections
- Health insurance type
- Implicit bias of physicians



Individual level factors associated with disparities in antibiotic prescribing – Healthcare providers

- Healthcare provider in rural settings
- Years in clinical practice
- High volume specialty such as urgent care
- Providers \geq 30 years of age
- By specialty and provider type
- (Primary care, APP, NP)

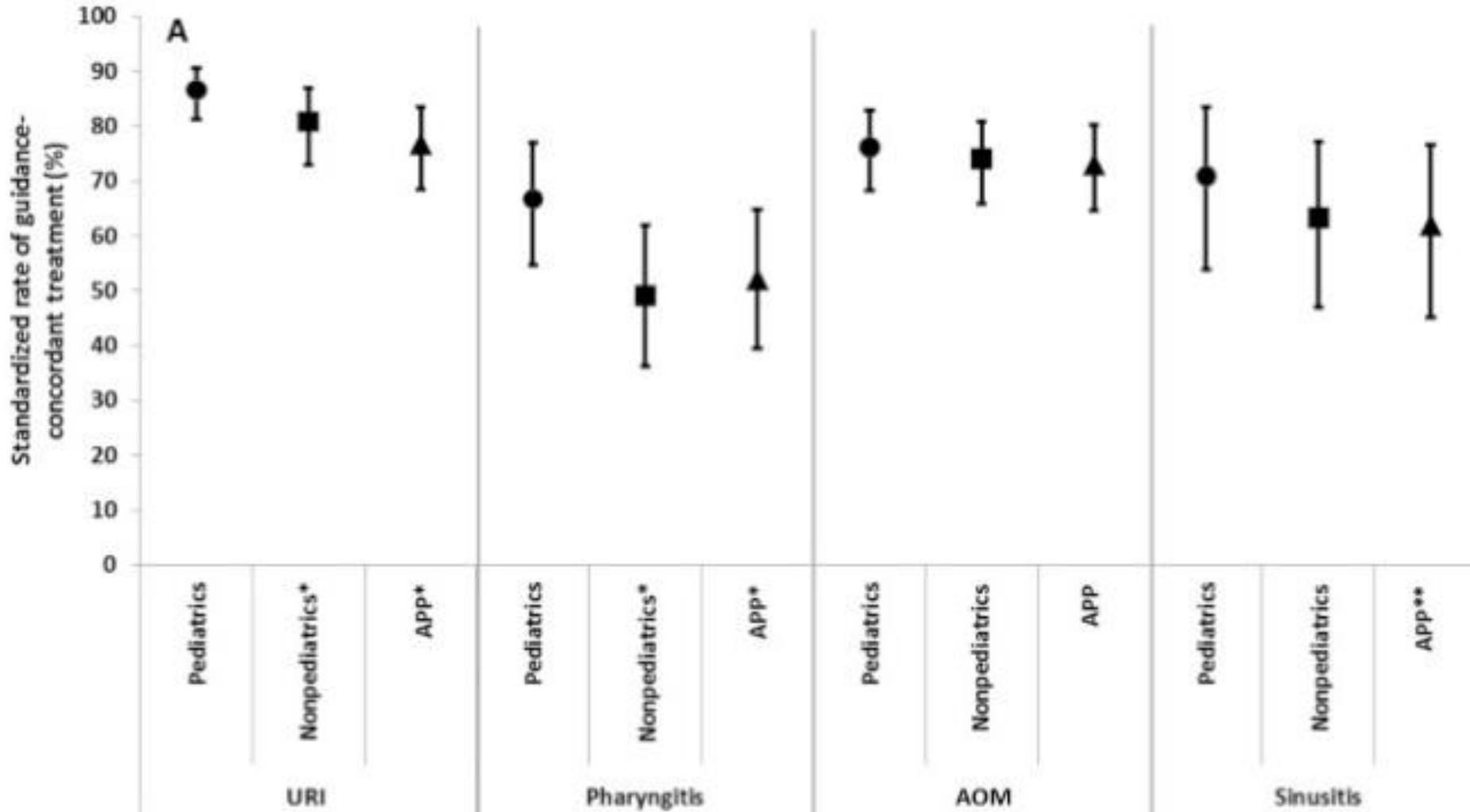
Schmidt ML, Spencer MD, Davidson LE. Patient, Provider, and Practice Characteristics Associated with Inappropriate Antimicrobial Prescribing in Ambulatory Practices. *Infect Control Hosp Epidemiol.* 2018 Mar;39(3):307-315.

