

Updating Your Knowledge of Dental Caries: Causes, Concerns, and Considerations

CareQuest Institute Continuing Education Webinar

June 15, 2023

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- We'll also make the slides and recording available on carequest.org.

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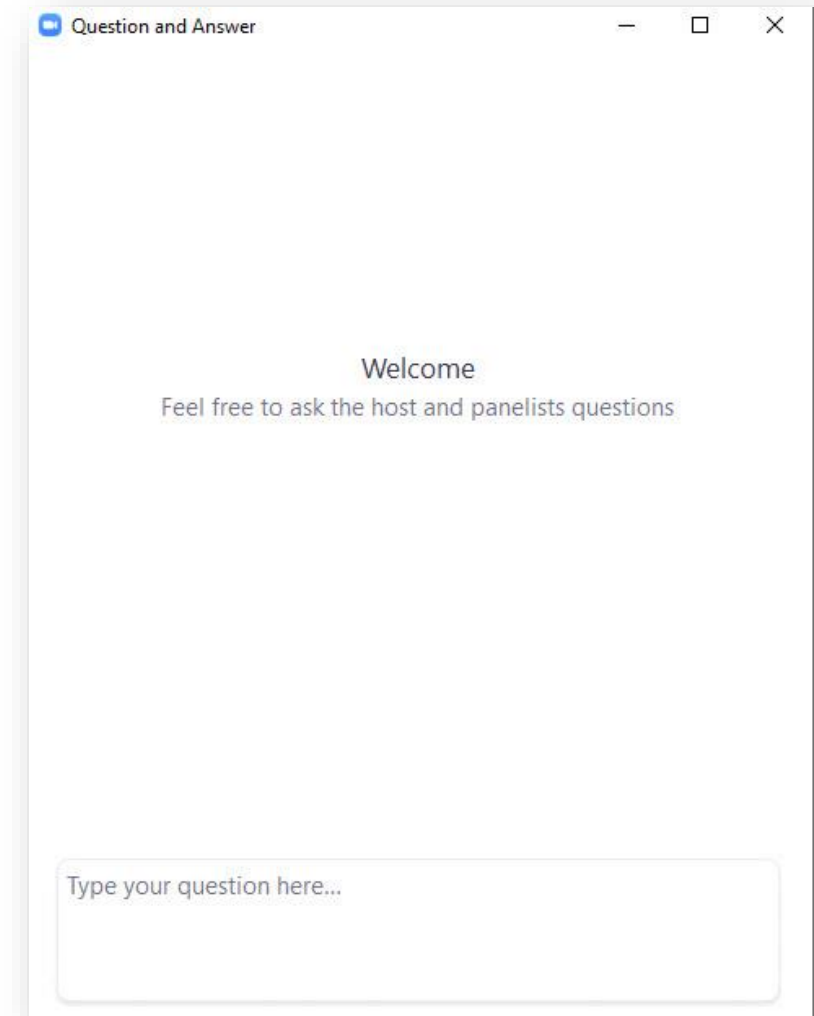
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*Full disclosures available upon request



Question & Answer Logistics

- Feel free to enter your questions into the **Question & Answer box** throughout the presentations.
- We will turn to your questions and comments toward the end of the hour.



Thank You!



Learning Objectives

At the end of this webinar, you'll be able to:

- Summarize the newest findings on the epidemiology of caries disease.
- Discuss the impact of saliva, diet, oral biofilms, and pH in the caries process.
- Identify the etiology of dental caries, including the impact of host factors, saliva, diet, and oral hygiene in caries balance.
- Recognize the key biological concepts and the histopathology of caries disease.

Updating Your Knowledge of Dental Caries: Causes, Concerns, and Considerations



WEBINAR | Thursday, June 15, 2023 | 7–8 p.m. ET | ADA CERP Credits: 1

MODERATOR



**Erinne Kennedy,
DMD, MPH, MMSc**

Assistant Dean for Curriculum and Integrated Learning, College of Dental Medicine, Kansas City University

PRESENTER



**Marcelle Nascimento,
DDS, MS, PhD**

Professor and Program Director of the Dental Clinical Research Unit, College of Dentistry, University of Florida

PRESENTER



**Bruce A. Dye,
DDS, MPH**

Delta Dental of Colorado Foundation Chair in Oral Health Equity; Professor and Chair, Department of Community Dentistry and Population Health School of Dental Medicine

Primer on the Epidemiology of Dental Caries in the United States

Bruce A. Dye, DDS, MPH

June 15, 2023



The Plan

- Setting the stage
- Reviewing epidemiologic measures for caries
- Highlighting key issues affecting the distribution of caries in the US



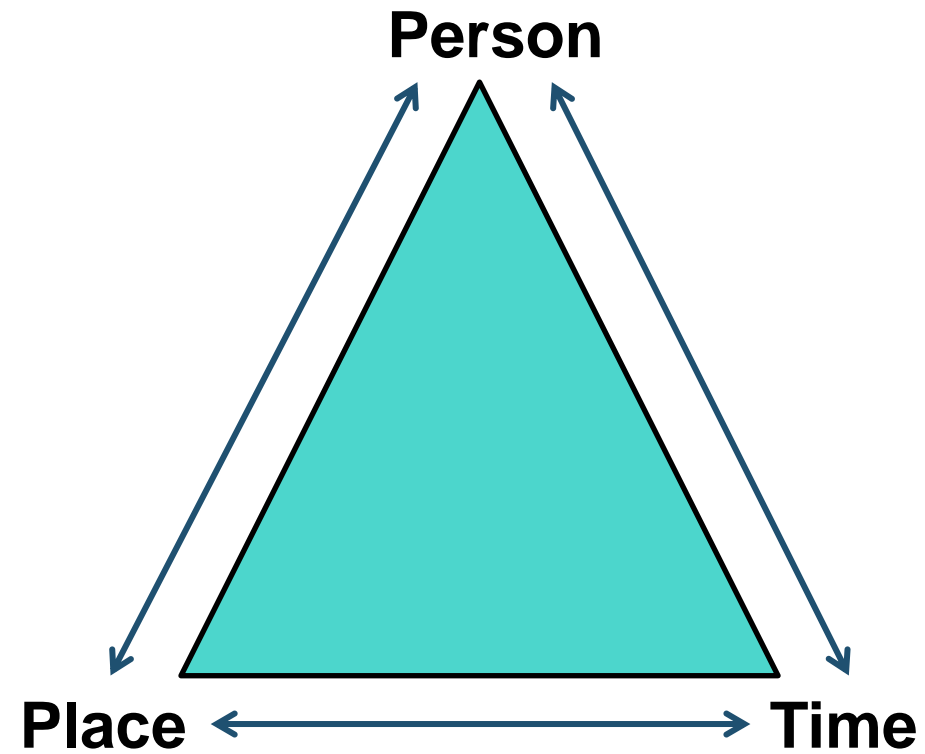
Public Health Core Sciences

- **Public health surveillance** - monitors a public health situation
- **Epidemiology** - determines where diseases originate, how or why they move through populations, and how we can prevent them

The Epidemiology Triad

Epidemiology is about collecting data to build a story:

It's about answering the who, the where, and the when



Essential Terms in Describing Disease Occurrence

Prevalence

- Is the number of affected persons present in a population at specified time divided by the number of persons in the population at that time
- **Caries prevalence** would be percentage of people with dental caries at one point in time

Incidence

- Is the number of new cases of a disease that occur during a specified time in a population at risk for developing the disease
- Measure of transition from non-disease to a disease state
- **Caries incidence** is new carious lesions over a defined duration of time

Essential Terms in Describing Disease Occurrence

Trend

- Change of differences in prevalence or incidence over time
- When describing “trend,” change over 3 or more points in time is preferred
- Can also be reported by location, by age, by gender, by socioeconomic status, by ethnicity, by educational attainment, etc.

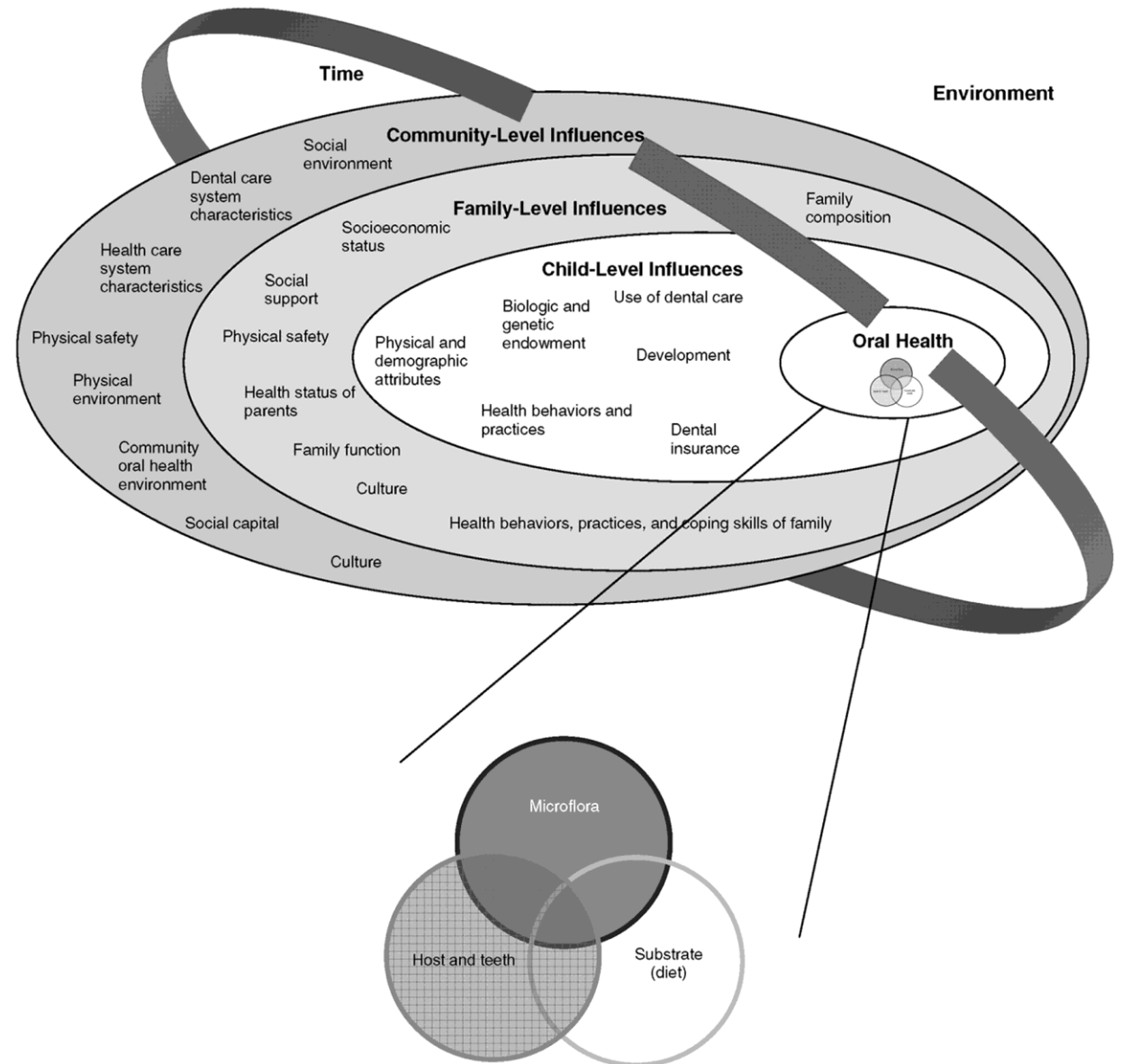
Essential Terms in Describing Disease Occurrence

