

# Dental Utilization for Medicaid-Enrolled Children with Cystic Fibrosis

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# Testing a Multifactorial Caries Model for Patients with Cystic Fibrosis at Seattle Children's Hospital



<http://www.catalinashope.org/wp-content/uploads/2011/03/giraffe1.jpg>



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# Rare Diseases



<http://www.dailymail.co.uk/health/article-2299282/Parents-heartache-THREE-children-diagnosed-life-threatening-condition-cystic-fibrosis.html>



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# Outline

- Cystic fibrosis overview
- Cystic fibrosis and oral health
- Study aims
- Methods
- Results
- Discussion
- Conclusion
- Acknowledgements
- Selected references



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# CYSTIC FIBROSIS



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## Overview of CF

- Most common life-limiting genetic disease in Whites
- Worldwide: 70,000 individuals
- United States: 30,000 individuals
- Prevalence overall:
  - European Union (27 countries): 0.737/10,000
  - United States: 0.797/10,000
- Prevalence by race:

Whites	Hispanics	Blacks	Asians
1:3,200	1:7,000	1:15,000	1:31,000



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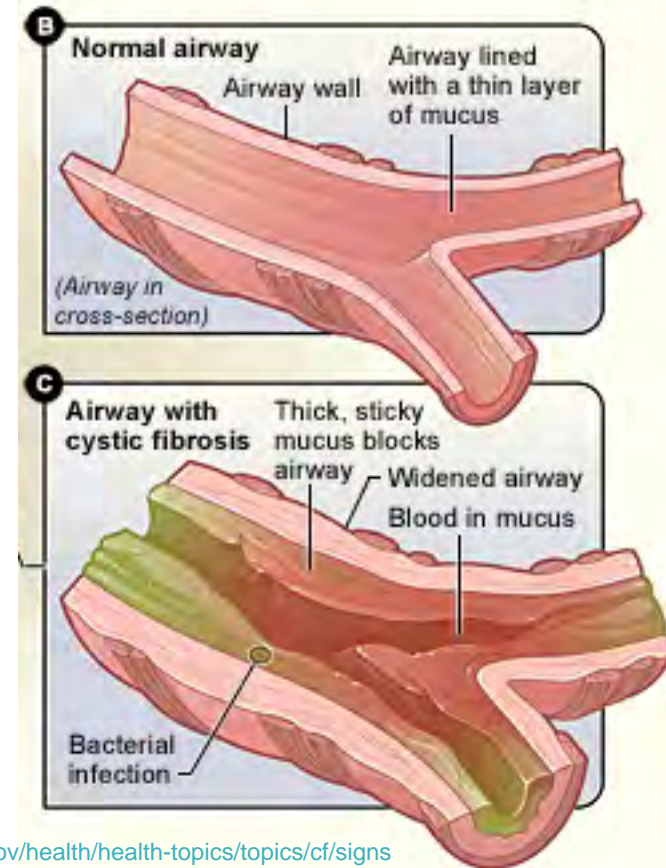




# Clinical effects on organ systems: Lungs

*Haemophilus influenzae*  
*Pseudomonas aeruginosa*  
*Burkholderia cepacia*  
*Staphylococcus aureus*

*Candida*  
*Aspergillus*



<http://www.nhlbi.nih.gov/health/health-topics/topics/cf/signs>

- Lung tissue damage
- Irreversible bronchiectasis and progressive respiratory failure

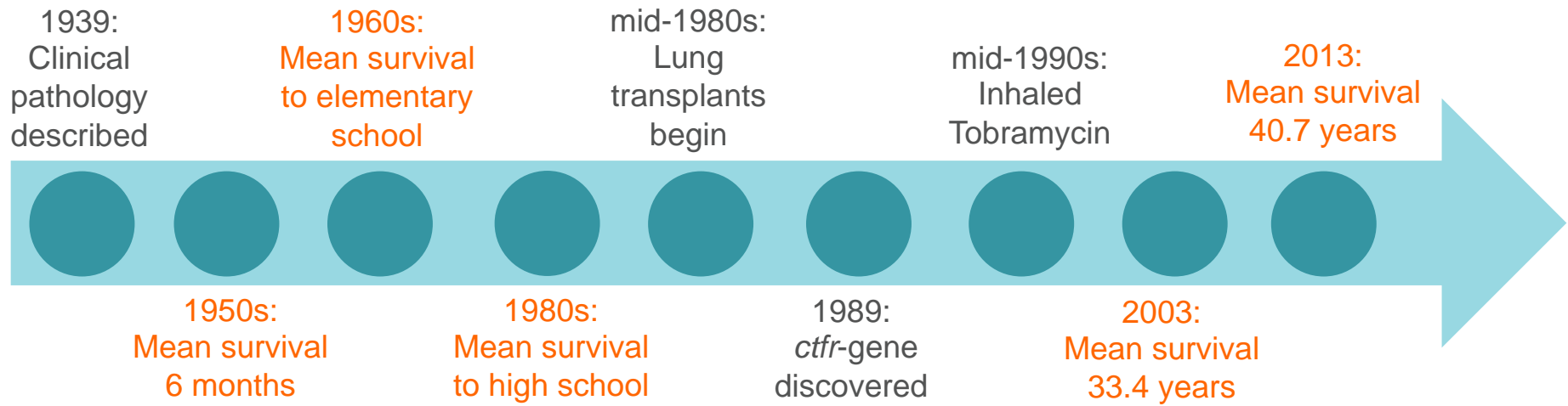


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# Life expectancy



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# CYSTIC FIBROSIS & ORAL HEALTH



