

# **Analysis of Sedgwick County Health Department School Dental Screening Data to Determine Target Areas for Intervention**

MPH Field Experience Report  
Kansas State University

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# Sedgwick County Health Department Mission

“To improve the health of Sedgwick County residents by preventing disease, promoting wellness, and protecting the public from health threats.”

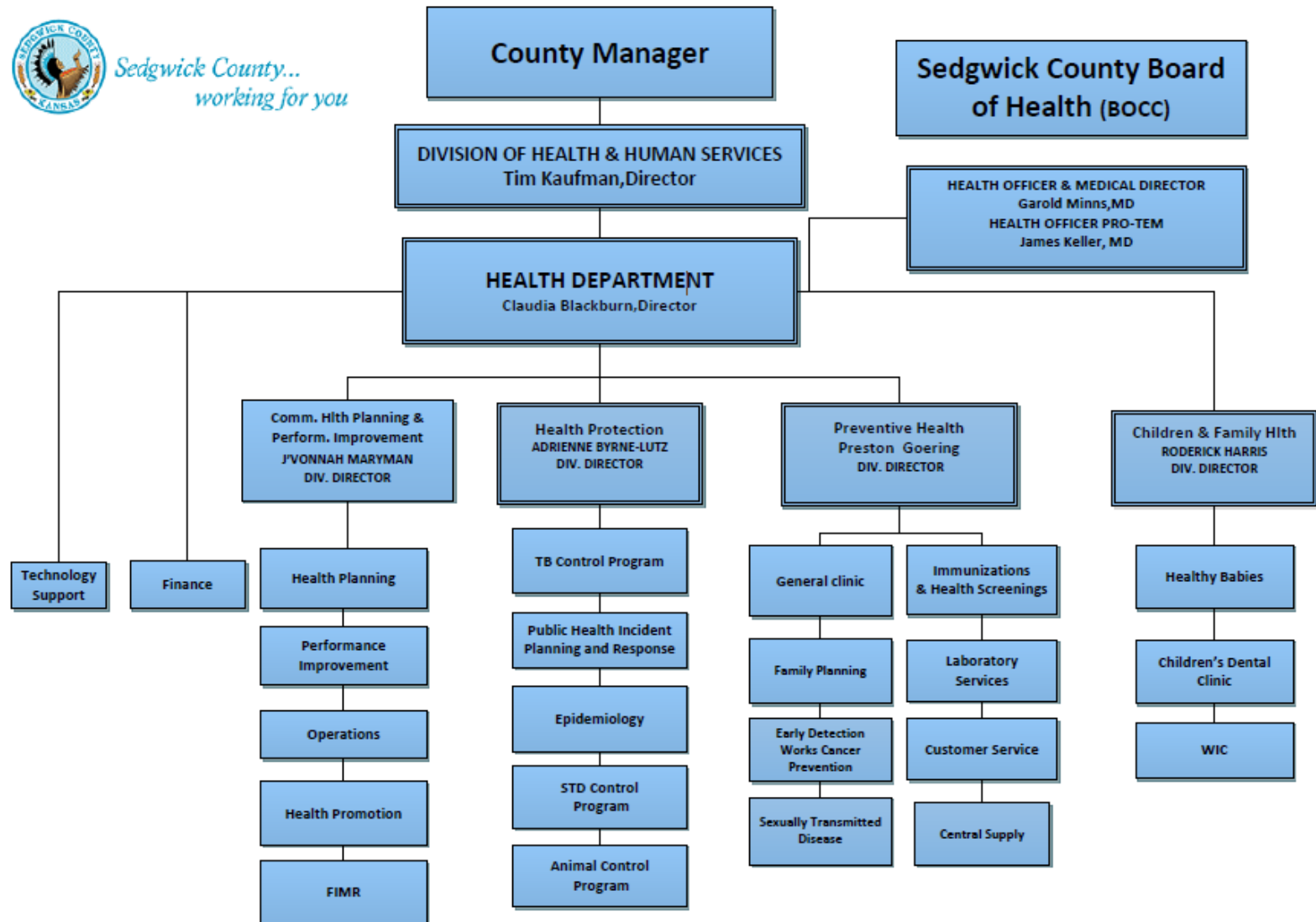


*Sedgwick County...*  
*working for you*

# SCHD Organizational Structure



*Sedgwick County...*  
*working for you*



# Community Health Planning and Performance Improvement

- Health Promotion
  - Educate about healthy behaviors and health care
    - Oral health, mental health, access to care, tobacco use
- Performance Improvement
  - Workforce development
- Fetal Infant Mortality Report
  - Evaluate infant deaths
  - Recommend and promote corrective actions



SCHD Project Imprint

# Health Protection

- TB control program
  - Assist with screening, diagnosis, treatment, and education
- STD Control
  - Perform surveillance and investigation of notifiable STD's
    - Chlamydia, Gonorrhea, Syphilis, HIV
- Epidemiology
  - Surveillance and investigation of non-STD notifiable diseases



# Health Protection

- Public Health Incident Planning and Response (PHIPR)
  - Metropolitan Medical Response System
  - Medical Response Corps
- Animal Control
  - Ensure proper housing and care of animals
  - Investigate animal cruelty calls
  - Enforce Sedgwick County codes



Hope in the Valley Equine Rescue

# Preventative Health

- West Central Clinic
  - Health screenings
  - Immunizations
  - TB skin testing
  - STD testing and treatment
  - Family planning
    - Contraceptives, pregnancy testing, and preconception counseling