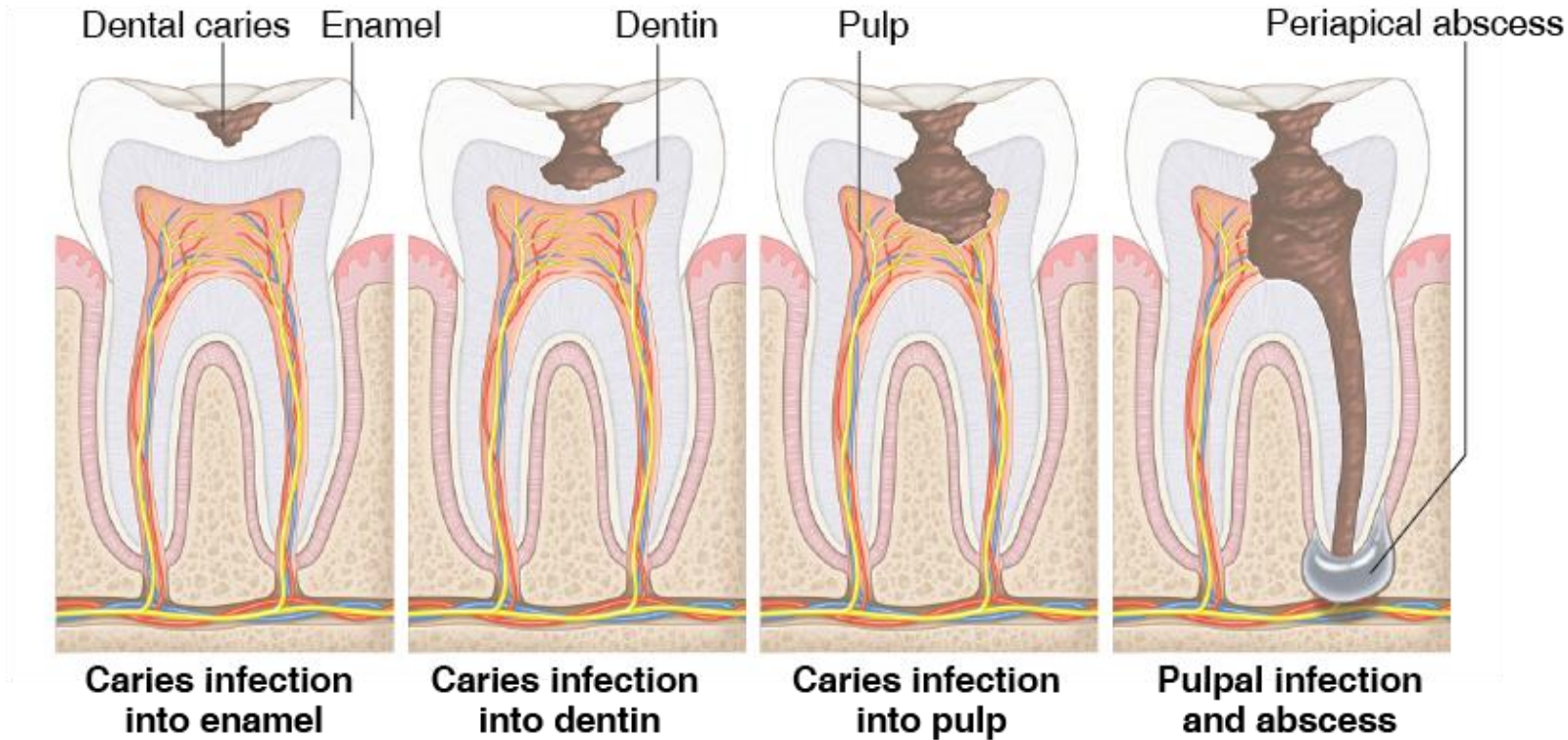
Disease vs Illness

- Disease is a pathological process – deviation from biologic norm
- Illness is a person's experience of an adverse health event
- **Dental caries – the disease process is:**
 - Dynamic sequence of biofilm-tooth interactions occurring over time on/within a tooth surface
 - Shift in the balance between protective factors (that aid in remineralization) and destructive factors (that aid in demineralization) that favor mineral loss within tooth structure over time
 - Process can be arrested at any time
 - Influenced by diet and other behaviors
 - Affects all ages (chronic, or lifelong, disease)
 - Disproportionally affects certain populations creating important health disparities
 - Multifactorial

When thinking about what **multifactorial** means ...

From: Influences on Children's Oral Health: A Conceptual Model





Understanding the traditional perspective of caries progression is important to understanding how and why we measure caries a particular way.

Source: Created by Jonathan Dimes for this NIH Report.

Dental Caries Indices – First Modern Standard

- **DMFT Index**

- Henry Klein, Carole Palmer, JW Knutson – 1938
- Originally developed for permanent teeth
- Only 28 teeth are included (exclude 3rd molars)
- Exclude teeth restored or extracted for any reason not associated with the caries process
- Decayed lesion is cavitated
- Coronal lesions only
- Visual/tactile assessment (requires hand tools: Mirror and Explorer)
- Remains the standard index used in the US today – critical to national oral health surveillance efforts since the 1960s

Dental Caries Indices – Permanent Teeth

- **DMFT | DMFS Index**
 - D – decayed (untreated decay)
 - M – missing (due to caries)
 - F – filled (restored as a result of caries)
 - T – teeth | S – surface
- Range of index score: (T: 0-28) or (S: 0-128)
- **Common interpretations**
 - DMFT or DMFS = 0 (Caries Free)
 - DMFT or DMFS > 0 (Have Caries experience)
 - DT or DS > 0 (Have Untreated Dental Decay)

Dental Caries Indices – Primary Teeth

- **dft | dfs Index**
 - d – decayed (untreated decay)
 - f – filled (restored as a result of caries)
 - t – teeth | s – surface
- Range of index score: (t: 0-20) or (s: 0-88)
- **Common interpretations**
 - dft or dfs = 0 (Caries Free)
 - dft or dfs > 0 (Have Caries Experience in Primary Dentition)
 - dt or ds > 0 (Have Untreated Dental Decay)

Dental Caries Indices – First “Comprehensive” Caries Index

- **International Caries Detection and Assessment System (ICDAS)**
 - Recommendations from 2001 NIH Consensus Conference on the Detection and Management of Dental Caries Throughout Life
 - Developed in 2002 by researchers from the UK, USA, Europe
 - Unified system of caries detection
 - Coronal caries
 - Root caries
 - Caries adjacent to restorations or sealants
- Based on contemporary understanding of the carious process
- Mostly a visual assessment (Hand tool: mirror)

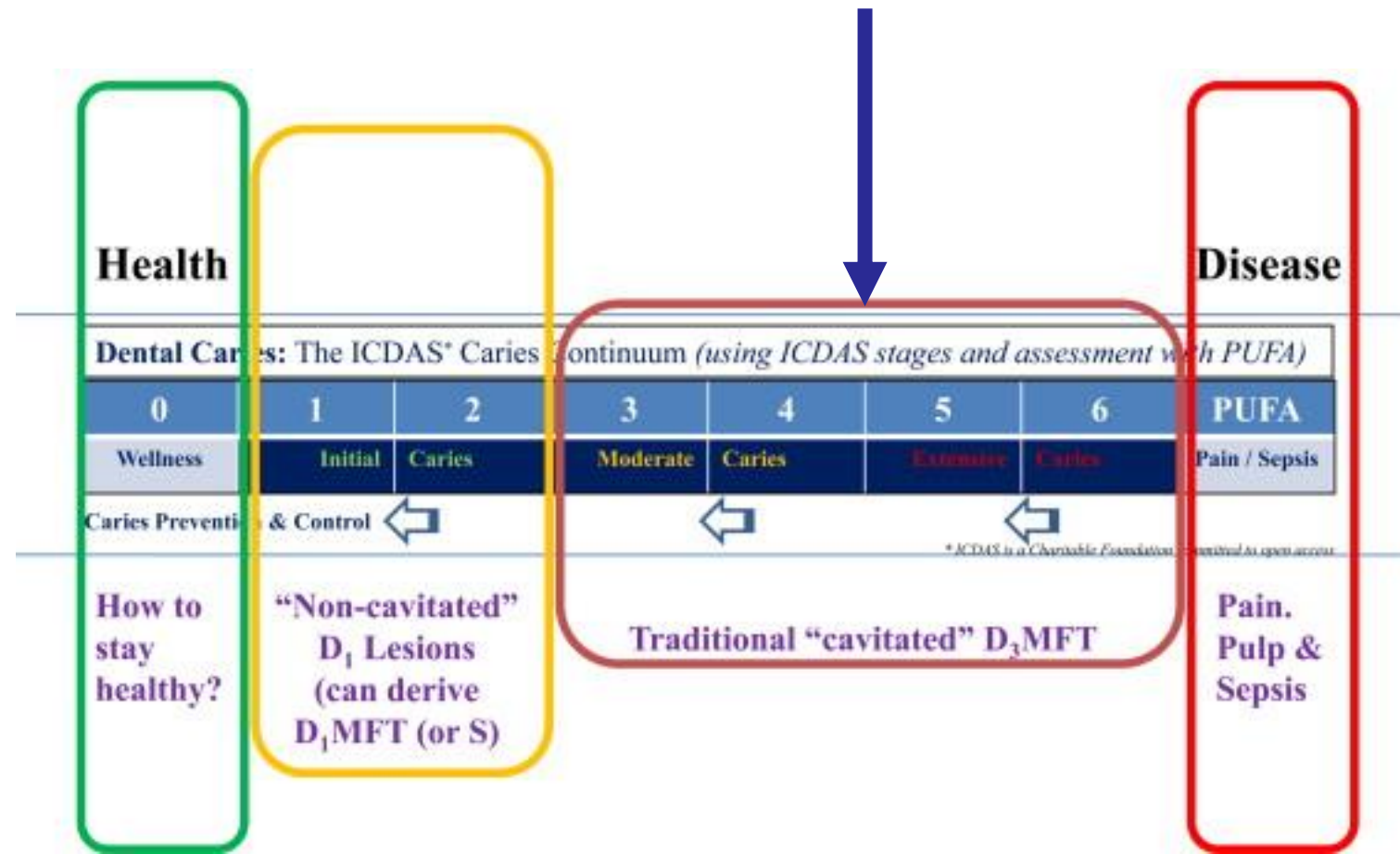
Dental Caries Indices – First “Comprehensive” Caries Index

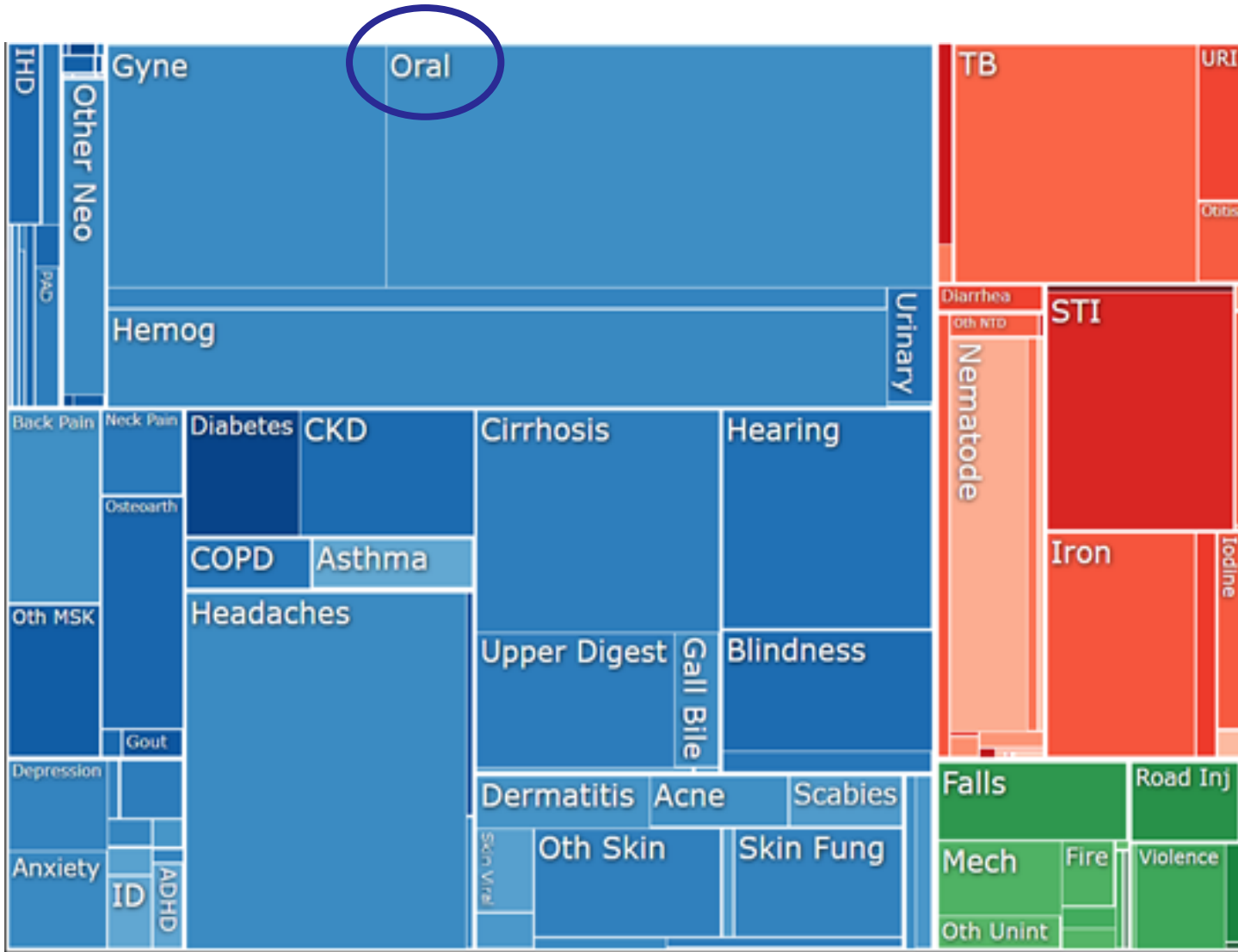
International Caries Detection Assessment System (ICDAS)

Code	Characteristic	WHO	Concept
0	Sound	0	Sound
1	First visual change in enamel	D1	Early Decay
2	More distinct change in enamel	D1	
3	Localized enamel breakdown	D2	Established Decay
4	Underlying dentin shadow	D2	
5	Distinct cavity with visible dentin	D3	Severe Decay
6	Extensive cavity with visible dentin	D3	

Where Does ICDAS and the Conventional DMFT Standard Overlap?