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# Caries prevalence



## Caries prevalence

- Lower than non-CF, healthy matched controls
  - Primosch 1980
  - Kinirons 1983, 1989, 1992
  - Aps & Martens 2004
  - Ferrazzano et al 2009
- Lower than non-CF, healthy siblings
  - Jagels & Sweeney 1976
  - Aps & Martens 2004
- Lower than individuals with chronic respiratory conditions
  - Narang et al 2003
- Lower than cohort of children with handicaps (undefined)
  - Swallow et al 1967



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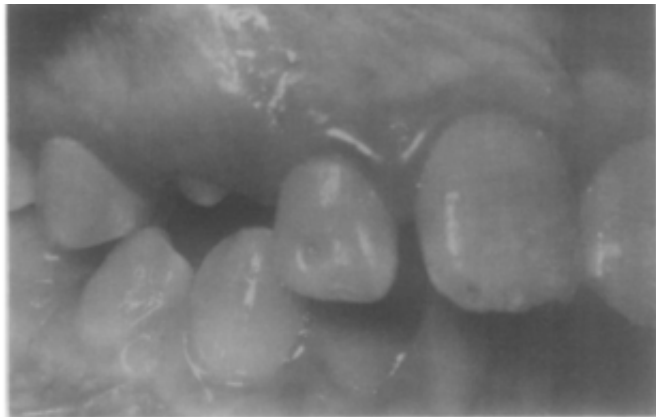


