

Shigella Infections in Maryland 1998-2002

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Background

- *Shigella* bacteria: gram-negative, nonmotile, non-encapsulated bacilli
- Symptoms: fever, fatigue, watery diarrhea, may progress to cramps and tenesmus
- Complications: severe dehydration, intestinal perforation, septicemia, seizures, and hemolytic uremic syndrome (HUS)
- In the U.S., among pathogens commonly transmitted through food, *Shigella* is the 3rd most common cause of bacterial infections after *Salmonella* and *Campylobacter*.



Research Questions

- Do the characteristics of the population affected by *Shigella* infections vary over time from 1998 to 2002?
- Why was there a sudden increase in the incidence rate of *Shigella* infection during 2002?



Maryland's Foodborne Diseases Active Surveillance Network (FoodNet)

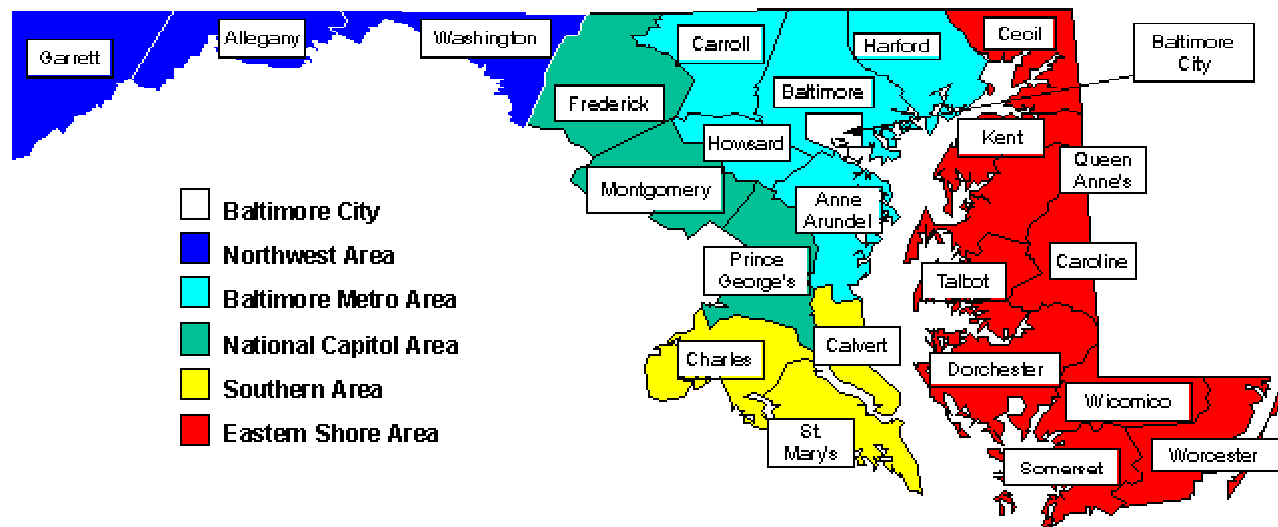
- Part of CDC's Emerging Infections Program
- Population-based active surveillance system for foodborne diseases caused by bacterial and parasitic infections
- Laboratory-confirmed cases
- Pathogens under surveillance:
*Campylobacter, E. coli 0157, Listeria monocytogenes, Salmonella, **Shigella**, Yersinia enterocolitica, Vibrio, Cryptosporidium and Cyclospora*

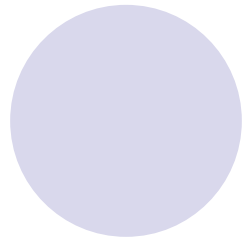
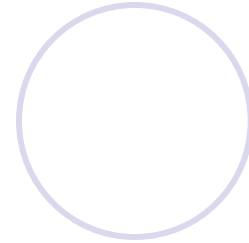
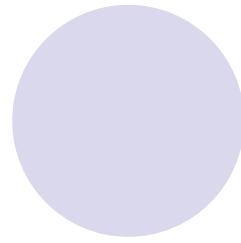
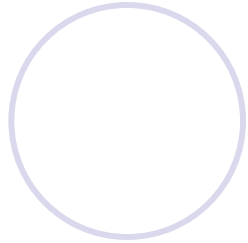
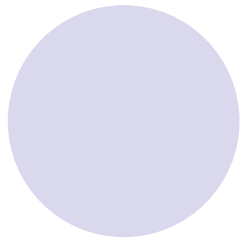