ICDAS measurement concept – A more holistic view

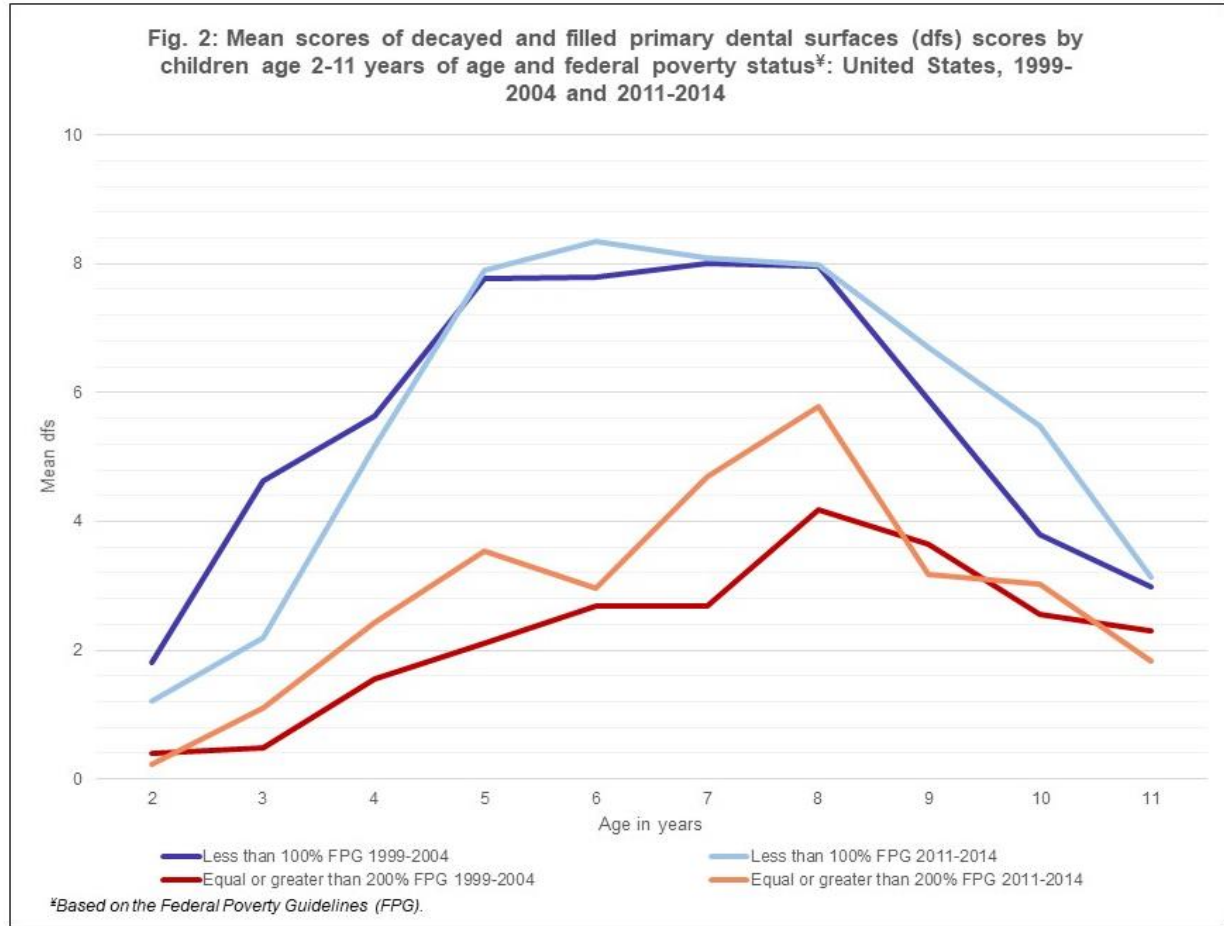




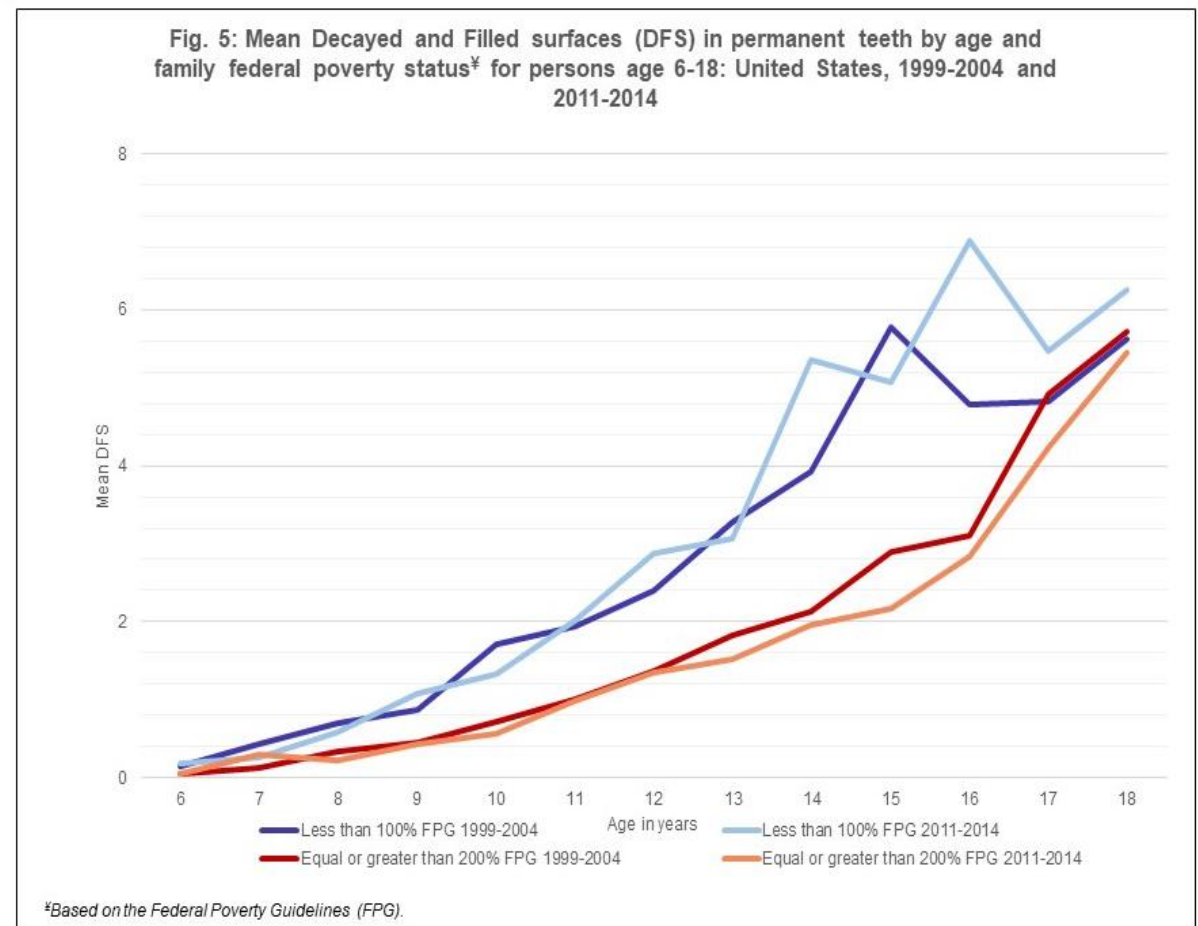
Global Burden of Disease Top 3 Prevalent Cases

- Oral Disorders (3.5B)
 - **Untreated dental caries #1**
 - **Severe perio #11**
- Headaches (3.0B)
- Tuberculosis (1.9B)

Trajectory for caries experience rapidly increases between age 2-3 for preschoolers living in poverty compared to those living in more affluent households. **Why prevention and early intervention is critical for caries prevention in children.**



Unlike in primary dentition of young children, the trajectory for caries experience is more gradual but increases at a higher rate in early adolescence for those living in poverty compared to those living in more affluent households.

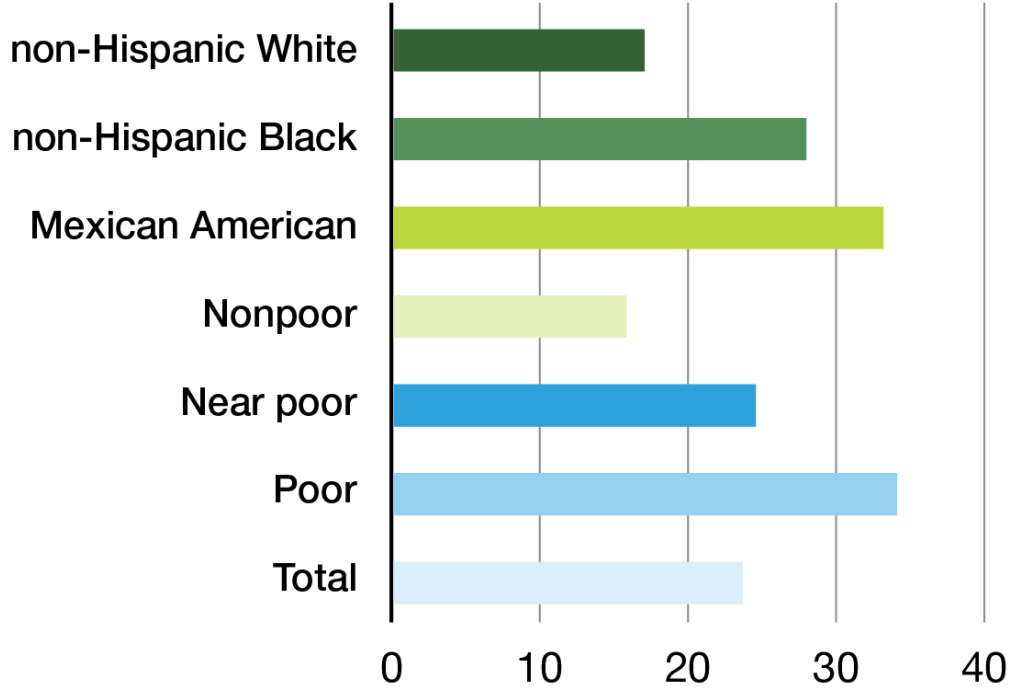




Dental caries experience (*dft | DMFT*)

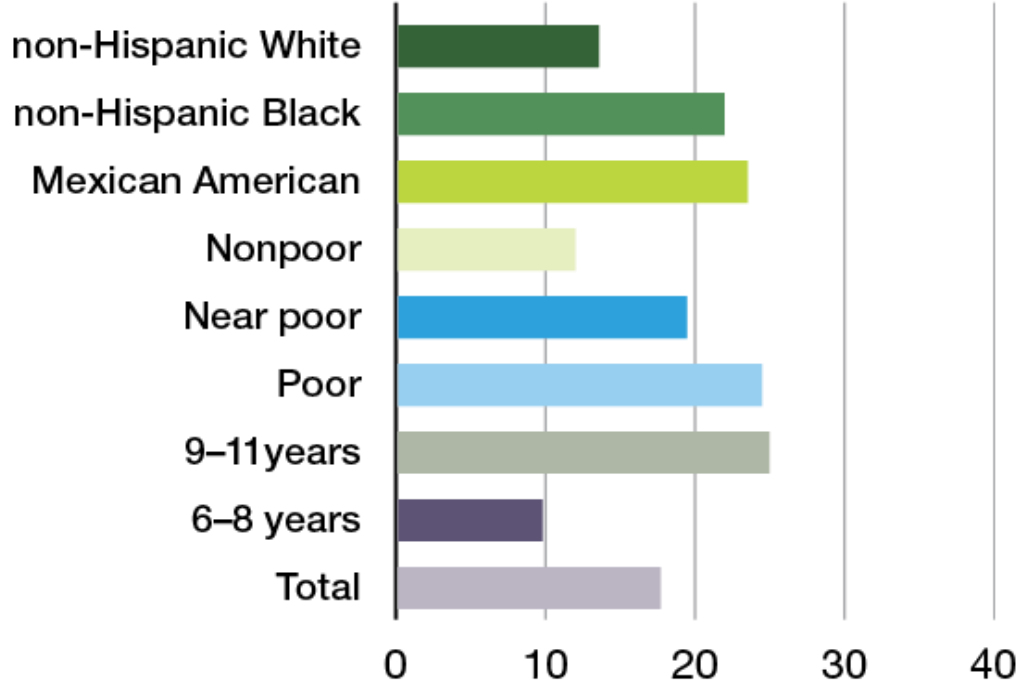
Percentage of Children age 2-5 with caries in **primary teeth**, US 2011-2016