# Risk factors for dental caries

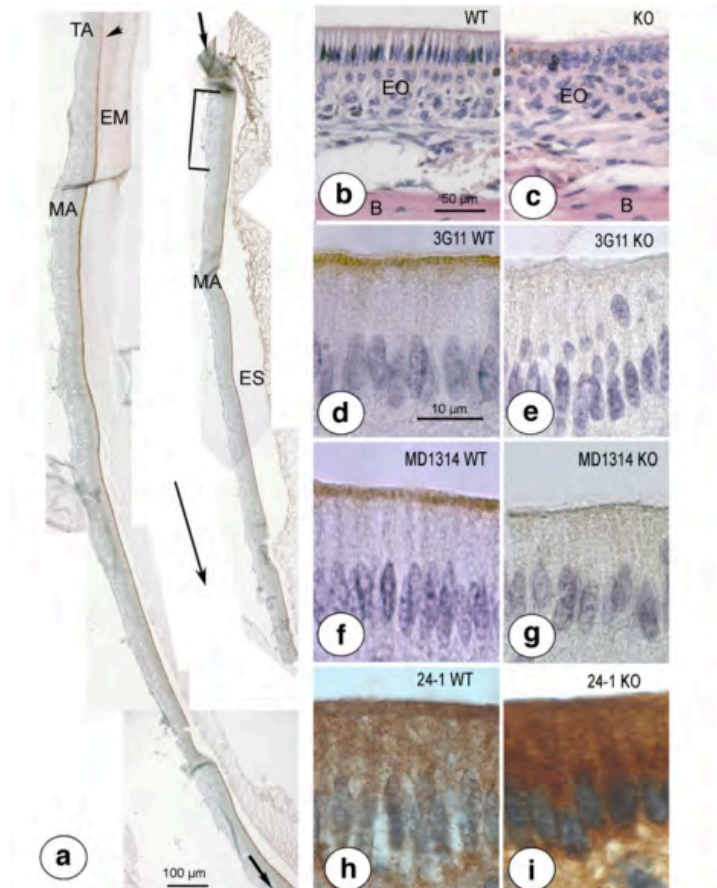
# Enamel defects



**Fig. 4.** Diffuse hypoplasia affecting the permanent first molar.



**Fig. 5.** Pitted hypoplasia of the maxillary lateral incisor.



Primosch 1980



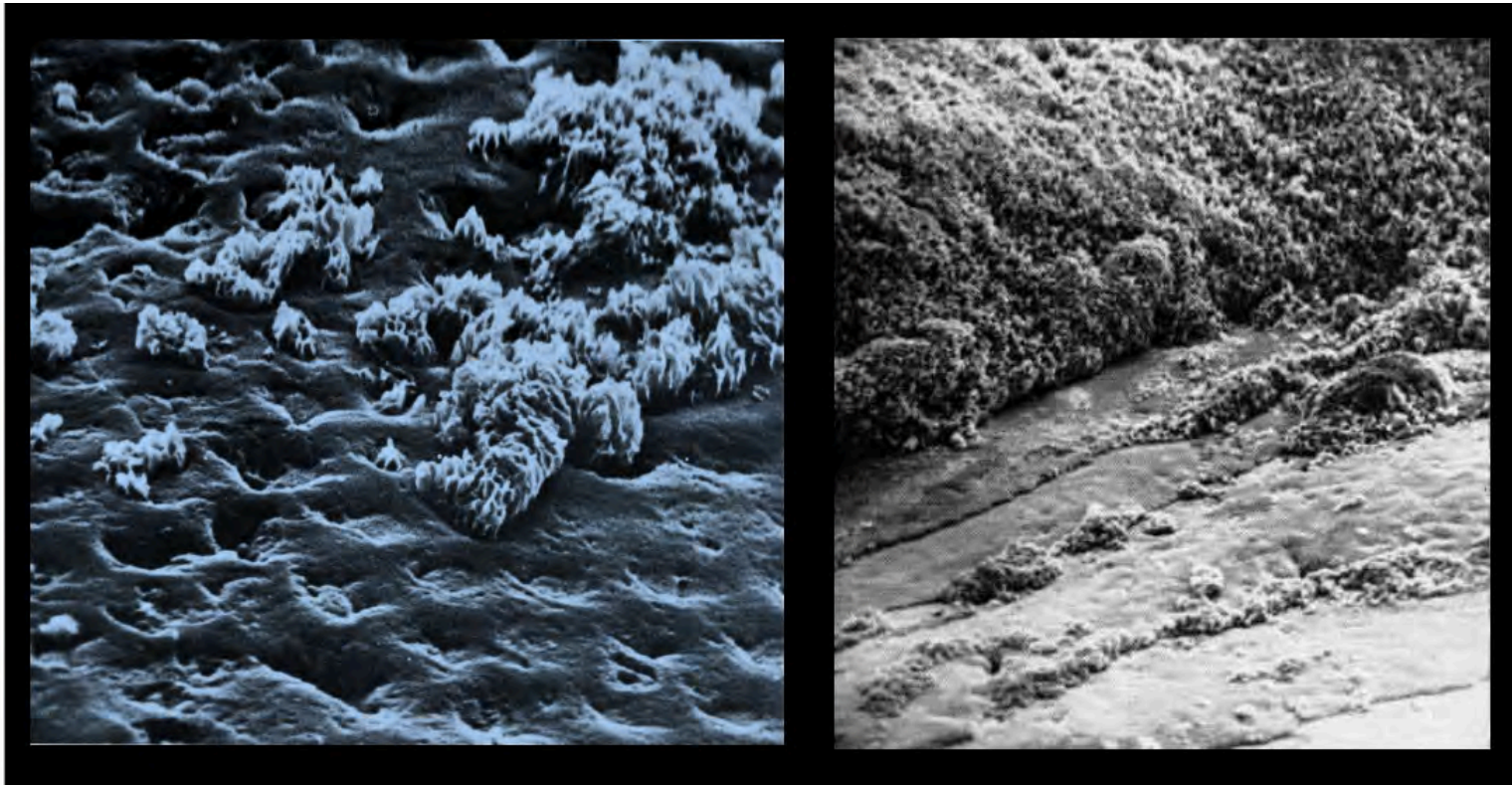
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## Enamel defects

- Weaken outer tooth structure
- Provide haven for microbes



[http://www.ada.org/~media/ADA/Education%20and%20Careers/Files/05\\_enamel\\_hypoplasia-caufield\\_bromage\\_b.ashx](http://www.ada.org/~media/ADA/Education%20and%20Careers/Files/05_enamel_hypoplasia-caufield_bromage_b.ashx)



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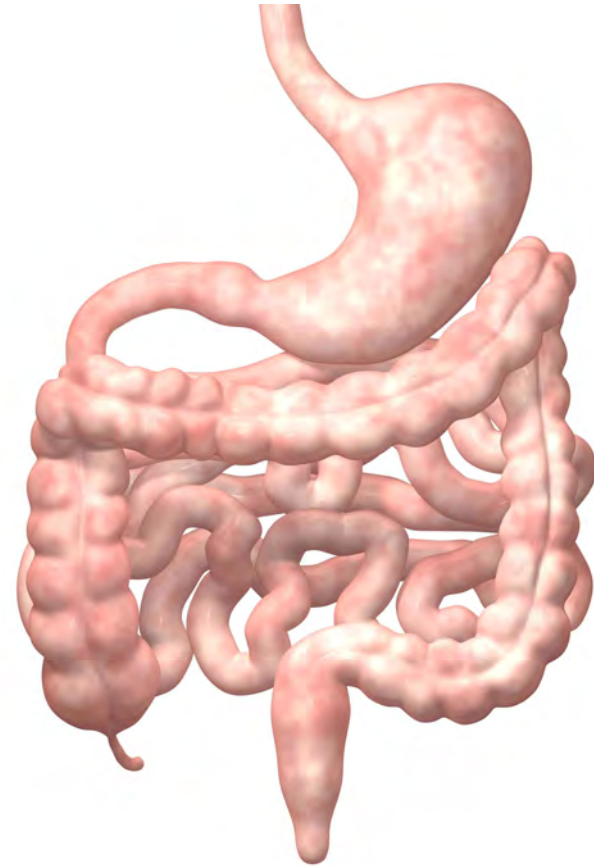
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# GERD