Methods

- Descriptive analysis of race distribution, sex ratio, % hospitalization, mean and median age of *Shigella* cases
- Incidence rates of *Shigella* infection calculated using census data from Maryland Department of Planning
- Chi-square test for trend
- Multiple logistic regression analysis

Maryland Counties





Results

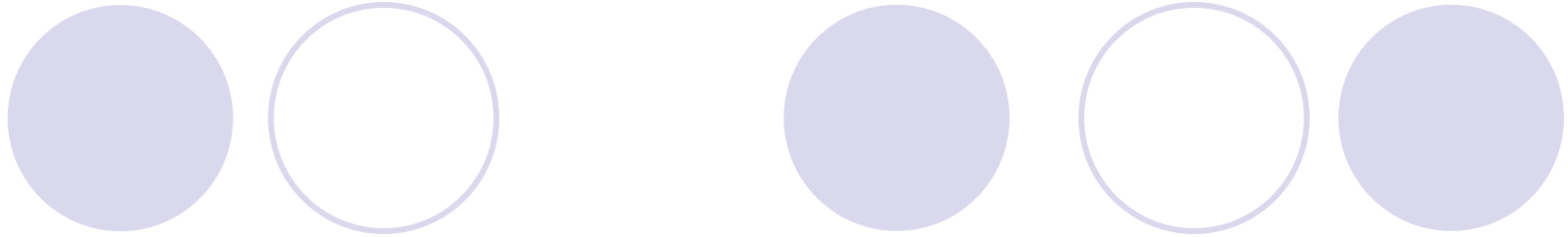




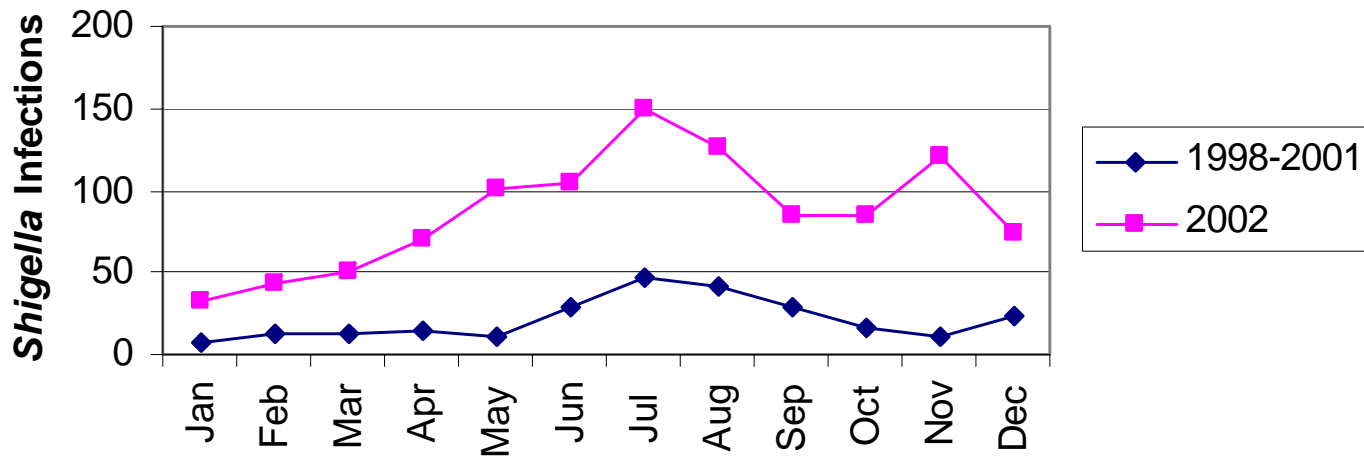
Shigella Infections in Baltimore Metro Area of Maryland, 1998-2002