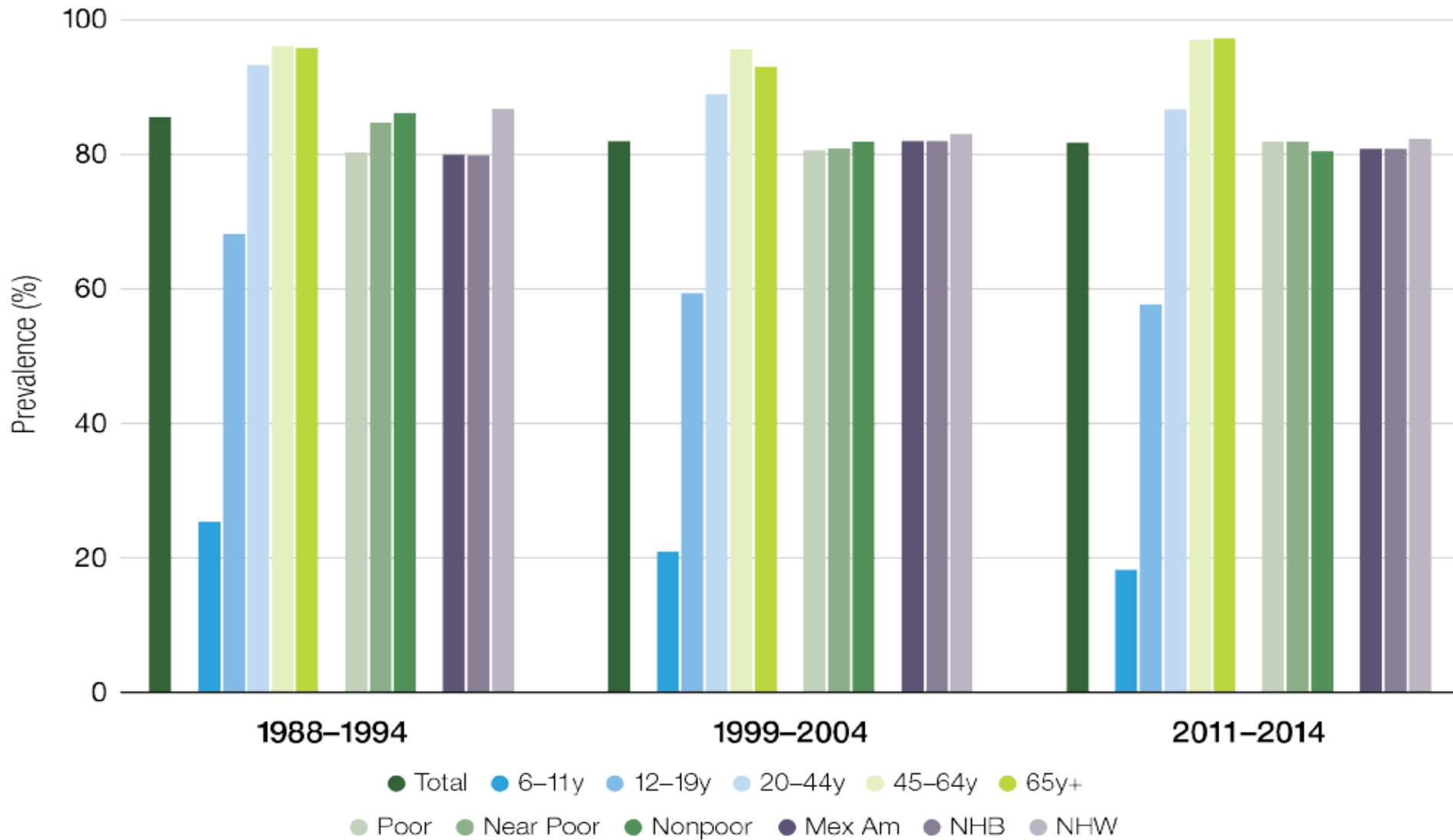
Dental caries experience



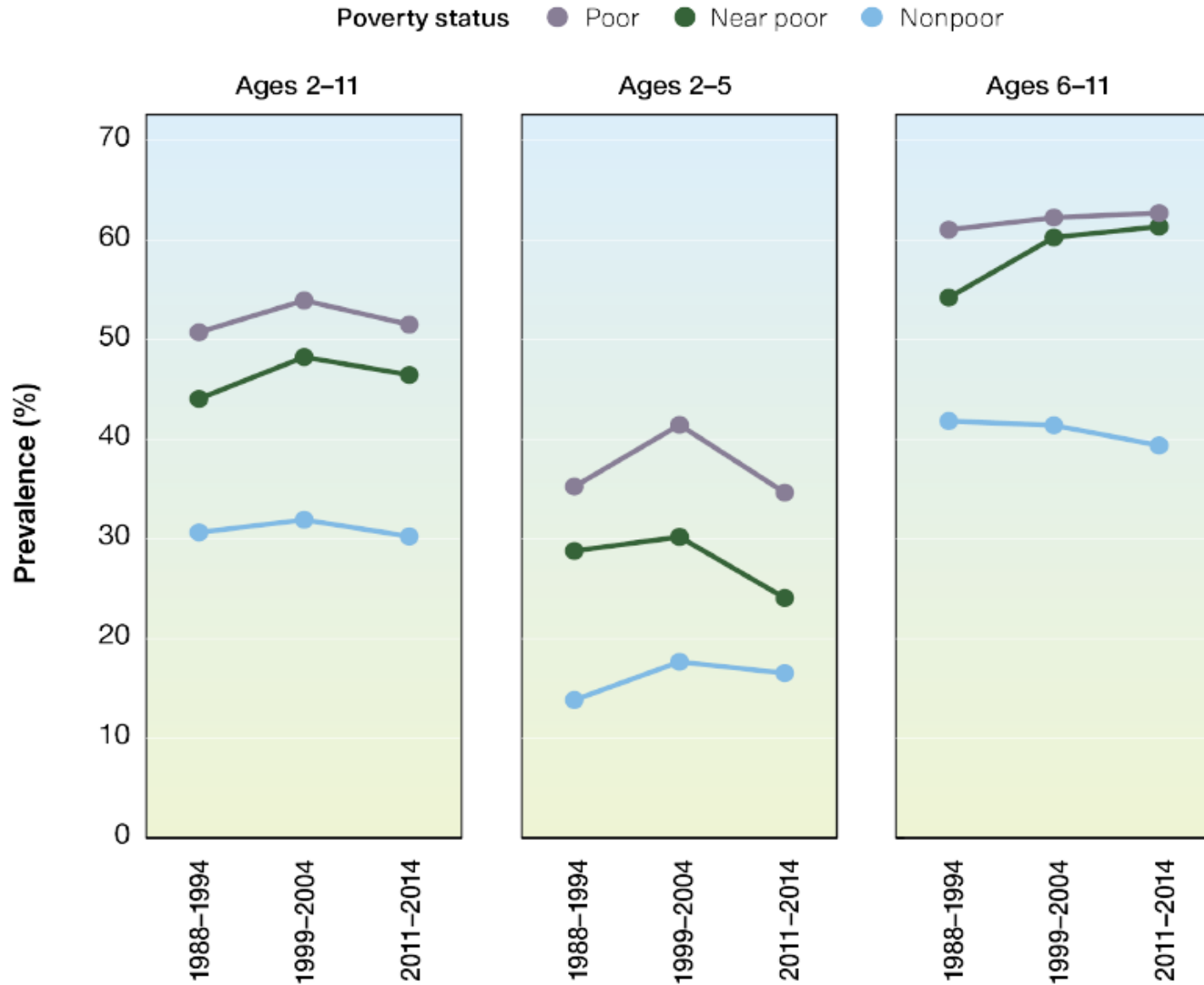
Percentage of Children age 6-11 with caries in **permanent teeth**, US 2011-2016

Dental caries experience



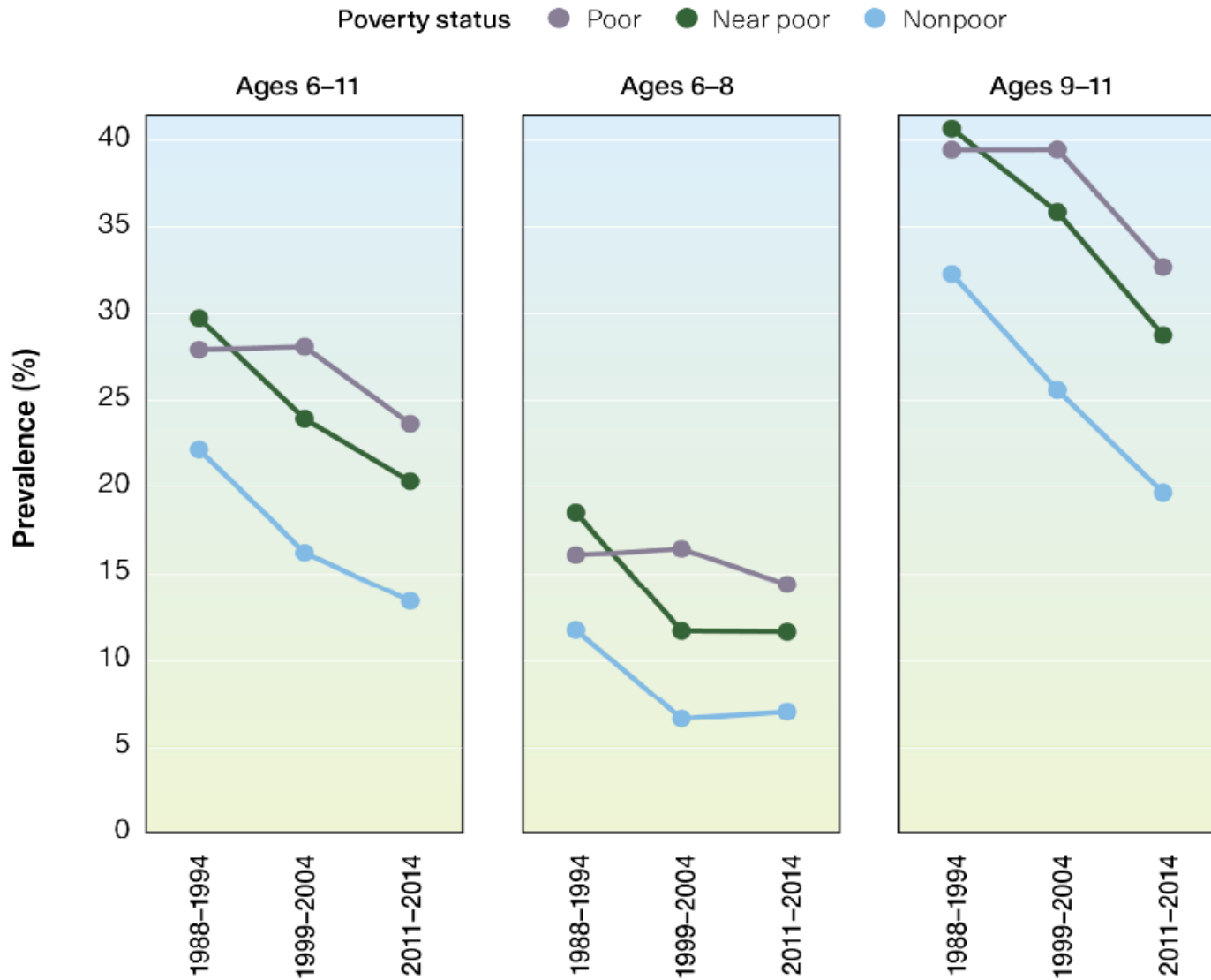


Trends in dental caries experience in **permanent teeth** across the lifespan, US 1988-2014