- GERD affects 55 – 76% of infants, children and adults with CF
- Individuals with GERD have higher caries experience than healthy siblings
  - Linnett et al 2002



<http://www.interactive-biology.com/tag/intestines/>



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# Medications

- Inhaled  $\beta$ -adrenergic receptor agonists
- Antibiotics
- Certain medications may increase caries risk



**Fig. 2.** Example of dentition demonstrating enamel hypoplasia in direct association with tetracycline discoloration.

Primosch 1980

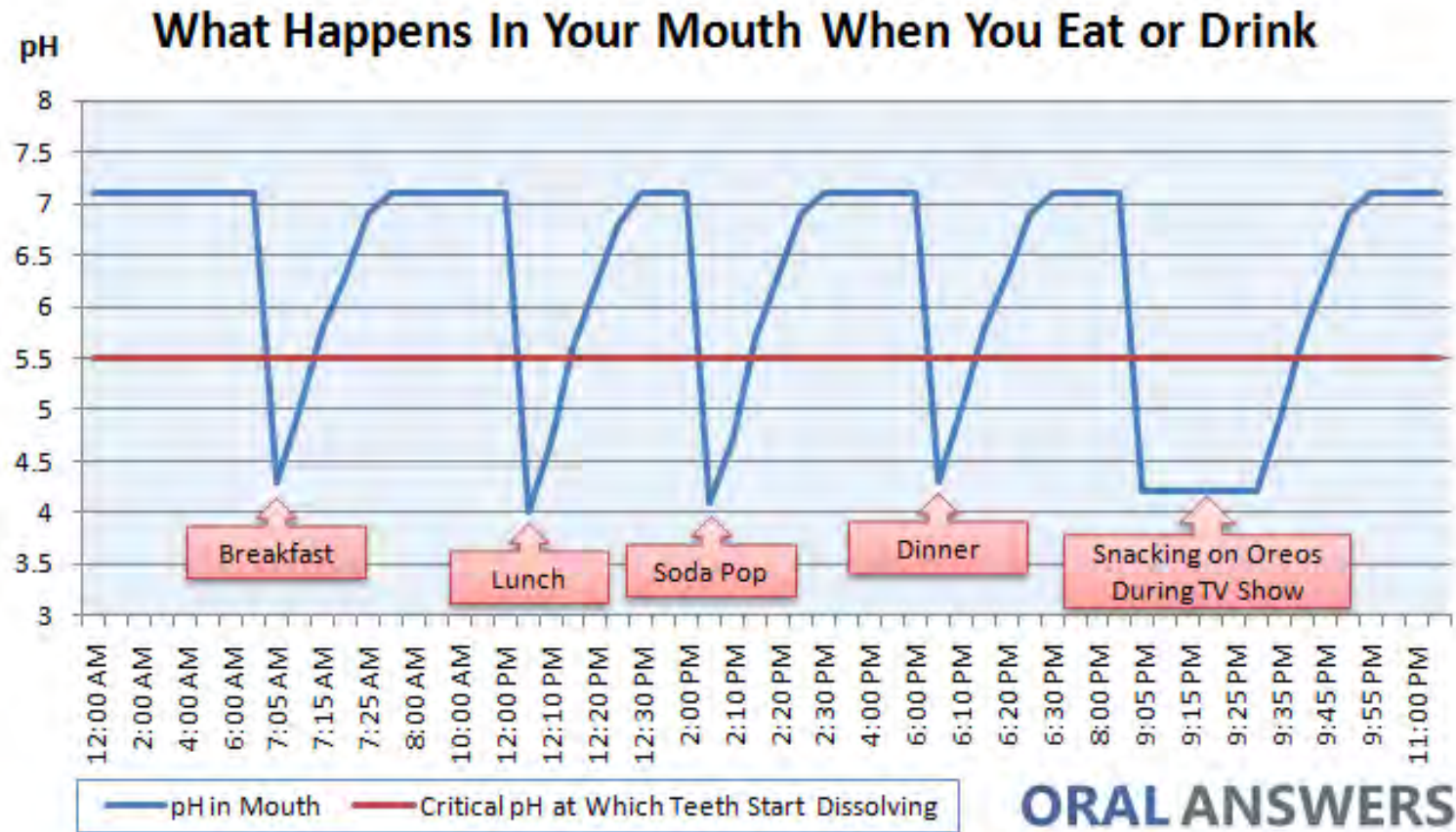


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# Diet



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## Risk factors

- Increased risk factors:
  - Enamel defects
  - GERD
  - Antibiotics
  - Xerostomic medications
- Possible increased risk factors:
  - Oral bacteria counts
  - Periodicity of eating