SCHD





# Children and Family Health



- Healthy Babies
  - Educate parents from prenatal to age 2
  - Healthy Today, Healthy Tomorrow
- WIC
  - Provide supplemental food and nutrition
    - Prenatal and breastfeeding women, new mothers, and children up to age 5
- Children's Dental Clinic
  - Conduct school dental screenings
  - Perform dental procedures for children with no dental insurance





# My Role at SCHD



- Analyzed school dental screening data
- Shadowed various programs and attended meetings
- Assist Epidemiology program
  - Attended West Nile Virus prevention meeting and Foreign Animal Disease Preparedness exercise
  - Aided in developing *Bordatella pertussis* informational material
  - Participated in weekly disease investigation meetings
  - Aided in the development for protocols regarding elevated blood lead level investigations

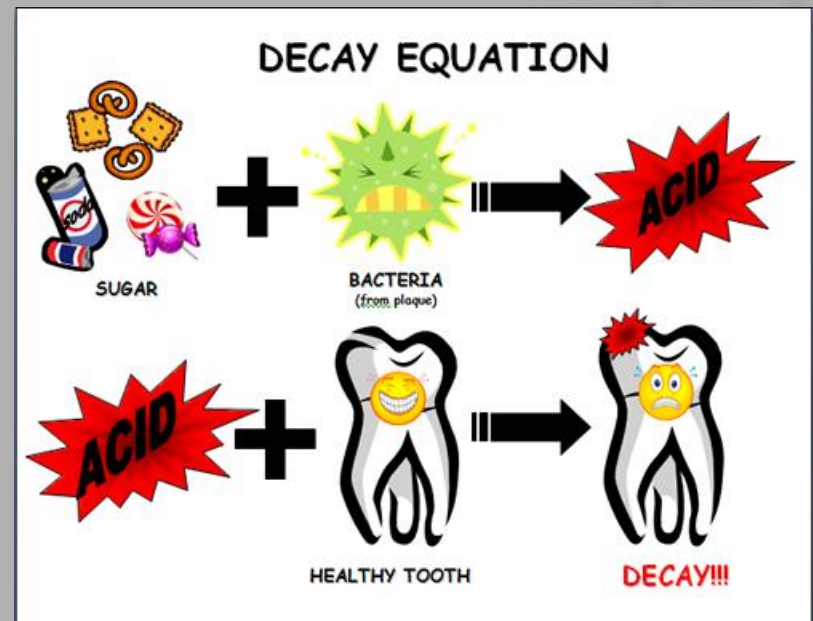
# Dental Decay

- Most common chronic disease of children
  - 5 times more common than asthma
  - 40-50% of children in the United States
  - 48% of children in Kansas
- Most expensive of common dental diseases
  - \$4.5 billion per year in treatment costs
- Affects growth and development
- Can lead to abscess formation, cellulitis, infection
- Primary teeth decay promotes decay in permanent teeth



# Formation of Dental Decay

- Occurs when oral bacteria feed on sugars and carbohydrates
  - Streptococcus mutans* and *Lactobacilli* spp.
- Bacteria adhere to teeth and form biofilms
- Produce organic acids that dissolve minerals in tooth enamel
  - If left untreated, mineral dissolution develops into decay
- Consumption of sugary drinks and foods increase risk
  - Consumption of milk is protective



Cary Pediatric Dentistry

# Prevention

- Proper dental care:
  1. Clean teeth early
  2. Use fluoride toothpaste
  3. Teach correct brushing procedure
  4. Visit dentist



Complete Care Dental Plan

- Dental sealants
  - Cover chewing surfaces
  - Preventative effect in 71% of children



Step 1: A tooth with no fillings and the patient has good oral hygiene.



Step 2: Cross section through the top of the tooth reveals the deep but very narrow groove.



Step 3: A small amount of a very fluid filling like sealant material is placed over the tooth and flows down into the grooves.



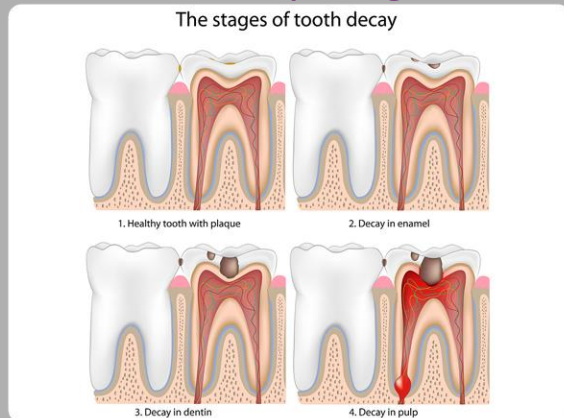
Step 4: The material is light cured and solidifies forming a protective and very durable "seal" over the biting surface of the tooth.



Step 5: A view of the sealant in place.

# Effect of Socioeconomic Status

- 80% of dental disease is found in only 20% of children
- Children below federal poverty level 2 times as likely to develop dental decay
- 3 times as likely to have unmet dental care needs
  - Inadequate distribution of dental clinics, lack of clinics accepting Medicaid, lack of pediatric dentists





# Project Objectives

1. Analyze the SCHED Children's Dental Clinic school screening data to determine schools with highest percentage of students with untreated decay
  - a. Summarize screening data and rank schools based on dental variables
  - b. Determine association of dental variables untreated decay and sealants present
2. Develop pilot study to determine barriers to accessing care
3. Perform online research on oral health programs
4. Assist in developing a communications plan for the SCHED Children's Dental Clinic