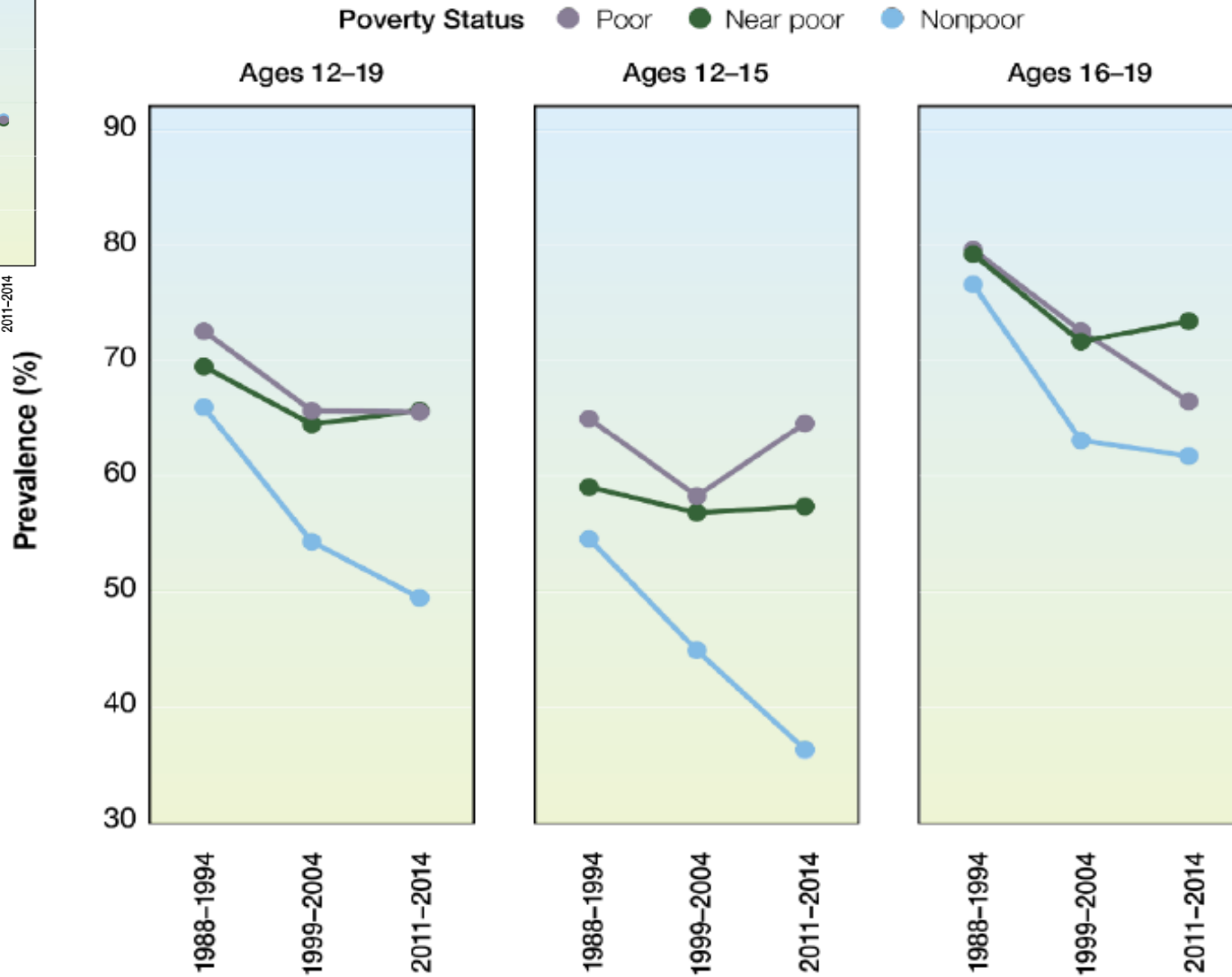
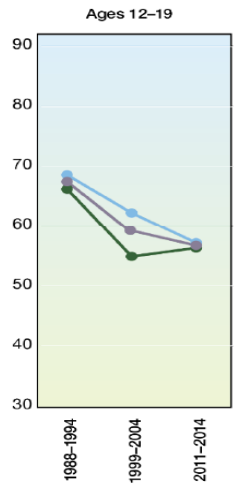
Trends in dental caries experience in **primary teeth** by poverty status for children age 2-11, US 1988-2014

Trend >> Flat



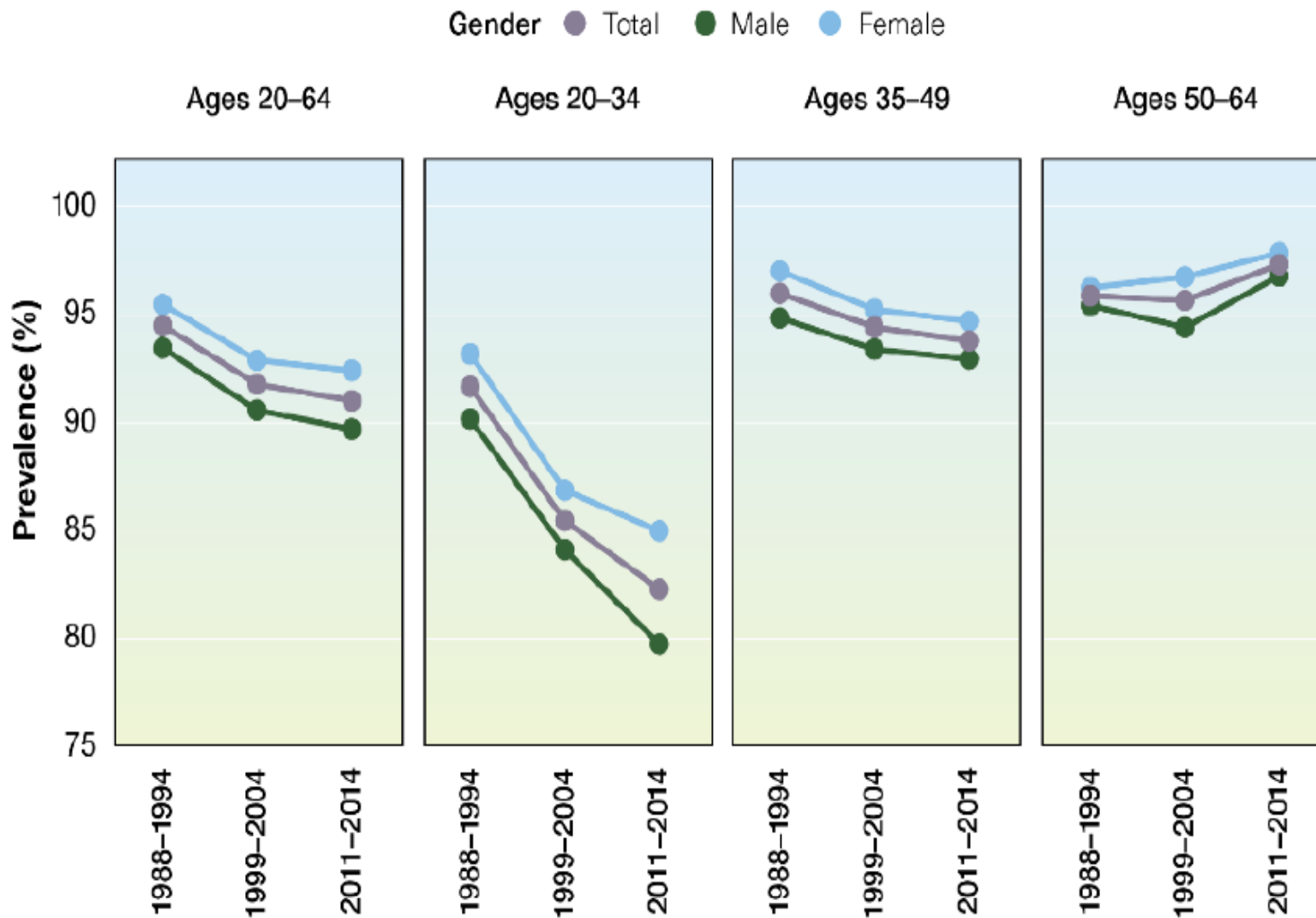
Trends in dental caries experience in **permanent teeth** by poverty status for children age 6-11, US 1988-2014

Trend >> Leveling Off (Age 6-8)



Trends in dental caries experience in **permanent teeth** by poverty status for adolescents age 12-19, US 1988-2014

Trend >> Disparities Increasing

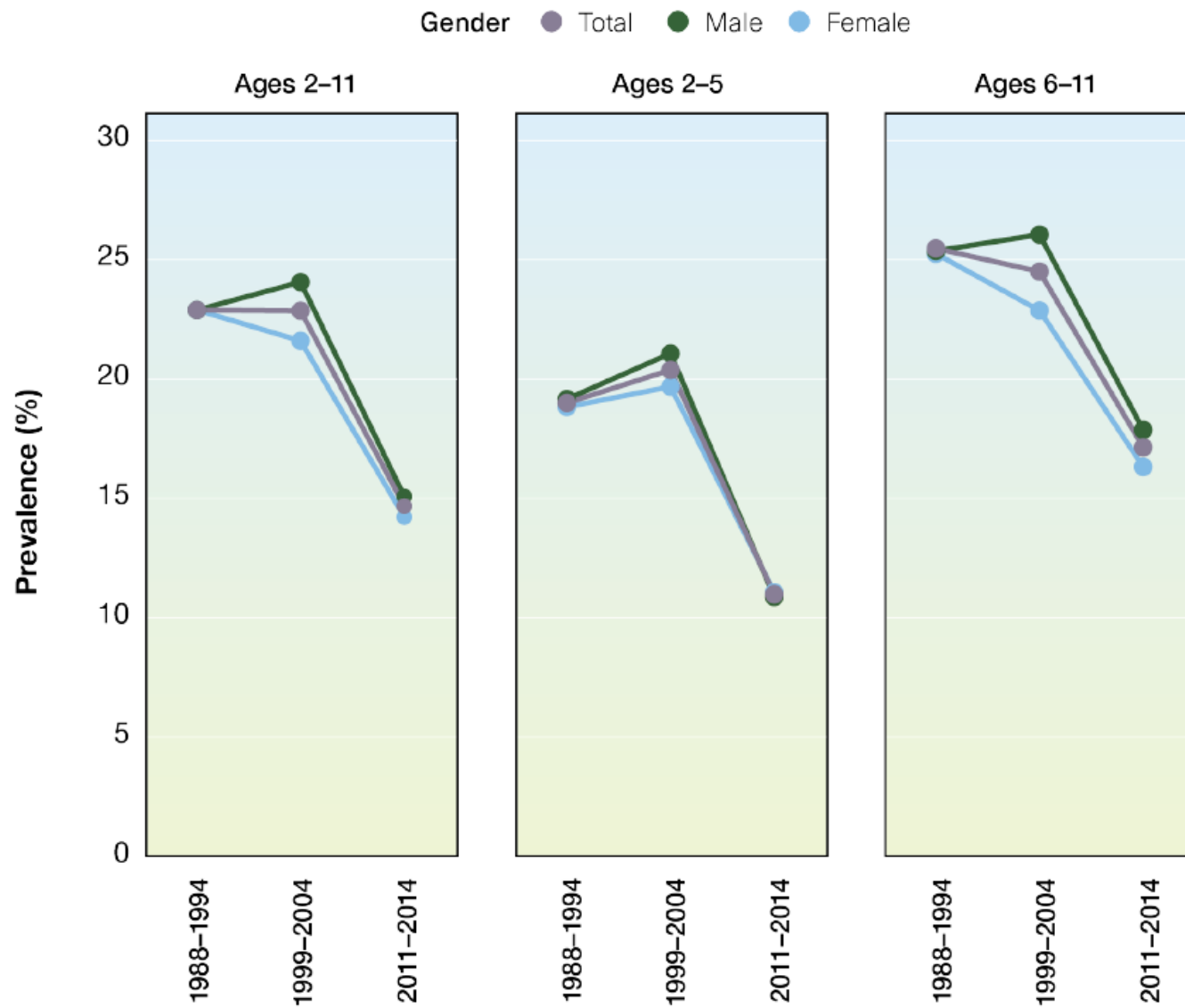


Trends in dental caries experience in **permanent teeth** by sex for working-age adults age 20-64, US 1988-2014