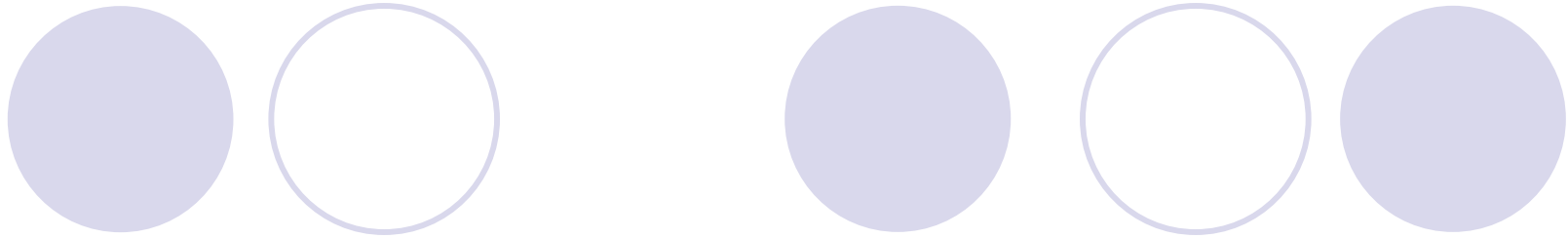
By serogroup

Percent (counts)	1998	1999	2000	2001	2002	Total
<i>Shigella boydii</i>	1.7% (1)	3.6% (2)	2.5% (2)	6.5% (4)	0.1% (1)	0.8% (10)
<i>Shigella flexneri</i>	36.2% (21)	36.4% (20)	14.8% (12)	27.4% (17)	0.8% (8)	6.0% (78)
<i>Shigella sonnei</i>	55.2% (32)	56.4% (31)	77.8% (63)	64.5% (40)	97.7% (1016)	91.2% (1182)
<i>Shigella</i> unspecified	6.9% (4)	3.6% (2)	4.9% (4)	1.6% (1)	1.4% (15)	2.0% (26)
Total	100% (58)	100% (55)	100% (81)	100% (62)	100% (1040)	100% (1296)