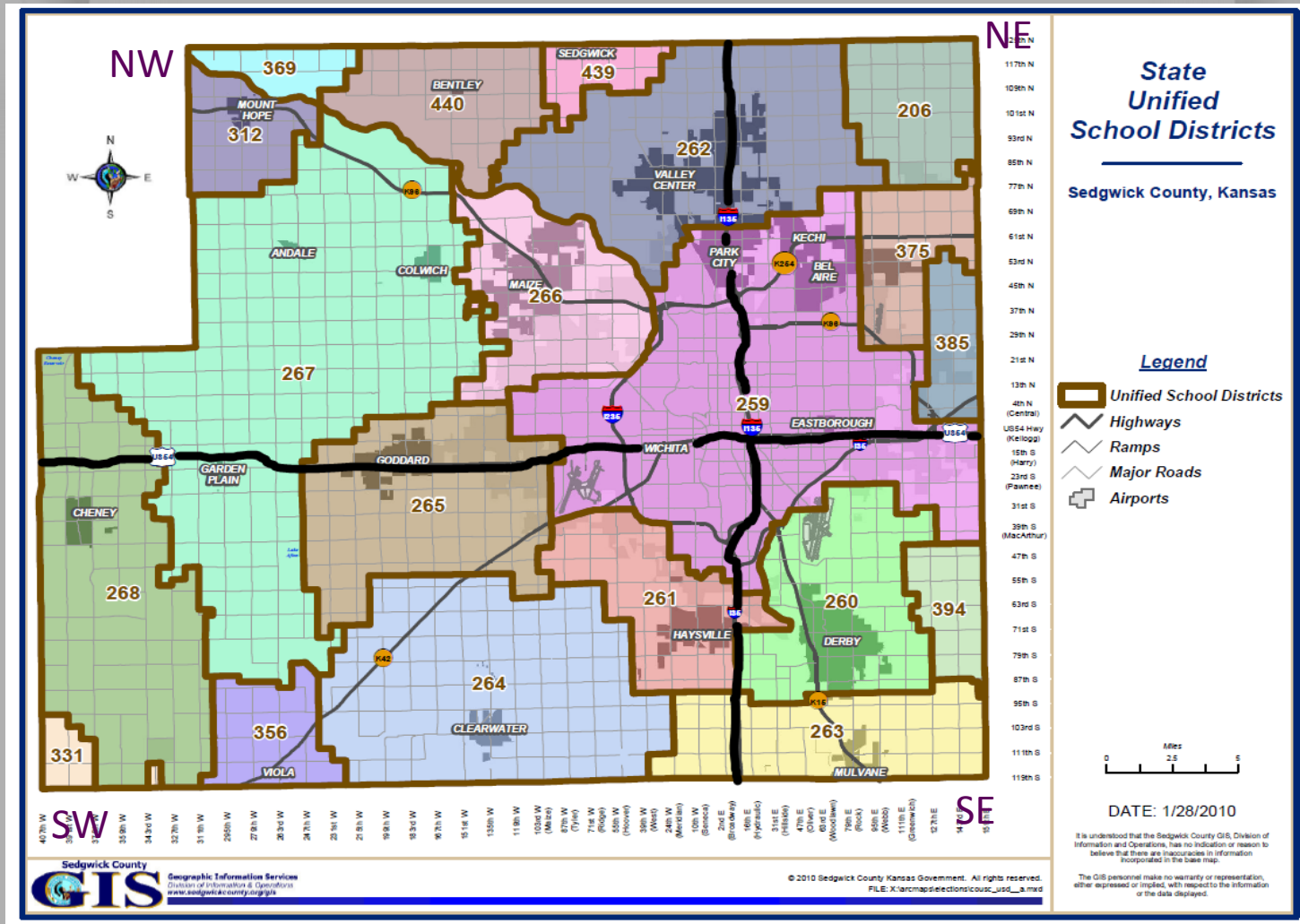
# Dataset



- School dental screening data was collected in 2012 and 2013 calendar years
  - 15,492 students and 51 schools in 2012
  - 16,452 students and 54 schools and facilities in 2013
- 4 dental variables
  - Percent untreated decay, percent emergencies, percent sealants present, percent sealants needed
- Descriptive variables
  - USD, school type, school location, predominant race, percent free lunch



# School District and Location Map





# Estimated Variables

- Percent free lunch and predominant race
  - Data from Kansas State Department of Education “Kansas K-12 County, District, and School Reports”
  - Numbers for schools with <10 students in a variable category not provided due to identifiability
  - 9 was used to estimate these values
- Free lunch quartiles
  - Quartile 1: <25%
  - Quartile 2:  $\geq 25\%$ -<50%
  - Quartile 3:  $\geq 50\%$ -<75%
  - Quartile 4:  $\geq 75\%$

# Summary of Screening Data

		2012		2013	
Variable		Number of Students	Mean Percent of Students Screened (range)	Number of Students	Mean Percent of Students Screened (range)
Screening Data	Total Individual Students	15492	81%	16372	88%
	Percent of County Enrollment		17%		18%
	Percent Untreated Decay				
	Percent Emergency	1154	14% (4%-50%)	2365	15% (0%-36%)
	Percent Sealants Present	252	3% (0%-14%)	724	5% (0%-26%)
	Percent Sealants Needed	1805	38% (3%-74%)	6041	36% (11%-81%)
		1870	35% (5%-67%)	7855	48% (2%-80%)