Trend >> Decline for Younger Adult Cohort

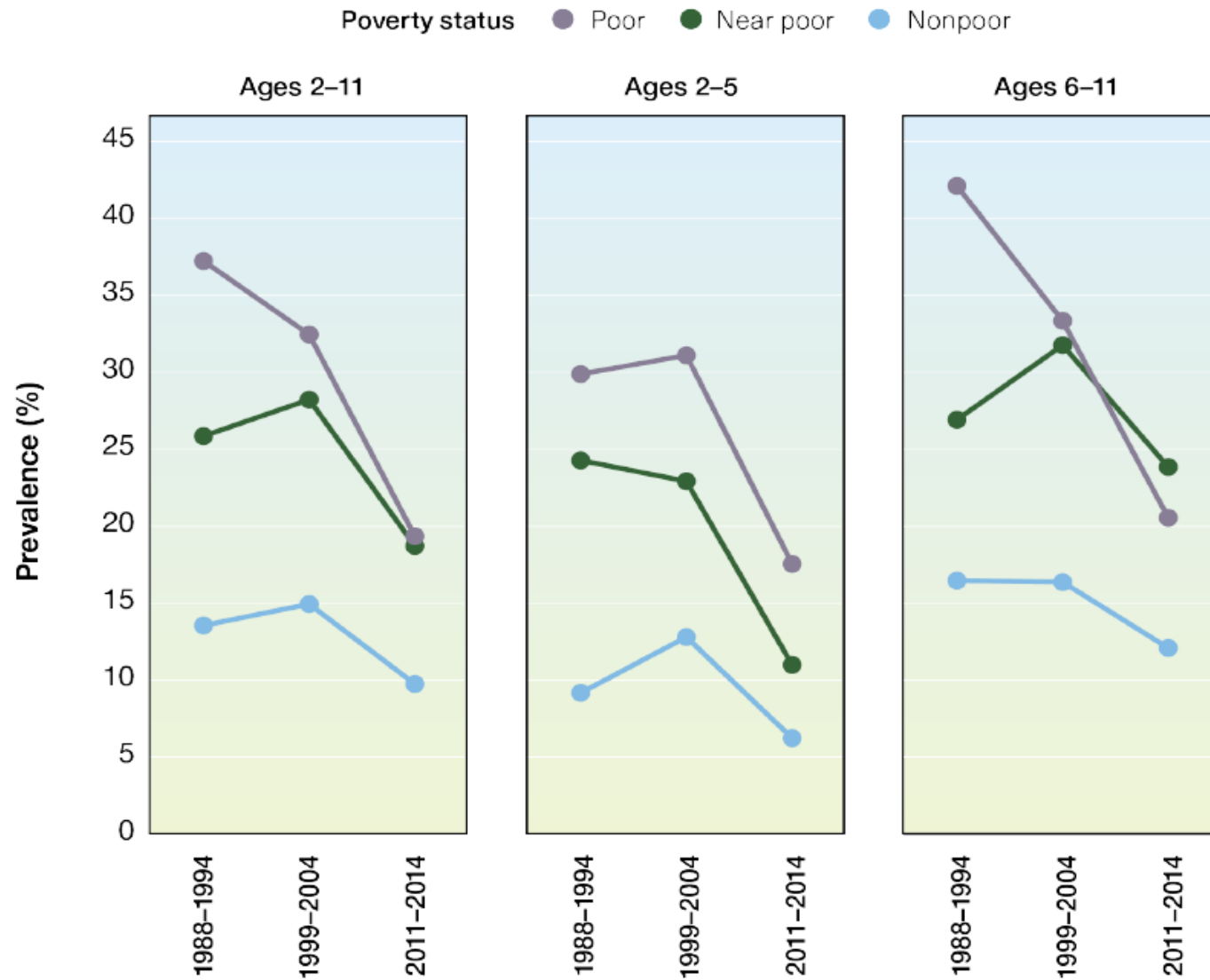


Untreated dental caries *(dt | DT)*



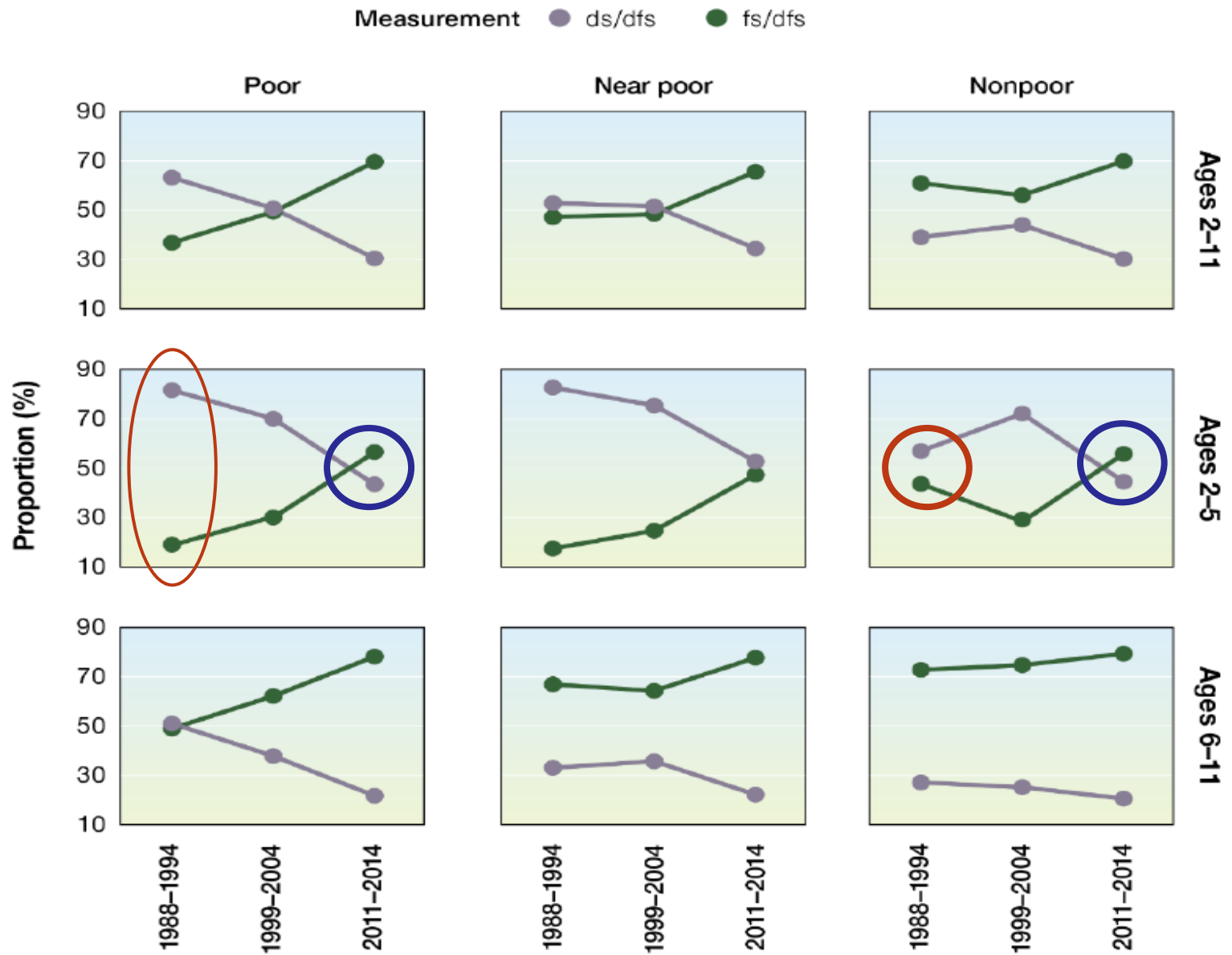
Trends in untreated caries in **primary teeth** by sex for children age 2-11, US 1988-2014

Trend >> Significant Decline



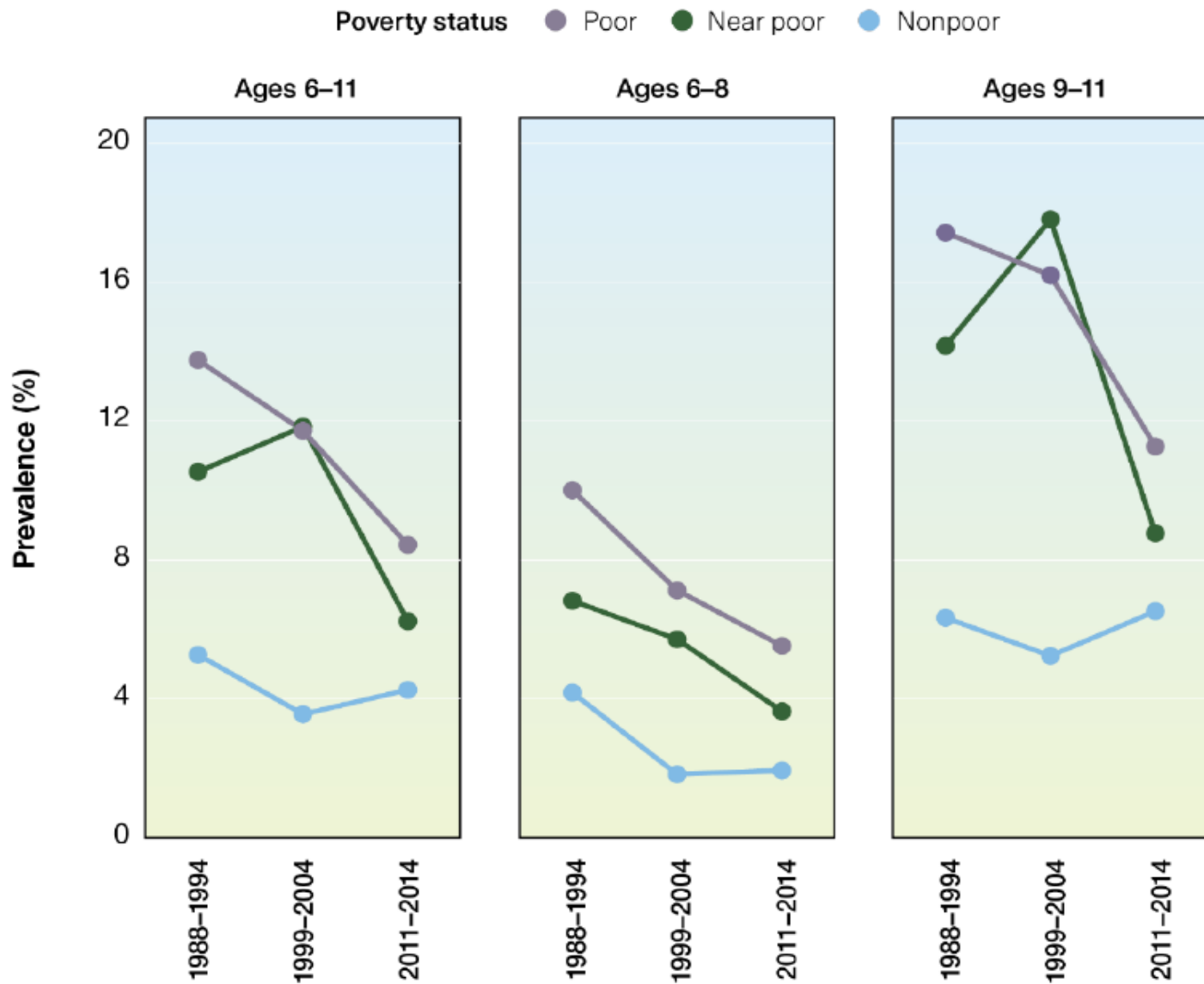
Trends in untreated caries in **primary teeth** by poverty status for children age 2-11, US 1988-2014

Trend >> Significant Decline
Better access to care resulting in a narrowing of disparities?