**Reported low caries prevalence?**

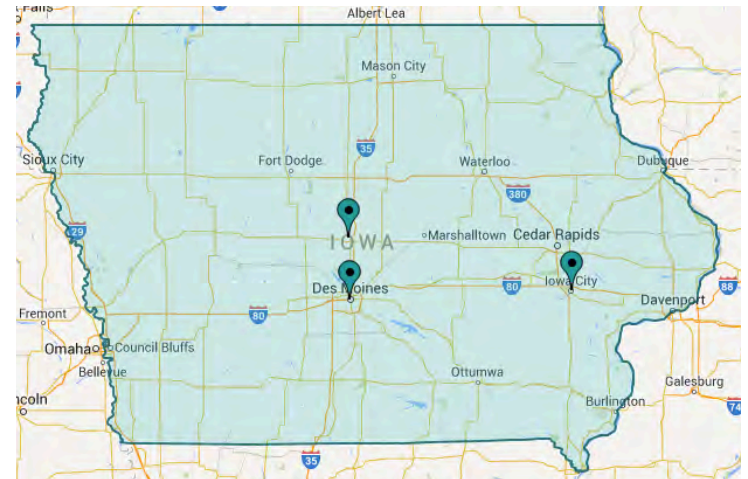


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## Health care use

- Cystic Fibrosis Foundation accredits 110 CF centers across the US
  - Blank Children's CF Center: Des Moines, IA
  - Mary Greenley Hospital: Ames, IA
  - University of Iowa: Iowa City, IA



- Children with CF meet with their medical management team every 3 months routinely
  - Pulmonologist, nutritionist, physical therapist, respiratory therapist, nurse, social worker and others



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# STUDY AIMS



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## Study aim 1

- To compare dental use for Medicaid-enrolled children with and without CF
- Given their chronic medical condition that requires the increased use of medical care beyond what is considered normal, this may encourage families of children with CF to use dental care
- We will test the hypothesis that children with CF use dental care at a higher rate than children without CF



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## Study aim 2

- To compare if the types of dental care individuals with CF use are different from individuals without CF
- We will test the hypothesis that children with CF use more diagnostic and preventive care and less restorative care than children without CF



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# METHODS



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## Data

- Administrative enrollment and medical and dental claims obtained from Iowa Department of Human Services
- Ages 3 – 17
- Enrolled in Medicaid at least 11 months



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## Study population: Medicaid enrollment

607,992

- Children 3 – 17 years in Iowa 2012 July estimate

234,556

- Children ages 3 – 17 years enrolled in Medicaid
- Iowa requirement: 0 – 133% of the FPL