Childers RC, Bisanz B, Vilke GM, Brennan JJ, Cronin AO, Castillo EM. A retrospective review of antibiotic use for acute respiratory infections in urgent-care patients. *Antimicrob Steward Healthc Epidemiol.* 2022 Dec 5;2(1):e189

Individual level factors associated with disparities in antibiotic prescribing – Healthcare providers

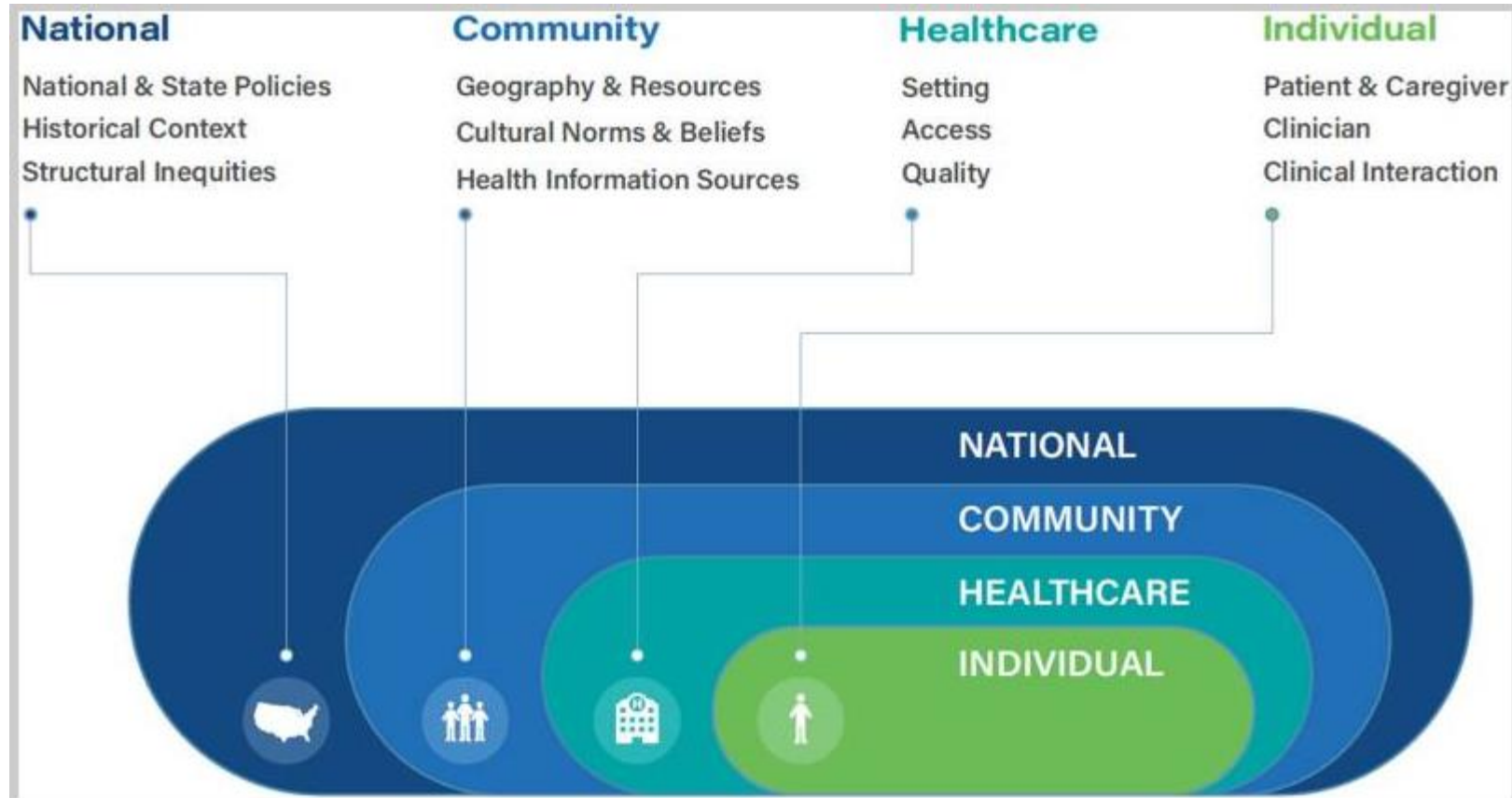
| Primary Care physician | Encounters that identified any infection for which antibiotics could be prescribed (n=8307) | | Encounters that identified a respiratory tract related infection (n=4975) | |
|------------------------|---|-------------------------|---|--------------------------|
| | Rates, % | AOR (95% CI) | Rates, % | AOR (95% CI) |
| No | 42.2 | Ref | 43.7 | Ref |
| Yes | 54.6 | 1.64 (1.39,1.94) | 55.1 | 1.50 (1.21, 1.88) |

Individual level factors associated with disparities in antibiotic prescribing – Healthcare providers



Frost HM, McLean HQ, Chow BDW. Variability in Antibiotic Prescribing for Upper Respiratory Illnesses by Provider Specialty. J Pediatr. 2018 Dec;203:76-85.e8

Factors associated with disparities in antibiotic prescribing



Kim C et al.. Health Equity and Antibiotic Prescribing in the United States: A Systematic Scoping Review. Open Forum Infect Dis. 2023 Aug 19;10(9):ofad440.

Way Forward: Community-level interventions



Expansion of
antibiotic
stewardship
programs to rural
areas



Community-wide
campaigns that
target key
stakeholders



Provision of
adequate resources
and experts - e.g
telemedicine

Perz JF, Craig AS, Coffey CS, Jorgensen DM, Mitchel E, Hall S, Schaffner W, Griffin MR. Changes in antibiotic prescribing for children after a community-wide campaign. JAMA. 2002 Jun 19;287(23):3103-9.