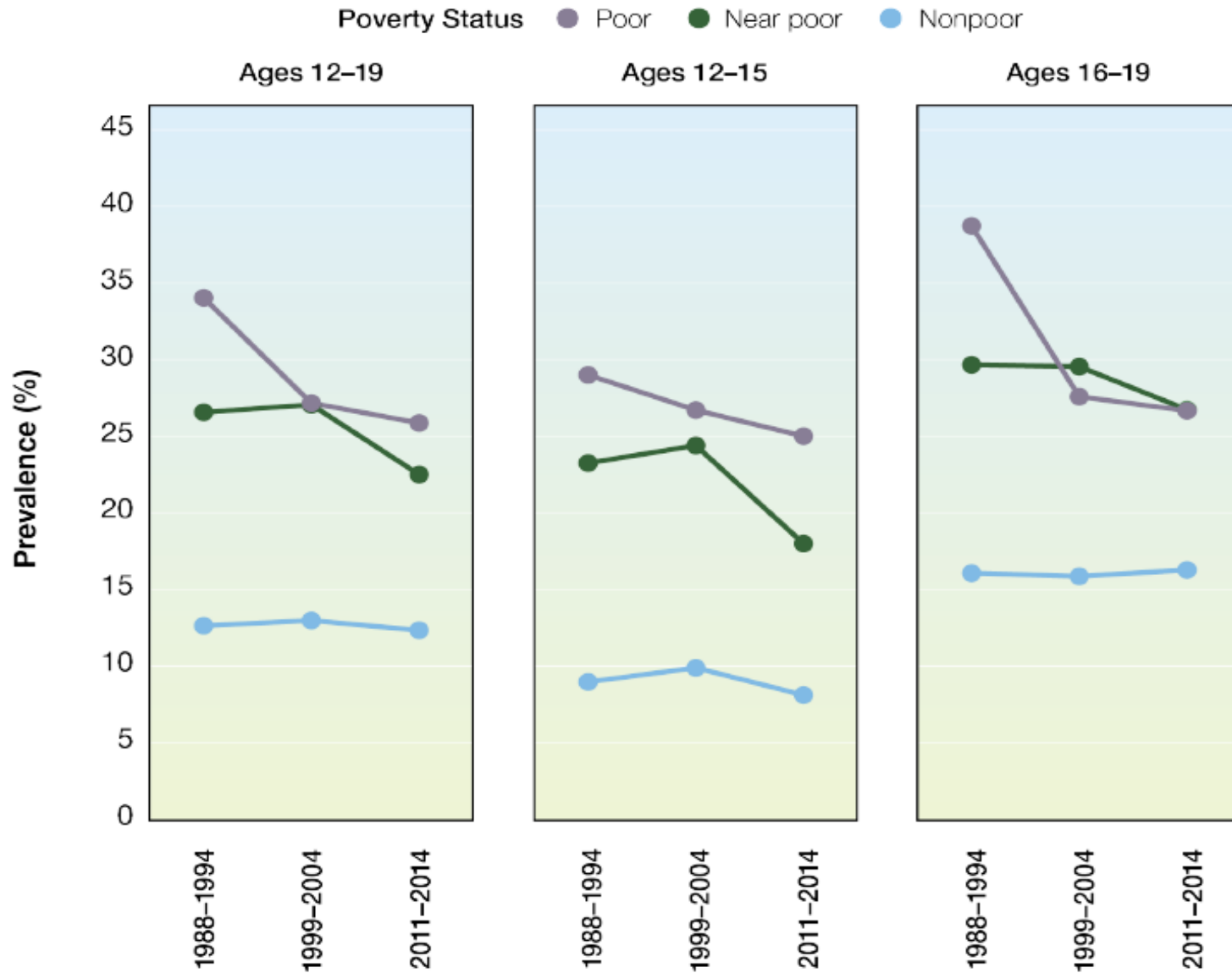
Trends in the contribution of ds | fs to overall dfs of **primary teeth** in primary teeth by poverty status for children age 2-11, US 1988-2014

Trend >> Significant Reduction Proportion of Untreated Caries
Better access to care resulting in more treatment and the elimination of a disparity between poor and non-poor children



Trends in untreated caries in **permanent teeth** by poverty status for children age 6-11, US 1988-2014

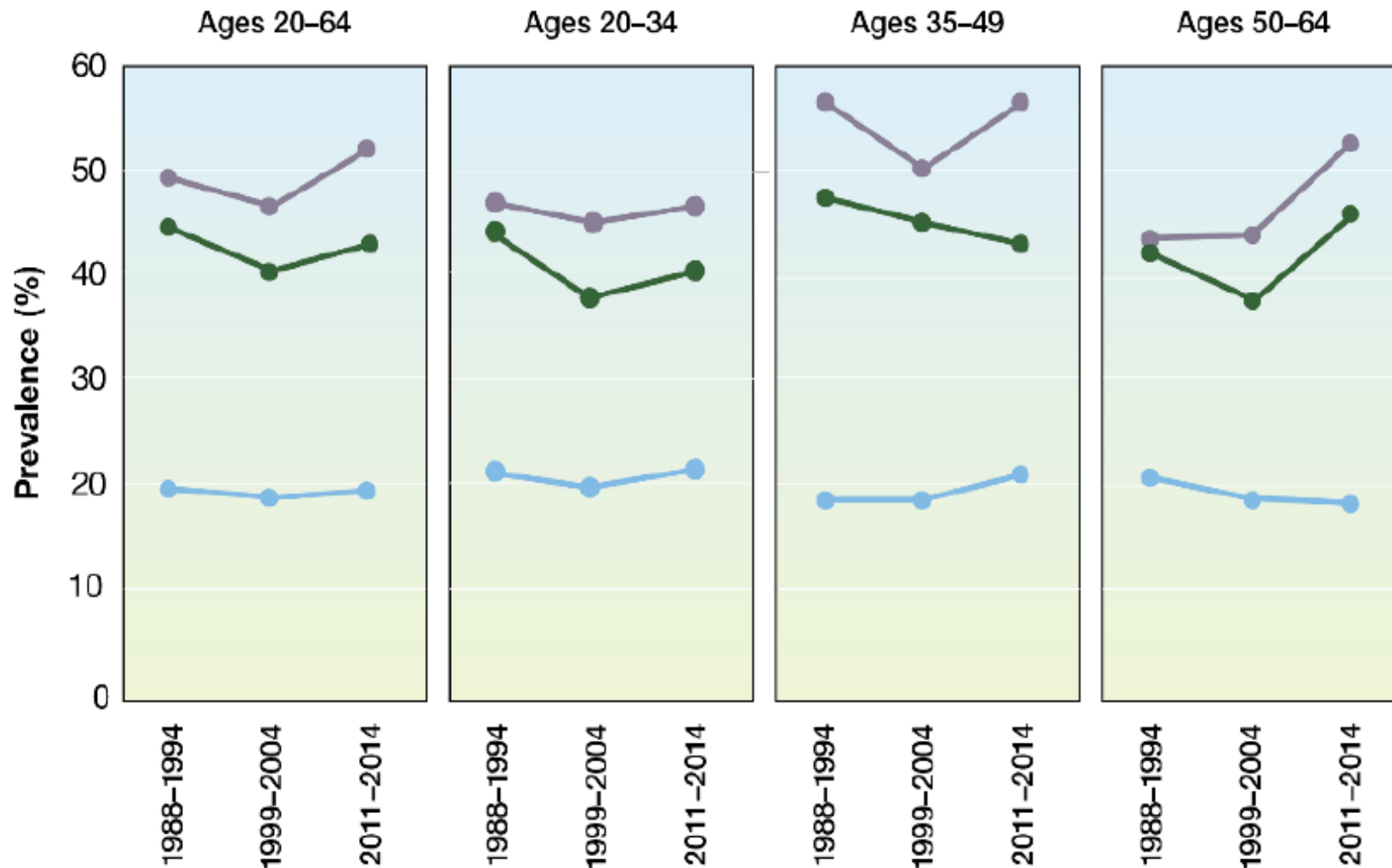
Trend >> Major Decline (Age 9-11)
Better access to care resulting in a narrowing of disparities?



Trends in untreated caries in **permanent teeth** by poverty status for adolescents age 12-19, US 1988-2014

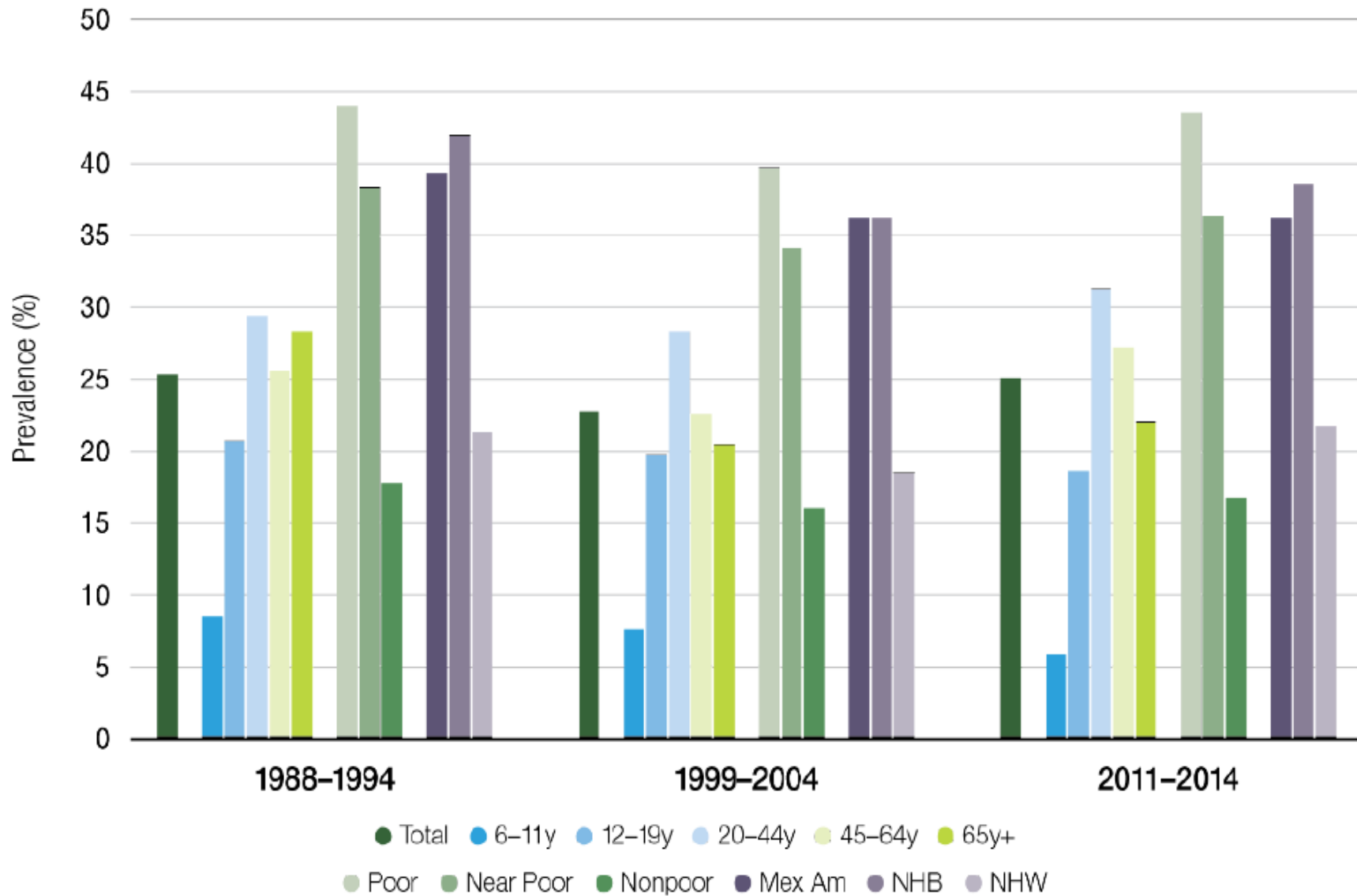
Trend >> Some Decline but Rate is Different compared to Children

Poverty Status ● Poor ● Near Poor ● Nonpoor



Trends in untreated caries in permanent teeth by poverty status for working-age adults age 20-64, US 1988-2014