156,268

- Children 3 – 17 years with at least 11 months enrollment in Medicaid

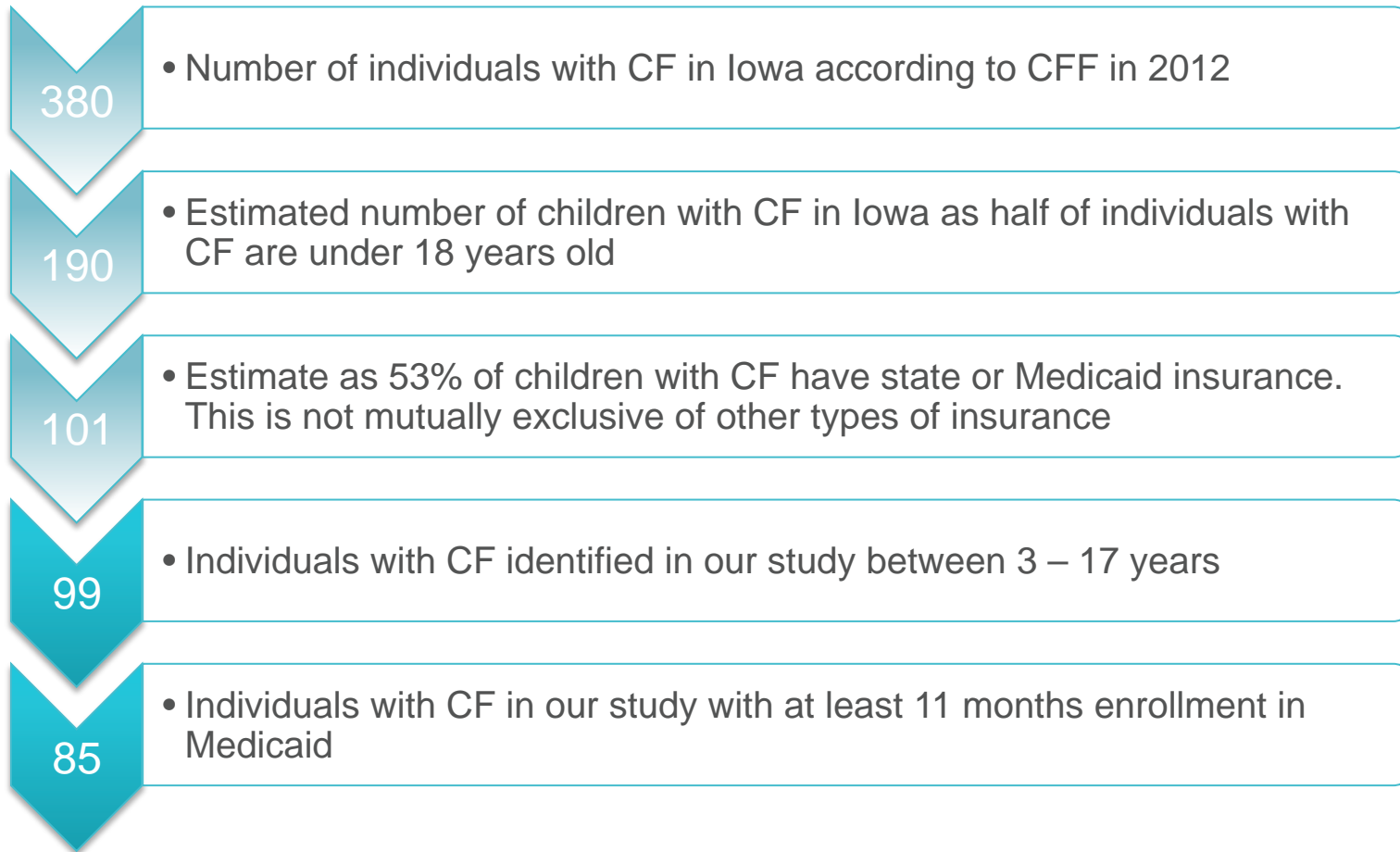


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# Cystic fibrosis in Iowa



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# Study variables: Independent & Dependent

- Independent variable: CF status
  - Case: ICD-9 CF codes (277.00, 277.01, 277.02, 277.03 or 277.09)
  - Control: No ICD-9 CF codes
- Dependent variable: Use of dental care
  - Use defined as any CDT code claimed
  - Further categorized as Diagnostic, Preventive, Routine Restorative or Complex Restorative



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## Study variables: Other

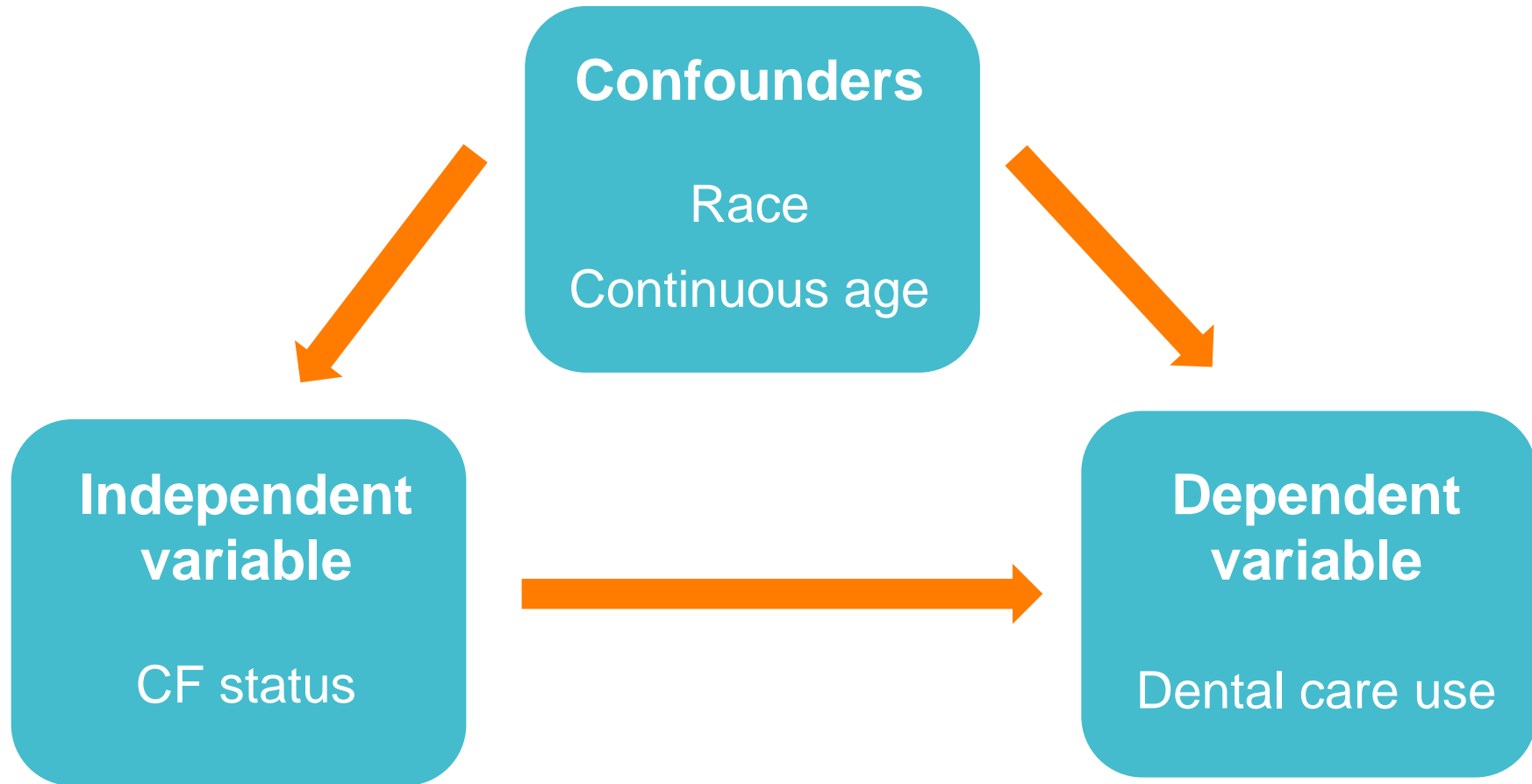
- Continuous age calculated from January 1, 2015
- Categorical age corresponding to diphyodont stages
  - 3 – 5 years: Primary dentition
  - 6 – 12 years: Mixed dentition
  - 13 – 17 years: Permanent dentition
- Gender
- Race
  - White
  - Black
  - Hispanic - Includes Hispanic and Multi-Hispanic
  - Other - Includes American Indian, Asia, Pacific Islander, Multi Other
  - Unknown