Way Forward: Health system-level interventions



- Availability of clinical decision support tools



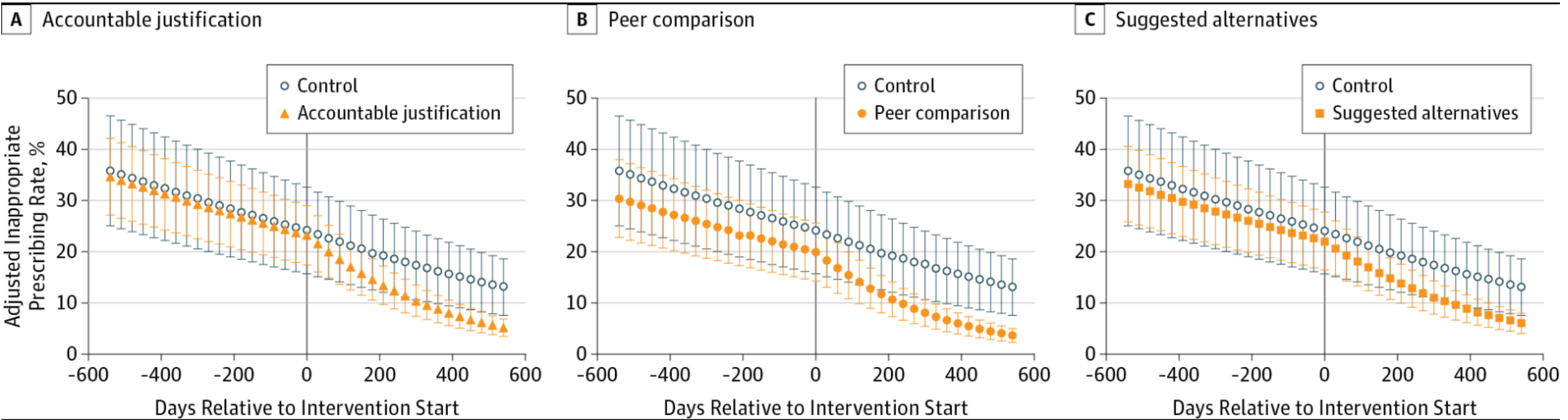
- Access to clinical pharmacists and infectious disease specialists



- Inclusion of all provider types in antibiotic stewardship efforts

Knobloch MJ, Musuuza J, Baubie K, Saban KL, Suda KJ, Safdar N. Nurse practitioners as antibiotic stewards: Examining prescribing patterns and perceptions. *Am J Infect Control.* 2021 Aug;49(8):1052-1057..

Way Forward: Health system-level interventions



Meeker D, Linder JA, Fox CR, et al. Effect of Behavioral Interventions on Inappropriate Antibiotic Prescribing Among Primary Care Practices: A Randomized Clinical Trial. *JAMA*. 2016;315(6):562–570.

Way Forward: Individual - level interventions



Teamwork



Awareness



Patient-provider
Relationships



Providers as
Educators

Knobloch MJ, Musuza J, Baubie K, Saban KL, Suda KJ, Safdar N. Nurse practitioners as antibiotic stewards: Examining prescribing patterns and perceptions. *Am J Infect Control.* 2021 Aug;49(8):1052-1057.

Way Forward

| Category | Students <u>without</u> patient-centered attitude (Mean score) | Students <u>with</u> patient-centered attitude (Mean score) | Mean difference | P-value |
|-----------------------------------|--|---|-----------------|--------------|
| White standardized patient | | | | |
| Interpersonal skills | 77.0 | 77.6 | 0.6 | 0.559 |
| History | 65.2 | 66.5 | 0.3 | 0.526 |
| Physical exam | 76.4 | 76.8 | 0.4 | 0.881 |
| Counseling | 92.1 | 92.3 | 0.2 | 0.891 |
| Black standardized patient | | | | |
| Interpersonal skills | 69.4 | 71.4 | 2.0 | 0.010 |
| History | 61.1 | 63.8 | 2.7 | 0.003 |
| Physical exam | 68.6 | 73.6 | 5.0 | 0.311 |
| Counseling | 88.7 | 92.1 | 3.4 | 0.002 |

Beach MC, Rosner M, Cooper LA, Duggan PS, Shatzer J. Can patient-centered attitudes reduce racial and ethnic disparities in care? Acad Med. 2007 Feb;82(2):193-8..

Way Forward



Teamwork



Awareness



Patient-provider
Relationships



Providers as
Educators

Knobloch MJ, Musuuza J, Baubie K, Saban KL, Suda KJ, Safdar N. Nurse practitioners as antibiotic stewards: Examining prescribing patterns and perceptions. *Am J Infect Control.* 2021 Aug;49(8):1052-1057..



Thank you



Questions?



chineme_enyioha@
med.unc.edu



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