# Summary of Screening Data

		Number of Schools 2012	Percent of Schools Screened 2012	Number of Schools 2013	Percent of Schools Screened 2013
USD	Private	6	12%	5	10%
	259	20	39%	23	45%
	260	7	14%	5	40%
	261	7	14%	7	14%
	262	5	10%	5	10%
	263	2	4%	2	4%
	264	3	6%	3	6%
	265	1	2%	1	2%
Location	NE	3	6%	8	16%
	NW	15	29%	15	29%
	SE	15	29%	12	24%
	SW	18	35%	16	31%
School Type	Private	6	12%	4	8%
	Public	45	88%	47	92%
School Grade Level	Elementary	37	73%	41	80%
	Middle	14	27%	13	20%
Predominant Race	White	31	61%	24	47%
	Hispanic	4	8%	4	8%
	Black	0	0%	2	4%
	Mixed	14	27%	17	33%
	Estimated*	2	4%	4	8%
Free Lunch Quartile	Quartile 1	4	7%	1	2%
	Quartile 2	22	41%	21	39%
	Quartile 3	10	19%	10	19%
	Quartile 4	7	13%	11	20%
	Estimated*	8	20%	11	20%

# School Rankings-Untreated Decay 2012

Ranking	School Name	% Total Decay	USD	Location	School Type	School Level	Predominant Race	Free Lunch Quartile	% Students Screened
1	12-259E4	24.91%	259	SE	Public	Elem.	Mixed	4	94.35%
2	12-259E7	24.08%	259	SW	Public	Elem.	Mixed	4	87.43%
3	12-259E3	22.73%	259	SW	Public	Elem.	White	4	69.53%
4	12-259E12	22.09%	259	NE	Public	Elem.	Mixed	3	57.85%
5	12-261E1	18.34%	261	SW	Public	Elem.	White	3	100.0%
6	12-259E13	18.17%	259	SE	Public	Elem.	White	4	91.45%
7	12-261E4	17.84%	261	SW	Public	Elem.	White	2	100.0%
8	12-259E5	16.99%	259	SW	Public	Elem.	Mixed	4	100.0%
9	12-261E3	16.54%	261	SW	Public	Elem.	White	2	100.0%
10	12-259E1	16.18%	259	SE	Public	Elem.	Mixed	3	94.71%
42	12-261M2	9.36%	261	SW	Public	Middle	Mixed	2	95.10%
43	12-259M7	9.28%	259	NW	Public	Middle	White	2	93.37%
44	12-259E10	8.59%	259	NW	Public	Elem.	White	2	87.97%
45	12-264M1	7.60%	264	SW	Public	Middle	White	Not Calculable	91.94%
46	12-000E2	7.56%	N/A	NW	Private	Elem.	White	Not Calculable	99.17%
47	12-000E1	6.51%	N/A	SE	Private	Elem.	Mixed	3	91.88%
48	12-260E1	5.72%	260	SE	Public	Elem.	White	2	84.26%
49	12-000E5	4.98%	N/A	NW	Private	Elem.	Mixed	Not Calculable	100.00%
50	12-259E9	4.37%	259	NW	Public	Elem.	Mixed	3	33.50%
51	12-259E2	3.89%	259	SE	Public	Elem.	White	2	96.59%

# School Rankings-Untreated Decay 2013

Ranking	School Name	% Total Decay	USD	Location	School Type	School Level	Predominant Race	Free Lunch Quartile	% Students Screened
1	13-259E16	35.08%	259	NE	Public	Elem.	Black	4	97.42%
2	13-259E13	35.58%	259	NW	Public	Elem.	Black	4	75.00%
3	13-259E11	24.60%	259	SE	Public	Elem.	Hispanic	4	84.42%
4	13-259E8	20.93%	259	SW	Public	Elem.	Mixed	4	71.33%
5	13-259E17	20.83%	259	SE	Public	Elem.	White	3	48.94%
6	13-259E6	19.18%	259	NE	Public	Elem.	Mixed	2	77.45%
7	13-259E1	18.25%	259	SE	Public	Elem.	Mixed	4	87.52%
8	13-259E4	18.06%	259	SW	Public	Elem.	White	3	74.35%
9	13-259E3	18.04%	259	SE	Public	Elem.	Hispanic	4	100.00%
10	13-259E10	17.69%	259	NE	Public	Elem.	White	2	91.42%
42	13-260E3	9.35%	260	SE	Public	Elem.	White	2	81.29%
43	13-259M1	8.27%	259	NE	Public	Middle	Mixed	3	100.00%
44	13-264E3	8.12%	264	SW	Public	Elem.	White	2	97.76%
45	13-000E4	7.74%	N/A	NW	Private	Elem.	Mixed	Not Calculable	100.00%
46	13-259M6	7.69%	259	NE	Public	Middle	Mixed	3	89.15%
47	13-261M2	7.59%	261	SW	Public	Middle	Mixed	2	92.42%
48	13-264M1	7.56%	264	SW	Public	Middle	White	1	92.97%
49	13-000E1	5.88%	N/A	NW	Private	Elem.	White	Not Calculable	89.47%
50	13-260E1	5.04%	260	SE	Public	Elem.	White	2	93.21%
51	13-261E5	0.00%	261	SW	Public	Elem.	Not Calculable	Not Calculable	80.00%