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# Confounders





# RESULTS



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# Bivariate statistics: Dental care use



## Dental care use

Any dental care		
	With CF	Without CF
Number of children	43 (50.6%)	104,409 (69.7%)

$p < 0.001$



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## Dental care use

### Types of dental care (number of children)

	With CF	Without CF	p-value
Diagnostic	42 (49.4%)	104,409 (66.9%)	0.177
Preventive	41 (48.2%)	102,718 (65.8%)	0.201
Routine restorative	5 (5.9%)	30,602 (19.6%)	0.100
Complex restorative	6 (7.1%)	18,714 (12.0%)	0.935



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# Multiple variable regression models: Dental care use



## Dental care use

### Any dental care (adjusted for race and age)

IRR	95% CI	p-value
0.819	0.80 – 0.84	< 0.001



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## Dental care use

### Types of dental care (adjusted for race and age)

	IRR	95% CI	p-value
Diagnostic	1.21	0.89 – 1.64	0.225
Preventive	1.19	0.88 – 1.63	0.264
Routine restorative	0.50	0.19 – 1.34	0.165
Complex restorative	0.82	0.31 – 2.16	0.684



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# DISCUSSION



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## Study aim 1

- Study conducted to compare dental use for Medicaid-enrolled children with and without CF
  - Children with CF are more integrated into the health care system
  - Hypothesis tested that children with CF use dental care at a higher rate than children without CF.
- Only about half of Medicaid-enrolled children with CF used dental care in 2012
  - **Significantly less** use than children without CF
  - Relationship holds true even when adjusted for race and age
- Other health care obligations
- Resource constraints
- Few dental referrals from CF team



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## Study aim 2

- Study conducted to compare if the types of dental care individuals with CF use are different from individuals without CF.
  - Hypothesis that children with CF use more diagnostic and preventive care and less restorative care than children without CF
- Children with CF use more diagnostic and preventive services than children without CF, but this difference is **not significant**
  - Relationship holds true when adjusted for race and age
- Some other etiology behind their low caries risk (i.e. a biological explanation)
- Sub-optimal services for everyone



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## Study aim 2

- Children with CF use less restorative care than children without CF, but this difference is **not significant**.
  - Relationship holds true when adjusted for race and age
  - Holds true for both routine and complex restorative care
- May lend support to the literature that children with CF have lower caries prevalence than children without CF
- May be a result of children with CF using less dental care than children with CF



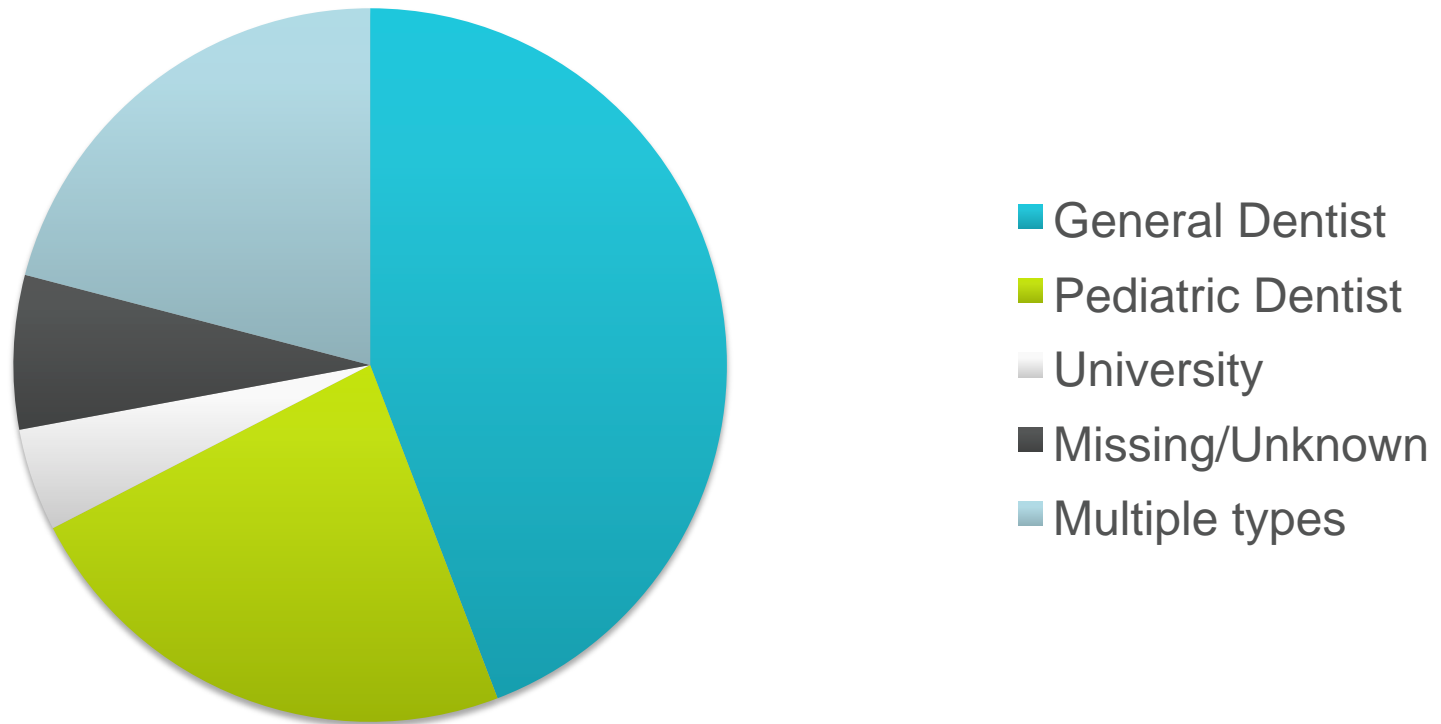
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# Dental provider type