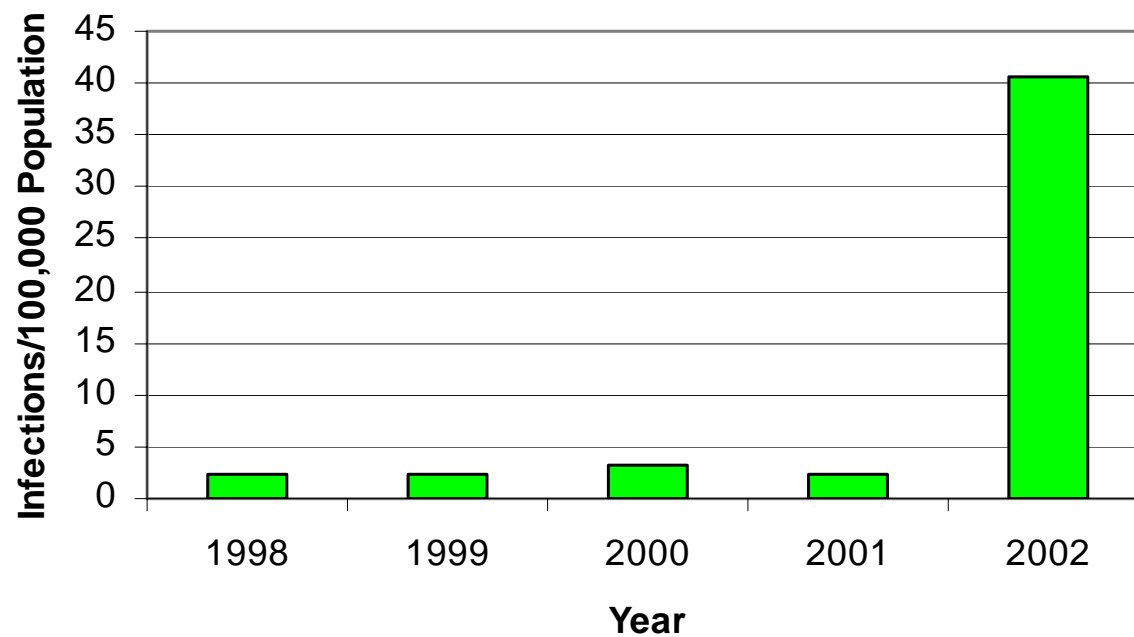


***Shigella* Infections in Baltimore Metro Area by Month 2002 vs. 1998-2001**





***Shigella* Incidence Rates
in Baltimore Metro Area of Maryland
1998-2002**



χ^2 (df=1) = 2.9 x 10³, p < 0.0001