# School Rankings-Emergency 2012

Ranking	School Name	% Emergency	USD	Location	School Type	School Level	Predominant Race	Free Lunch Quartile	% Students Screened
1	12-259E7	7.02%	259	SW	Public	Elem.	Mixed	4	87.43%
2	12-259E4	5.87%	259	SE	Public	Elem.	Mixed	4	94.35%
3	12-259E3	5.52%	259	SW	Public	Elem.	White	4	69.53%
4	12-259E13	5.40%	259	SE	Public	Elem.	White	4	91.45%
5	12-261E1	4.37%	261	SW	Public	Elem.	White	3	100.00%
6	12-261E3	4.26%	261	SW	Public	Elem.	White	2	100.00%
7	12-261E4	3.99%	261	SW	Public	Elem.	White	2	100.00%
8	12-259E1	3.66%	259	SE	Public	Elem.	Mixed	3	94.71%
9	12-259E5	3.18%	259	SW	Public	Elem.	Mixed	4	100.00%
10	12-259M4	2.99%	259	NW	Public	Middle	Hispanic	4	94.51%
42	12-000E6	1.20%	N/A	NW	Private	Elem.	Hispanic	Not Calculable	90.22%
43	12-264M1	1.17%	264	SW	Public	Middle	White	Not Calculable	91.94%
44	12-260M1	0.86%	260	SE	Public	Middle	White	2	90.86%
45	12-260E5	0.65%	260	SE	Public	Elem.	White	1	46.86%
46	12-000E5	0.50%	N/A	NW	Private	Elem.	Mixed	Not Calculable	100.00%
47	12-259E9	0.49%	259	NW	Public	Elem.	Mixed	3	33.50%
48	12-261E5	0.00%	261	SW	Public	Elem.	Not Calculable	Not Calculable	71.43%
49	12-000E3	0.00%	N/A	SW	Private	Elem.	Mixed	Not Calculable	79.43%
50	12-000E4	0.00%	N/A	NW	Private	Elem.	White	1	98.41%
51	12-000E2	0.00%	N/A	NW	Private	Elem.	White	Not Calculable	99.17%



# School Rankings-Emergency 2013

Ranking	School Name	% Emergency	USD	Location	School Type	School Level	Predominant Race	Free Lunch Quartile	% Students Screened
1	13-259E16	10.80%	259	NE	Public	Elem.	Black	4	97.42%
2	13-259E4	10.24%	259	SW	Public	Elem.	White	3	74.35%
3	13-259E10	9.03%	259	NE	Public	Elem.	White	2	91.42%
4	13-259E3	9.02%	259	SE	Public	Elem.	Hispanic	4	100.00%
5	13-259E14	8.67%	259	SW	Public	Elem.	Mixed	4	100.00%
6	13-259E11	7.75%	259	SE	Public	Elem.	Hispanic	4	84.42%
7	13-259E8	7.31%	259	SW	Public	Elem.	Mixed	4	71.33%
8	13-259E17	7.27%	259	SE	Public	Elem.	White	3	48.94%
9	13-259E15	6.96%	259	NE	Public	Elem.	Mixed	3	64.08%
10	13-259E13	6.37%	259	NW	Public	Elem.	Black	4	75.00%
42	13-259M6	1.97%	259	NE	Public	Middle	Mixed	3	89.15%
43	13-000E4	1.79%	N/A	NW	Private	Elem.	Mixed	Not Calculable	100.00%
44	13-259M5	1.75%	259	NE	Public	Middle	Mixed	3	72.96%
45	13-260E2	1.59%	260	SE	Public	Elem.	White	3	67.02%
46	13-000E3	1.48%	N/A	NW	Public	Elem.	Mixed	Not Calculable	98.07%
47	13-000E1	1.18%	N/A	NW	Private	Elem.	White	Not Calculable	89.47%
48	13-260E4	1.02%	260	SE	Public	Elem.	White	2	66.00%
49	13-260E1	0.84%	260	SE	Public	Elem.	White	2	93.21%
50	13-264E2	0.43%	264	SW	Public	Elem.	White	2	97.76%
51	13-261E5	0.00%	261	SW	Public	Elem.	Not Calculable	Not Calculable	80.00%

# School Rankings-Sealants Needed 2012

Ranking	School Name	% Sealants Need.	USD	Location	School Type	School Level	Predominant Race	Free Lunch Quartile	% Students Screened
1	13-000E6	48.80%	N/A	NW	Private	Elem.	Hispanic	Not Calculable	90.22%
2	12-264M1	45.61%	264	SW	Public	Middle	White	Not Calculable	91.94%
3	12-000E4	41.94%	N/A	NW	Private	Elem.	White	1	98.41%
4	12-000E1	41.86%	N/A	SE	Private	Elem.	Mixed	3	91.88%
5	12-259M1	41.81%	259	NE	Public	Middle	Mixed	3	87.62%
6	12-259M5	40.00%	259	NE	Public	Middle	Mixed	3	79.27%
7	12-260E6	40.00%	260	SE	Public	Elem.	White	2	67.57%
8	12-259M4	39.61%	259	NW	Public	Middle	Hispanic	4	94.51%
9	12-259M2	38.96%	259	NW	Public	Middle	Mixed	3	87.51%
10	12-260E3	38.50%	260	SE	Public	Elem.	White	2	75.00%
42	12-260E2	29.18%	260	SE	Public	Elem.	White	2	88.69%
43	12-261E2	27.69%	261	SW	Public	Elem.	White	2	100.00%
44	12-261E1	27.51%	261	SW	Public	Elem.	White	3	100.00%
45	12-259E9	26.70%	259	NW	Public	Elem.	Mixed	3	33.50%
46	12-264E2	26.43%	264	SW	Public	Elem.	White	2	94.29%
47	12-259E13	25.18%	259	SE	Public	Elem.	White	4	91.45%
48	12-261E3	24.56%	261	SW	Public	Elem.	White	2	100.00%
49	12-263E1	24.03%	263	SE	Public	Elem.	White	2	99.09%
50	12-259E4	21.44%	259	SE	Public	Elem.	Hispanic	4	94.35%
51	12-264E1	20.76%	264	SW	Public	Elem.	White	1	90.08%