## Provider Types



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## Study strengths

- Adds previously missing analysis of dental care use to the small but growing body of knowledge about the oral health of individuals with CF
  - Previous studies focus on oral health characteristics, caries prevalence
- Our study compares similar groups of children who may be missed from traditional studies of dental care
  - Previous studies have inherent bias because they rely on families and children who present to academic medical centers.



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## Study limitations

- Study only encompasses one year and only one state
  - Future studies should look at multiple years and/or states
- Dental provider type assessed only for children with CF
  - Unable to currently do a statistical analysis
- Dental utilization rates do not give an accurate picture of existing dental needs
  - Just because children with CF did not use dental care does not mean they do not have dental needs.



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# Clinical recommendations

## CF team

- be more cognizant about oral health
- increase dental referrals

## General dentists

- increase pre-doctoral education for treating patients with SHCNs
- recognize caries risk

## Individuals with CF

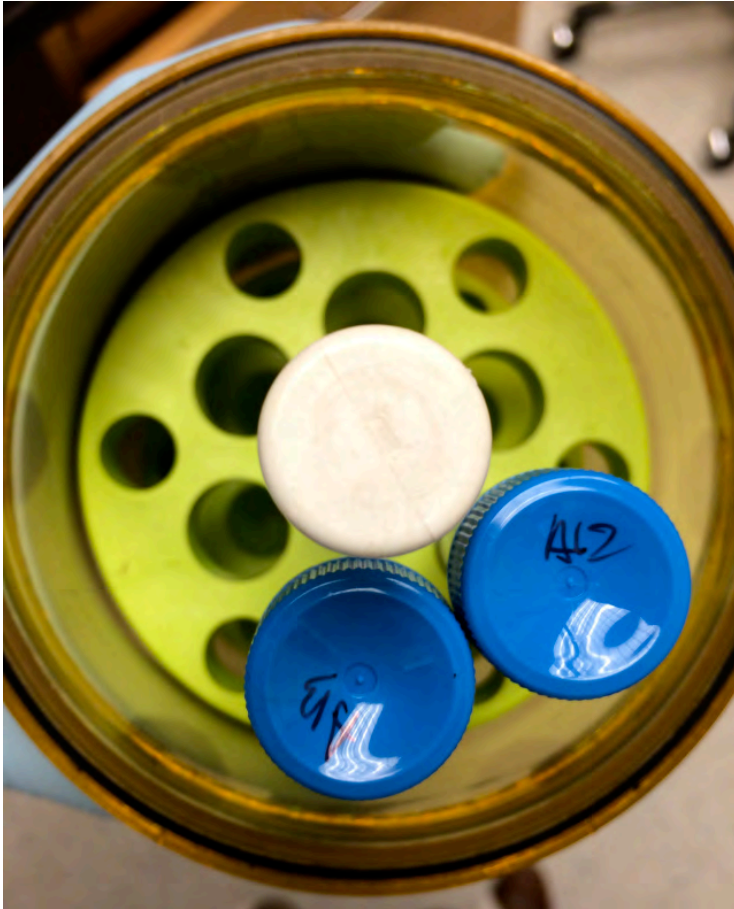
- recognize increased caries risk factors
- understand oral health implications on overall health



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## Future directions



- Further research into what types of dental providers individuals with CF use
  - Direct future dental education
- Look at dental use trends over multiple years and in multiple states
- Survey families on barriers to dental care
- Conduct clinical trials to look at risk factors for dental caries in individuals with CF.



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# CONCLUSION



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## Conclusion

- Children with CF face increased risk factors for developing dental caries, but the literature reports they paradoxically have an overall lower caries prevalence
- Increased dental care use is not a probable etiology for this lower caries prevalence as children with CF use less than children without CF
- Future population and clinical studies are needed to determine why children with CF have lower caries prevalence



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<http://www.dailymail.co.uk/health/article-2299282/Parents-heartache-THREE-children-diagnosed-life-threatening-condition-cystic-fibrosis.html>



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