Trend >> Generally flat but more adults age 50-64 are having untreated caries

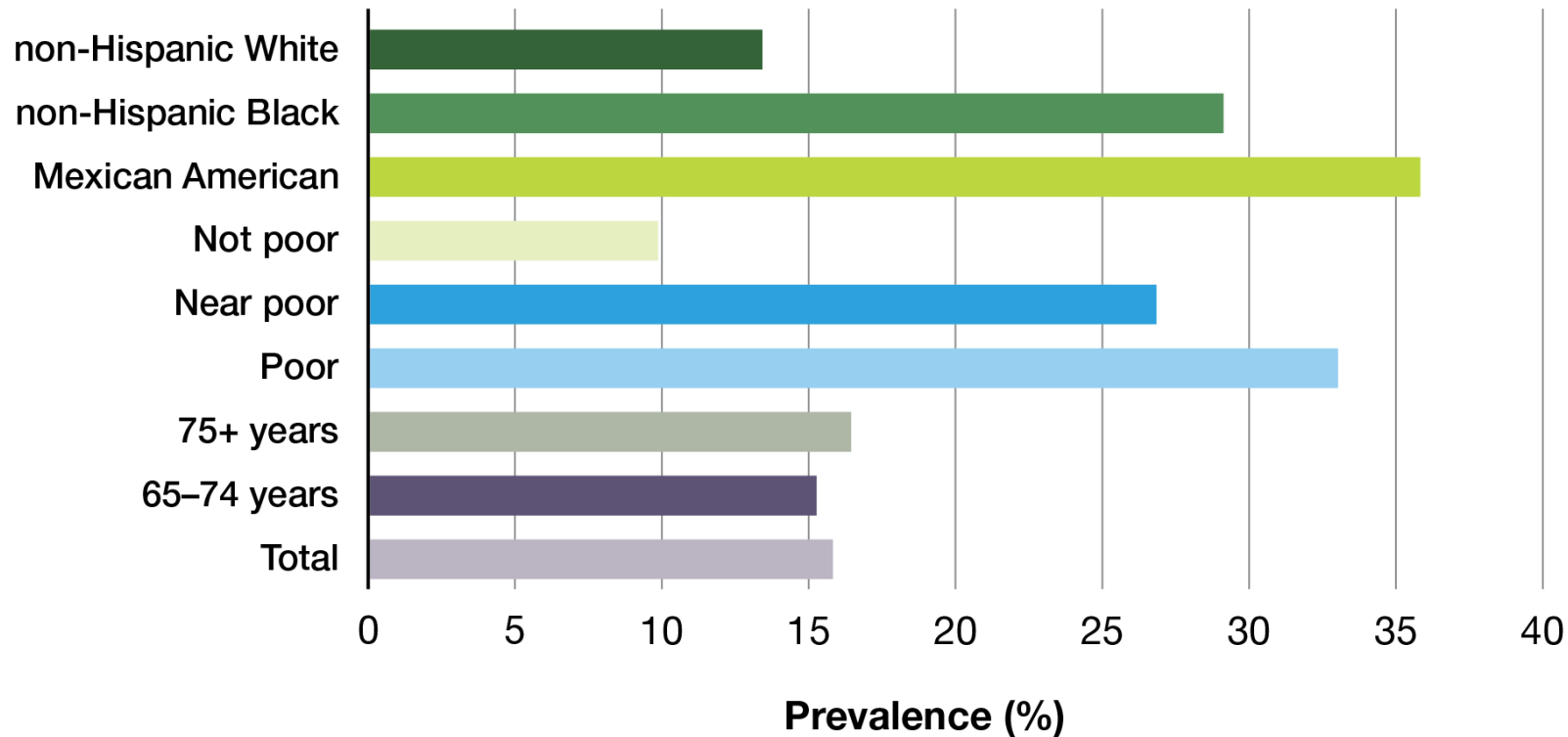


Trends in untreated caries in **permanent teeth** across the lifespan, US 1988-2014

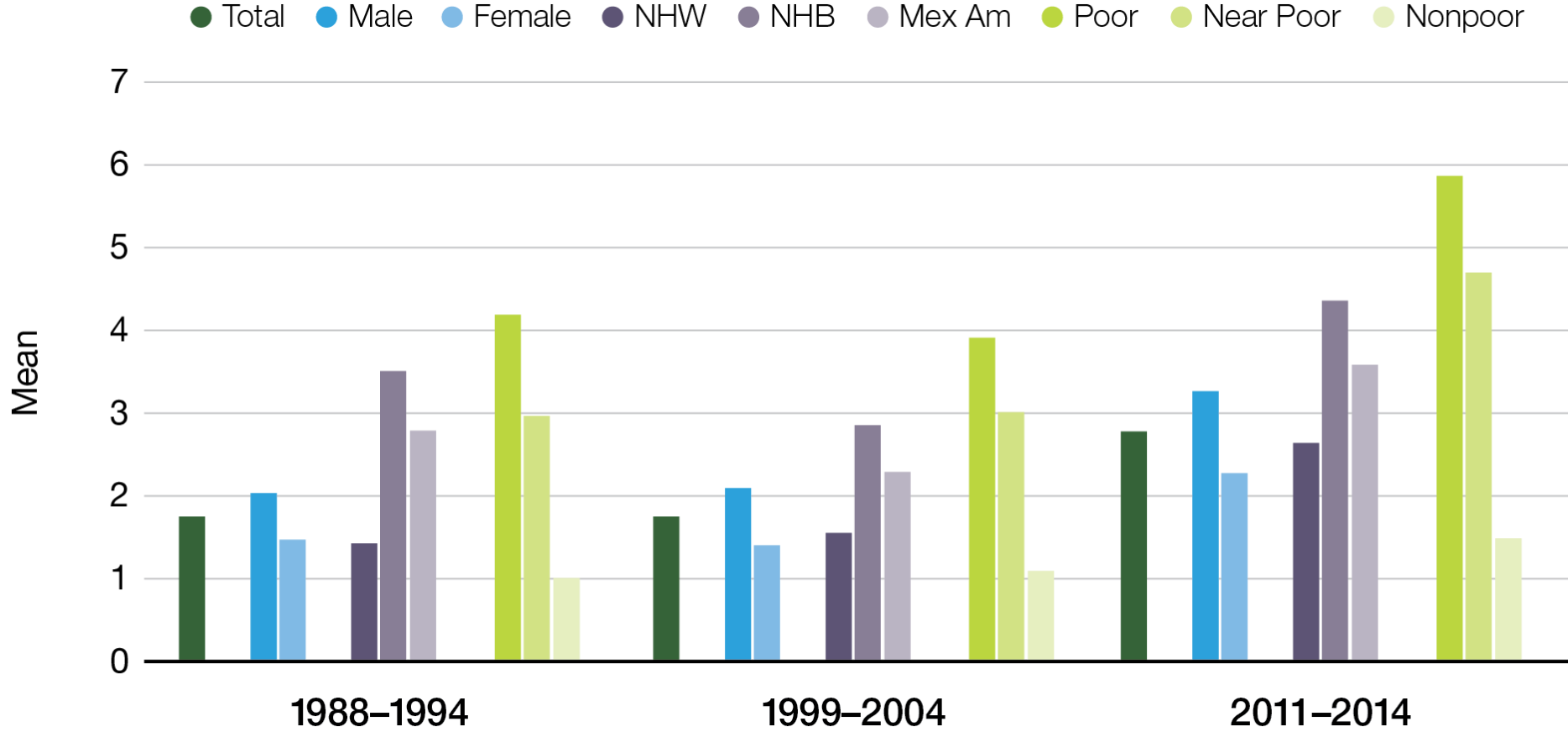
IMPORTANT >>
Substantial disparities exist by poverty and r/e across the entire population, UNLIKE what we see for caries experience

Percentage of Older Adults age 65+ with caries in permanent teeth, US 2011-2016

Untreated dental caries



Substantial disparities (measured by untreated caries) exist by poverty and r/e in this age group, UNLIKE what we see for caries experience



Trends in mean number of dental surfaces affected by untreated caries in **permanent teeth** of working-age adults, US 1988-2014

Trend >> Increasing Number of Surfaces Affected

Epidemiology of Dental Caries – Key Takeaways

- Important disparities for dental caries continues to exist in the US by r/e and poverty status
- Substantial progress has been made in reducing untreated dental caries in children, especially in preschool-age children since 2000
- Significant reductions in disparities by r/e and poverty for children have occurred especially in the primary dentition since 2000
- Magnitude of caries disparities by r/e and poverty in the US for adults is greater when measured by untreated caries status versus caries experience
- Caries prevalence is very high in the adult population – only about 5% of adults age 45 and older are caries free in the US



Bruce A. Dye, DDS, MPH

Delta Dental of Colorado Foundation

Chair in Oral Health Equity Professor and Chair

Department of Community Dentistry and Population Health School
of Dental Medicine

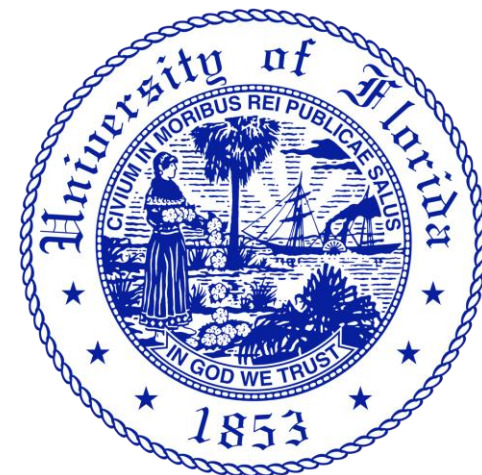
BRUCE.DYE@CUANSCHUTZ.EDU

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Dental Caries

causes, concerns, and considerations

Marcelle Nascimento DDS, MS, PhD | June 15, 2023



Question and Answer



Erinne Kennedy, DMD, MPH, MMSc

Assistant Dean for Curriculum and Integrated Learning
College of Dental Medicine, Kansas City University

ErKennedy@kansascity.edu

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Missed Connections
Providers and Consumers Want More Medical-Dental Integration

Oral health and overall health are inextricably linked. There is mounting evidence to suggest that poor oral health is related to a variety of chronic health conditions, such as high blood pressure, dementia, diabetes, and obesity. Despite this known connection, dental care is still largely siloed from medical care. The Centers for Disease Control and Prevention (CDC) estimates that integrating basic health screenings into a dental setting could save the health care system up to \$100 million every year.¹

CareQuest Institute for Oral Health conducted a nationally representative survey in January and February 2021 to assess consumers' perspectives on oral and overall health (n=5,320). CareQuest Institute also conducted a nationwide survey of oral health providers to assess perspectives and current behaviors related to interprofessional practice (n=377). Consumers and oral health providers described a lack of integration between medical and oral health care, and a desire for increased interprofessional collaboration.

Key Findings:
Medical-dental collaboration is currently uncommon.

- 63% of consumers report that their primary medical doctor "rarely" or "never" asks about their oral health.
- 33% of consumers report that their oral health provider "rarely" or "never" asks about their overall health.
- Less than a third of consumers report receiving general health screenings from their oral health provider.
- A majority (89%) of adults report never receiving a referral from their oral health provider to a non-oral health professional.
- Almost a fourth (24%) of participating oral health providers report currently implementing interprofessional practice.
- 45% of responding oral health providers report "rarely" integrating their care with clinicians outside of dentistry, with only 14% reporting it is part of their "daily" practice.

Webinar Evaluation

Complete the **evaluation by Friday, June 23** to receive CE credit. You will receive a link to the survey within 24 hours.

Next Webinar:

June 29: In Need of Treatment: Cost, Inequities, and Our Oral Health System in 2023 at 7–8 p.m. ET

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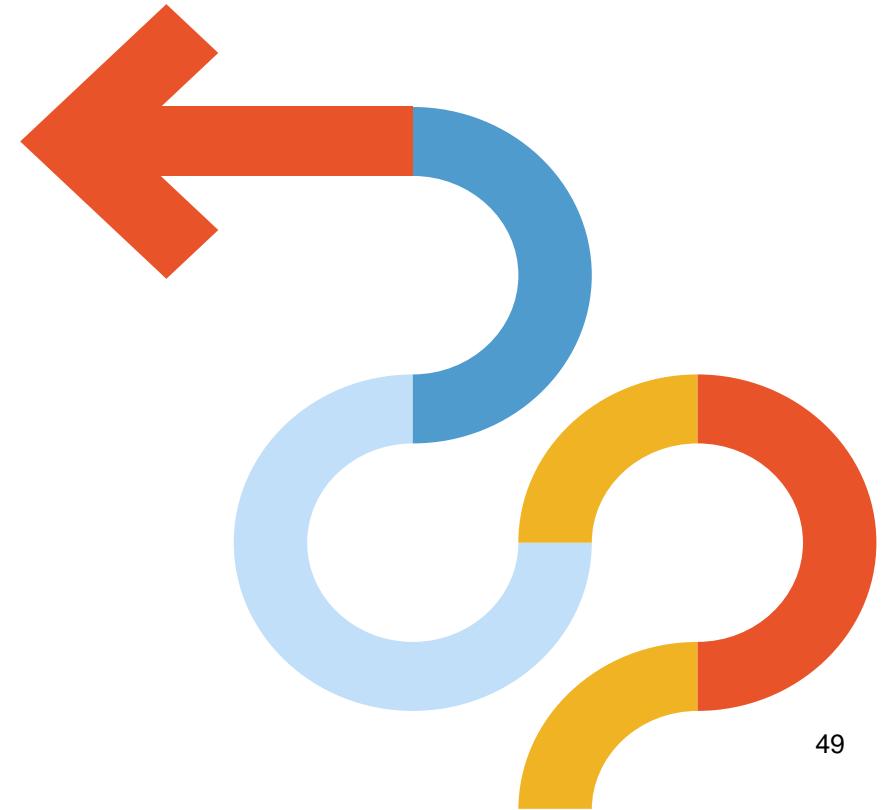
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