# School Rankings-Sealants Needed 2013

Ranking	School Name	% Sealants Need.	USD	Location	School Type	School Level	Predominant Race	Free Lunch Quartile	% Students Screened
1	12-260E2	79.89%	260	SE	Public	Elem.	White	3	67.02%
2	13-262M1	75.52%	262	NW	Public	Middle	White	2	36.29%
3	13-259M6	69.59%	259	NE	Public	Middle	Mixed	3	89.15%
4	13-261M2	69.20%	261	SW	Public	Middle	Mixed	2	92.42%
5	13-261M3	68.28%	261	SW	Public	Middle	White	2	99.31%
6	13-259M1	65.37%	259	NE	Public	Middle	Mixed	3	100.00%
7	13-264E2	64.96%	264	SW	Public	Elem.	White	2	91.76%
8	13-261E5	64.29%	261	SW	Public	Elem.	Not Calculable	Not Calculable	80.00%
9	13-264M1	62.79%	264	SW	Public	Middle	White	1	92.97%
10	13-000E3	62.07%	N/A	NW	Private	Elem.	Mixed	3	98.07%
42	13-264E1	36.47%	264	SW	Public	Elem.	White	2	96.76%
43	13-259E2	35.54%	259	SW	Public	Elem.	Mixed	4	92.66%
44	13-260E4	34.58%	260	SE	Public	Elem.	White	2	66.00%
45	13-259E3	34.27%	259	SE	Public	Elem.	Hispanic	4	100.00%
46	13-259E5	31.55%	259	NW	Public	Elem.	Mixed	3	85.57%
47	13-259M3	30.88%	259	NW	Public	Middle	Hispanic	4	86.63%
48	13-000E1	29.41%	N/A	NW	Private	Elem.	White	Not Calculable	89.47%
49	13-263E1	28.67%	263	SE	Public	Elem.	White	2	96.51%
50	13-259E14	25.33%	259	SW	Public	Elem.	Mixed	4	100.00%
51	13-259E12	18.75%	259	NW	Public	Elem.	Mixed	Not Calculable	82.76%

# School Rankings-Sealants Present 2012

Ranking	School Name	% Sealants Pres.	USD	Location	School Type	School Level	Predominant Race	Free Lunch Quartile	% Students Screened
1	12-264E1	65.68%	264	SW	Public	Elem.	White	1	90.08%
2	12-264M1	64.91%	264	SW	Public	Middle	White	Not Calculable	91.94%
3	12-261E5	60.00%	261	SW	Public	Elem.	Not Calculable	Not Calculable	71.43%
4	12-000E6	58.43%	N/A	NW	Private	Elem.	Hispanic	Not Calculable	90.22%
5	12-259M3	54.97%	259	SE	Public	Middle	Hispanic	4	100.00%
6	12-259M7	54.37%	259	NW	Public	Middle	White	2	93.37%
7	12-000E2	53.78%	N/A	NW	Private	Elem.	White	Not Calculable	99.17%
8	12-261M2	52.11%	261	SW	Public	Middle	Mixed	2	95.10%
9	12-000E5	51.74%	N/A	NW	Private	Elem.	Mixed	3	100.00%
10	12-259E9	51.74%	259	NW	Public	Middle	Mixed	3	33.50%
42	12-000E4	29.03%	N/A	NW	Private	Elem.	White	1	98.41%
43	12-259E11	28.25%	259	NW	Public	Elem.	White	3	92.53%
44	12-261E4	27.00%	261	SW	Public	Elem.	White	2	100.00%
45	12-260E6	26.91%	260	SE	Public	Elem.	White	2	67.57%
46	12-260E4	26.76%	260	SE	Public	Elem.	White	2	100.00%
47	12-261E2	25.49%	261	SW	Public	Elem.	White	2	100.00%
48	12-259E4	24.91%	259	SE	Public	Elem.	Hispanic	4	94.35%
49	12-259E7	22.74%	259	SW	Public	Elem.	Mixed	4	87.43%
50	12-259E3	21.75%	259	SW	Public	Elem.	White	4	69.53%
51	12-259E1	20.62%	259	SE	Public	Elem.	Mixed	3	94.71%

# School Rankings-Sealants Present 2013

Ranking	School Name	% Sealants Pres.	USD	Location	School Type	School Level	Predominant Race	Free Lunch Quartile	% Students Screened
1	13-259E6	80.82%	259	NE	Public	Elem.	Mixed	2	77.45%
2	13-260E2	67.20%	260	SE	Public	Elem.	White	3	67.02%
3	13-259M2	58.31%	259	SE	Public	Middle	Mixed	4	92.89%
4	13-259M4	56.08%	259	NW	Public	Middle	Hispanic	4	93.35%
5	13-264M1	55.81%	264	SW	Public	Middle	White	1	92.97%
6	13-264E2	52.56%	264	SW	Public	Elem.	White	2	91.76%
7	13-261M1	49.74%	261	SW	Public	Middle	White	2	99.31%
8	13-259M5	48.08%	259	NE	Public	Middle	Mixed	3	72.96%
9	13-259M7	48.08%	259	NW	Public	Middle	Mixed	2	82.81%
10	13-000E3	46.80%	N/A	NW	Private	Elem.	Mixed	3	98.07%
42	13-259E4	25.88%	259	SW	Public	Elem.	White	3	74.35%
43	13-261E4	24.21%	261	SW	Public	Elem.	White	2	99.33%
44	13-260E3	23.74%	260	SE	Public	Elem.	White	2	81.29%
45	13-259E3	22.65%	259	SE	Public	Elem.	Hispanic	4	100.00%
46	13-264E1	21.28%	264	SW	Public	Elem.	White	2	96.76%
47	13-259E15	20.51%	259	NE	Public	Elem.	Mixed	3	64.08%
48	13-259E11	19.52%	259	SE	Public	Elem.	Hispanic	4	84.42%
49	13-259E1	17.30%	259	SE	Public	Elem.	Mixed	4	87.52%
50	13-259E12	16.67%	259	NW	Public	Elem.	Mixed	Not Calculable	80.76%
51	13-263E1	11.33%	263	SE	Public	Elem.	White	2	96.51%