Incidence rates of *Shigella* infections in Baltimore Metro Area of Maryland, 1998-2002

By race

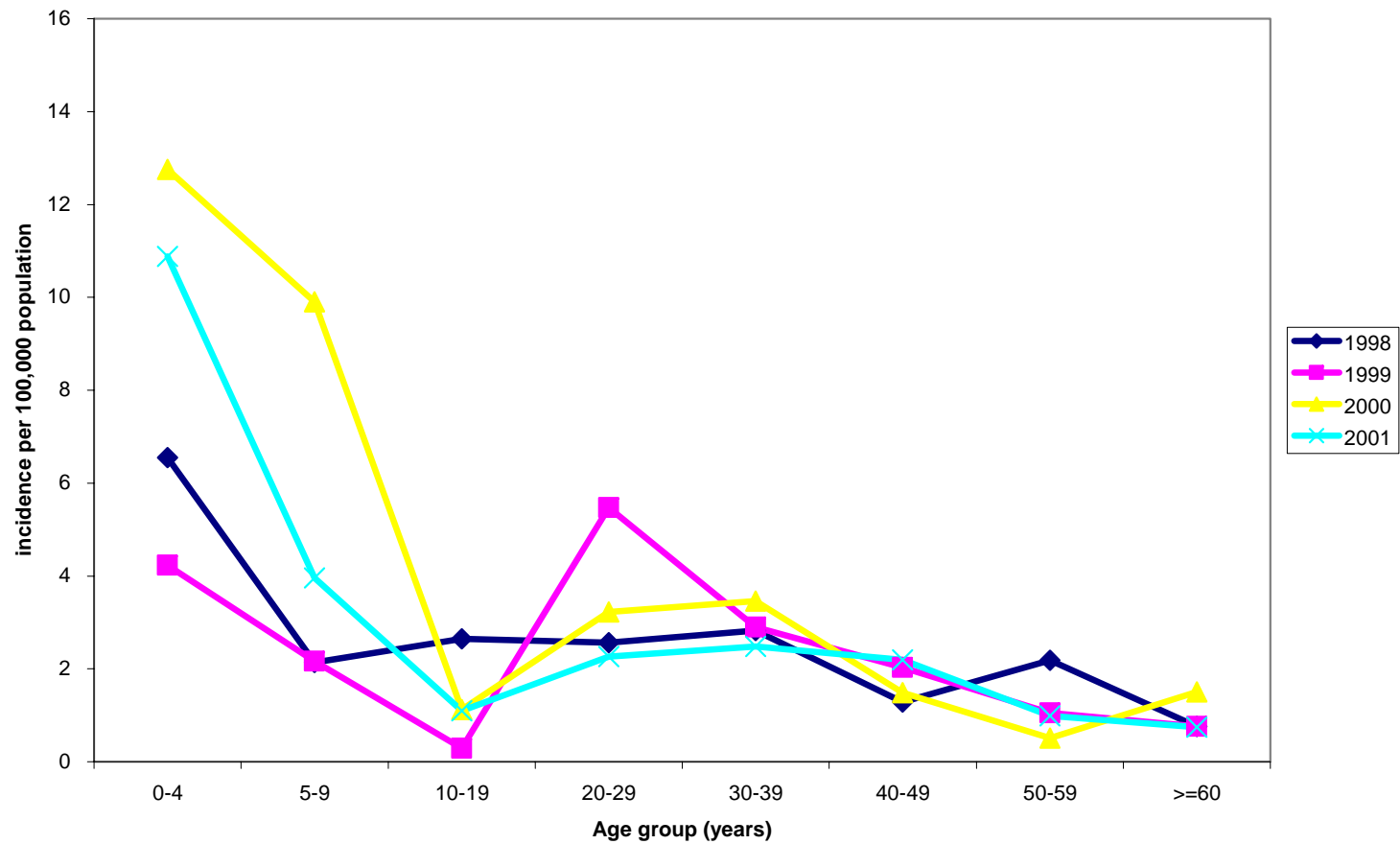
Incidence rate/100,000	1998	1999	2000	2001	2002	p value**
White	1.6	1.3	3.6	1.0	9.8	<.0001
Black	2.7	2.7	1.8	5.8	119.4	<.0001
Other*	3.9	2.5	0.9	2.7	6.9	.17