# Comparing 10 Schools with Highest Percentage

- 2012
  - 9 schools in both untreated decay and emergency
  - No schools in both untreated decay and sealants present
  - No schools in both untreated decay and sealants needed
- 2013
  - 7 schools in both untreated decay and emergency
  - No schools in both untreated decay and sealants present
  - No schools in both untreated decay and sealants needed



# Comparing 10 Schools with Lowest Percentage

- 2012
  - 4 schools in both untreated decay and emergency
  - No schools in both untreated decay and sealants present
  - No schools in both untreated decay and sealants needed
- 2013
  - 6 schools in both untreated decay and emergency
  - 1 schools in both untreated decay and sealants present
  - No schools in both untreated decay and sealants needed



# Association of Dental Decay and Sealants Present

- Null hypothesis: “Among children screened during school screening by the SCDH Children’s Dental Clinic, a low level of students with sealants present in a school is not related statistically to a high level of untreated decay in the school, considering the effects of other dental screening conditions (dental variables) and school characteristics (descriptive variables).”



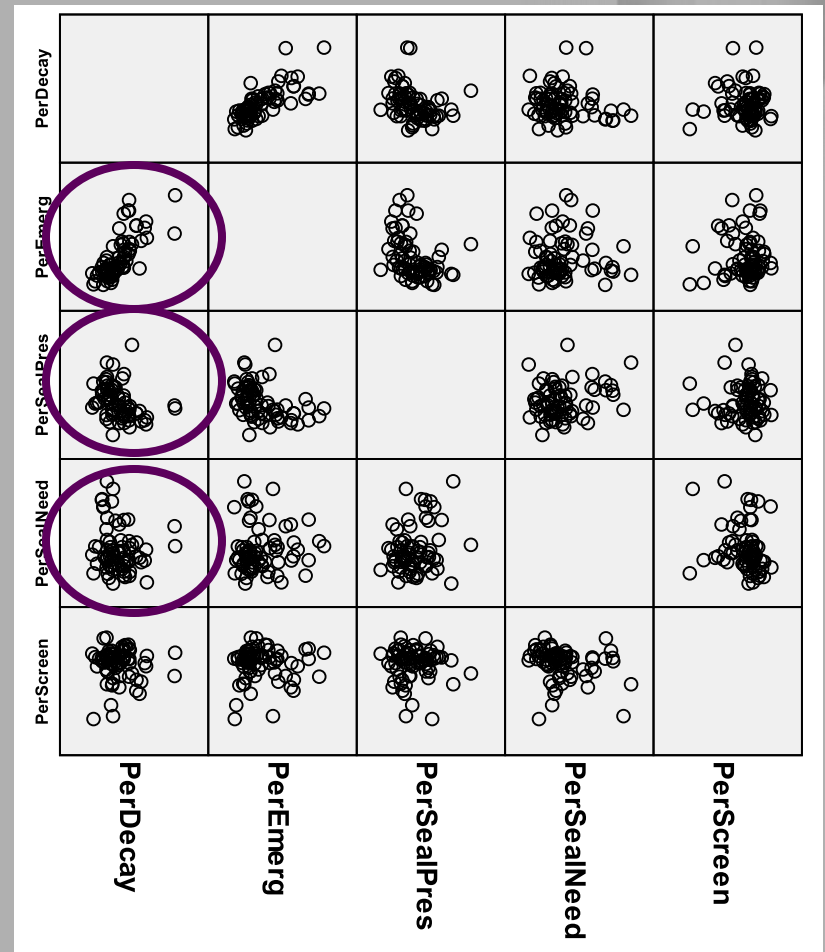
# Variable Coding



- 2012 and 2013 years combined
  - Schools with low percent students screened, low total enrollment, and not calculable free lunch removed
- Percent untreated decay, percent emergency, percent sealants present, percent sealants needed
  - Dichotomized based on mean
- USD
  - Dichotomized into USD 259 and non-USD 259
- School location
  - Dichotomized into SE and non-SE
- Predominant race
  - Dichotomized into predominant White and predominant non-White
- Free lunch quartile
  - Dichotomized into quartiles 1-2 and quartiles 3-4

# Scatterplot Diagnostic

- Untreated decay
  - Potential positive association
    - Emergency
  - Potential negative association
    - Sealants present
  - No apparent association
    - Sealants needed



# Pearson Correlation Coefficient

	Untreated Decay	Percent Emergency	Percent Sealants Present	Percent Sealants Needed	Percent Screened	Percent Free Lunch
Untreated Decay	1.000 (0.0)					
Percent Emergency	0.739 (<0.001)	1.000 (0.0)				
Percent Sealants Present	-0.335 (0.0041)	-0.385 (0.0008)	1.000 (0.0)			
Percent Sealants Needed	-0.132 (0.269)	0.036 (0.761)	0.239 (0.043)	1.000 (0.0)		
Percent Screened	-0.013 (0.916)	0.023 (0.845)	-0.015 (0.897)	-0.213 (0.072)	1.000 (0.0)	
Percent Free Lunch	0.571 (<0.001)	0.529 (<0.001)	-0.117 (0.329)	-0.072 (0.547)	0.049 (0.685)	1.000 (0.0)

# Univariate Analysis

## Categorical Dental and Descriptive Variables Associated with Untreated Decay High ( $\geq 13.9\%$ )

Dental/Descriptive Variable	Mantel-Haenszel Odds Ratio	95% Confidence Interval (test-based)	Mantel-Haenszel $\chi^2$ (p-value)
Emergency-High	57.18	(11.32-295.20)	37.52 (<0.0001)
Sealants Present-Low	8.04	(2.67-24.15)	15.1603 (<0.0001)
Sealants Needed-High	0.91	(0.35-2.38)	0.0331 (0.8536)
Year	1.41	(0.55-3.55)	0.4965 (0.4810)
USD	5.58	(1.99-15.64)	11.2807 (0.0008)
Location	0.56	(0.21-1.49)	1.3277 (0.2492)
School Type*	0.00	-	8462 (0.3576)
School Level	9.50	(2.48-36.38)	13.0445 (0.0003)
Predominant Race	0.37	(0.14-0.96)	4.1955 (0.0405)
Free Lunch Quartile	7.03	(2.47-20.03)	14.2813 (0.0002)

\*Missing values for the Private school type, calculation of the Mantel-Haenszel Odds Ratio, and 95% confidence interval cannot be performed accurately.

# Developing the Logistic Model

## *Model E*

Continuous: Emergency, Sealants Needed, Sealants Present , Free Lunch

Categorical: USD, Location, School Level, Predominant Race



## *Model D*

Continuous: Sealants Needed, Sealants Present , Free Lunch

Categorical: Emergency, USD, Location, School Level, Predominant Race



## *Model C*

Continuous: Sealants Needed, Sealants Present , Free Lunch

Categorical: USD, Location, School Level, Predominant Race

Emergency removed from modeling



## *Model B*

Continuous: Sealants Needed, Sealants Present

Categorical: USD, Location, School Level, Predominant Race, Free Lunch

Emergency removed from modeling



## ***Model A-Selected Model***

Categorical: Sealants Needed, Sealants Present , Free Lunch, USD, Location, School Level, Predominant Race

Emergency removed from modeling

# Final Reduced Model

The Association of Dental and Descriptive Variables with Untreated Decay of  $\geq 13.9\%$  (High) After Using Step-wise Logistic Regression (*Model A*)

(72 schools modeled)

Reduced model with all categorical variables and without percent emergency

Dental/Descriptive Variable	Variable Type	Parameter Estimate (Standard Error)	Odds Ratio (95% Confidence Interval)	Wald $\chi^2$ (p-value)
Sealant Present-Low	Categorical	3.113 (0.842)	22.480 (4.315-117.108)	13.663 (0.0002)
Free Lunch	Categorical	2.983 (0.823)	19.752 (3.936-99.117)	13.140 (0.0003)
<b>-2 log likelihood for intercept and covariates = 99.313</b>				

## Hosmer-Lemeshow Goodness-of-Fit Test:

Goodness-of-Fit Test Statistic= 0.5935

P-value from  $\chi^2$  distribution with 2 degrees of freedom= 0.7432





# Conclusions



- Sealants present
  - Analysis indicated a strong negative correlation between sealants present low and untreated decay high-reject null hypothesis
  - Odds of an untreated decay high, sealants present low school were 22 times more likely than odds of an untreated decay low, sealants present low school, considering the effects of free lunch quartile 3 and 4
- Free lunch
  - Analysis indicated strong positive correlation between free lunch high and untreated decay high
  - Odds of an untreated decay high, free lunch quartile 3 or 4 school were 20 times more likely than odds of an untreated decay low, free lunch quartile 3 or 4 school, considering the effects of sealants present low



# Conclusions



- School level and location
  - Included in *Model A*, but not reduced model
  - Further analysis indicated that these variables significantly associated with sealants present low
- Emergency
  - Preliminary analysis indicated positive association with untreated decay
  - Unable to include in final model due to multi-collinearity of variables
  - Univariate analysis using emergency as outcome showed similar results as untreated decay
    - Supports positive association between the variables



# Comparison to Healthy People 2020

- Untreated decay
  - Healthy People 2020 goal is  $\leq 25.9\%$
  - SCHD school screening data: average 14% (2012) and 15% (2013)
  - Only 5 schools were above this goal in both years
- Sealants present
  - Healthy People 2020 goal is  $\geq 28.1\%$
  - SCHD school screening data: average 38% both years
  - 31 schools were below this goal



# Limitations



- Selection bias
  - Convenience sample
  - Lack of enrollment information
- Lack of external validity
- Misclassification bias
  - Estimation of total enrollment, predominant race, free lunch quartile
- Categorization
  - Using mean to dichotomize not ideal



# Project Objectives Revisited

1a. Summarize screening data and rank schools based on dental variables

- completed

1b. Determine association of dental variables untreated decay and sealants present

- completed

2. Develop pilot study to determine barriers to accessing care

- survey completed, waiting for IRB approval

3. Perform online research on oral health programs

- Completed, no similar analysis identified

4. Assist in developing a communications plan for the SCHD Children's Dental Clinic

- Partially completed through development of "Find Your Dental Home" flyer



# Future Directions



- Distribute parent survey to 3 selected pilot schools
- Create flyer or brochure using information gathered from survey to distribute to pilot schools
- Determine if there is an increase in visits to the SCHED Children's Dental Clinic from pilot schools
- If successful, perform second round of survey using 3-5 new schools



# Core Competencies



- **Biostatistics**
  - Analysis of dental screening data
  - Association between untreated decay and sealants present
- **Environmental Toxicology**
  - Fluoride use in water
  - Assisting with elevated blood lead level protocol development



# Core Competencies



- Epidemiology
  - Analysis of dental decay rates in Sedgwick County schools
  - Assistance with disease investigations
- Administration of Health Care Organizations
  - Shadowing West Central Clinic
- Social and Behavioral Basis of Public Health
  - Behavioral aspect to oral health





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