*Other: Asian & other. (Excluded race unknown)

** χ^2 test for trend, 4 degree of freedom.

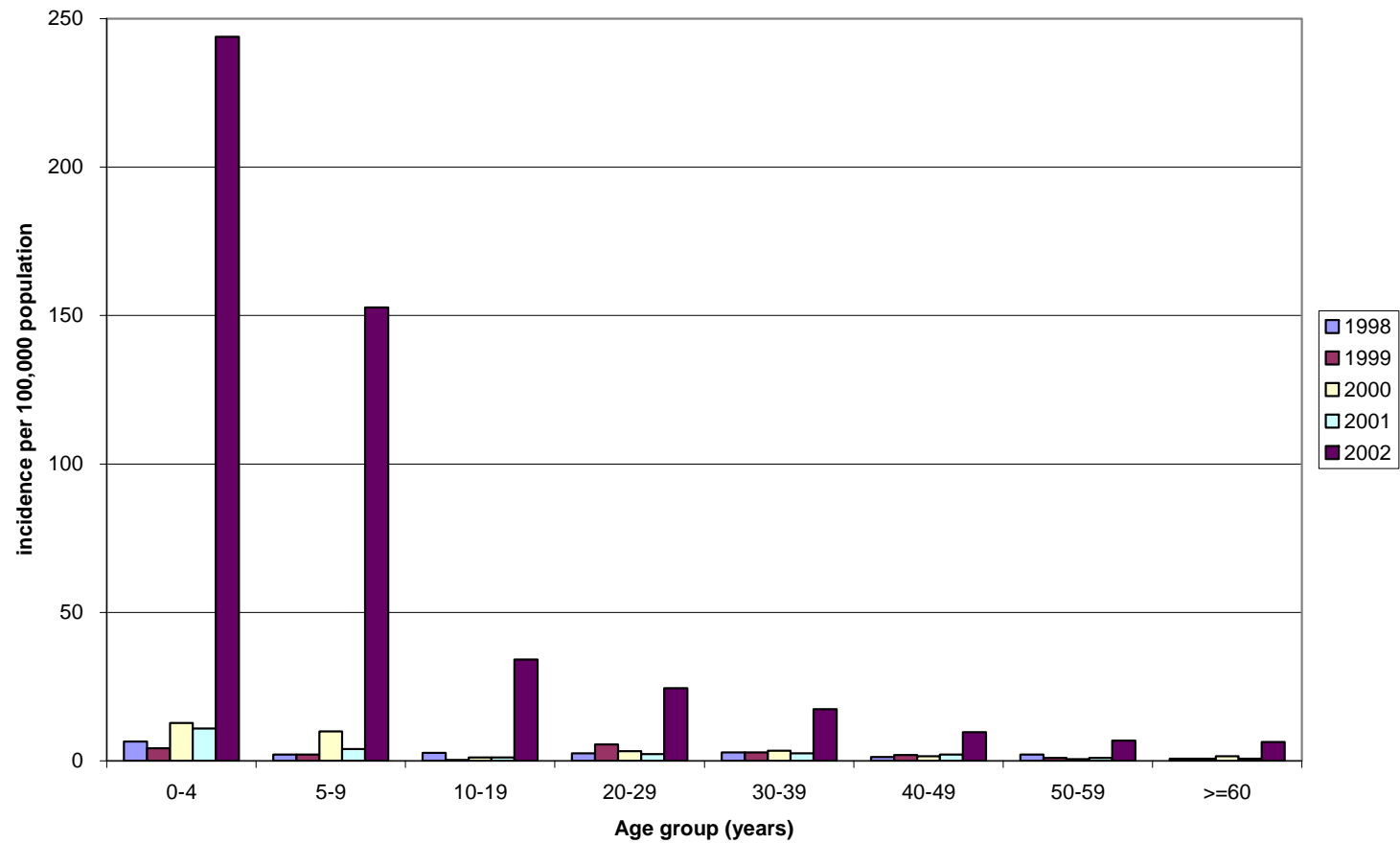
Age Distribution

Incidence of *Shigella* Infections in Baltimore Metro Area by Age Category, 1998-2001



Age Distribution (cont'd)

Incidence of *Shigella* Infections in Baltimore Metro Area by Age Category, 1998-2002



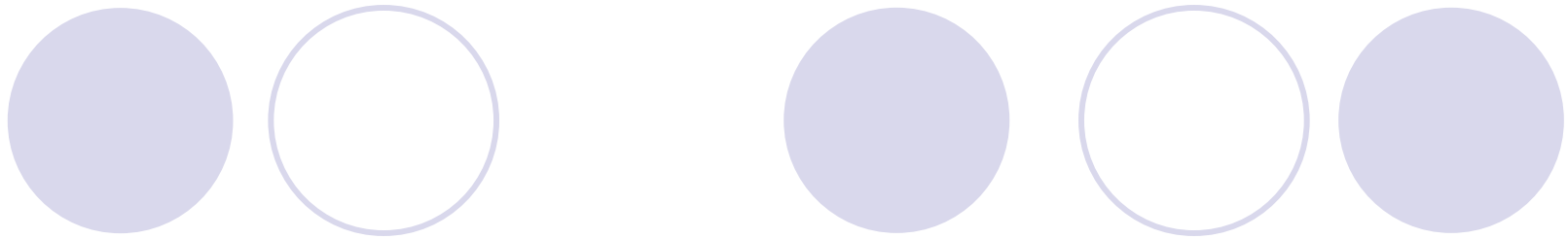


Incidence rates of *Shigella* infections in Baltimore Metro Area of Maryland, 1998-2002

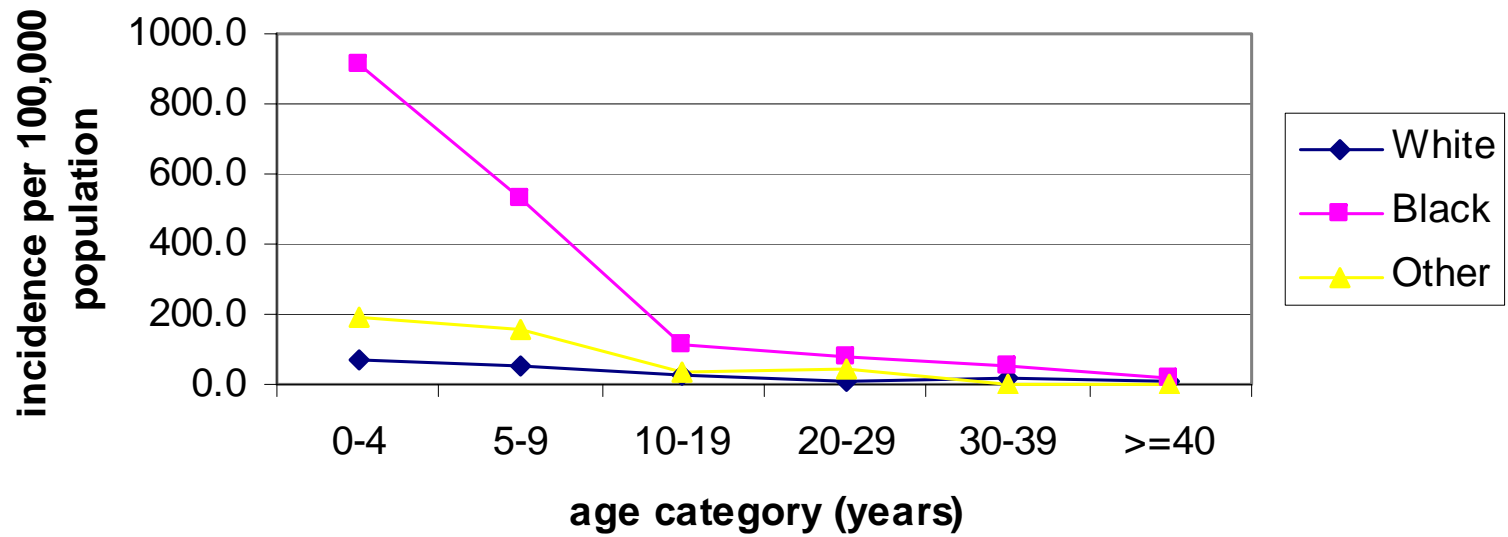
By jurisdiction

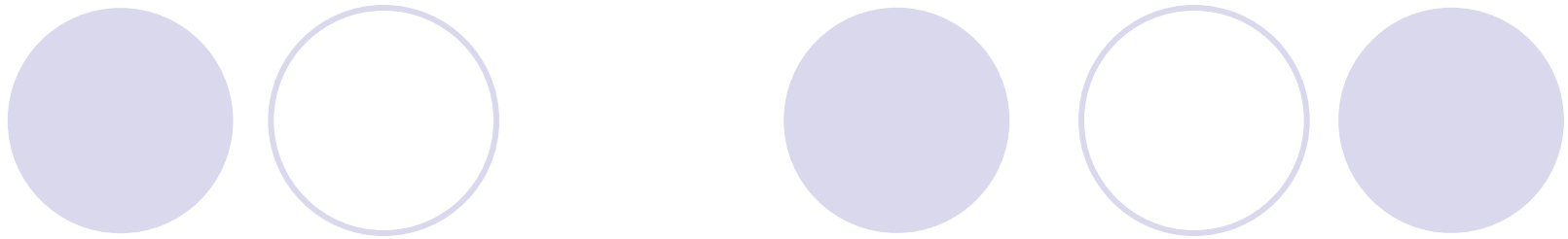
Incidence rate/100,000	1998	1999	2000	2001	2002	P value*
Anne Arundel	1.5	2.7	0.6	2.4	9.5	<.0001
Baltimore City	3.7	2.9	7.4	4.6	106.3	<.0001
Baltimore County	2.5	1.5	3.2	2.0	36.3	<.0001
Carroll	1.4	2.0	1.3	0.0	2.5	.423
Harford	0.5	0.5	0.5	0.9	7.0	<.0001
Howard	1.7	3.3	1.2	1.2	5.0	.023

* χ^2 test for trend, 4 degrees of freedom.

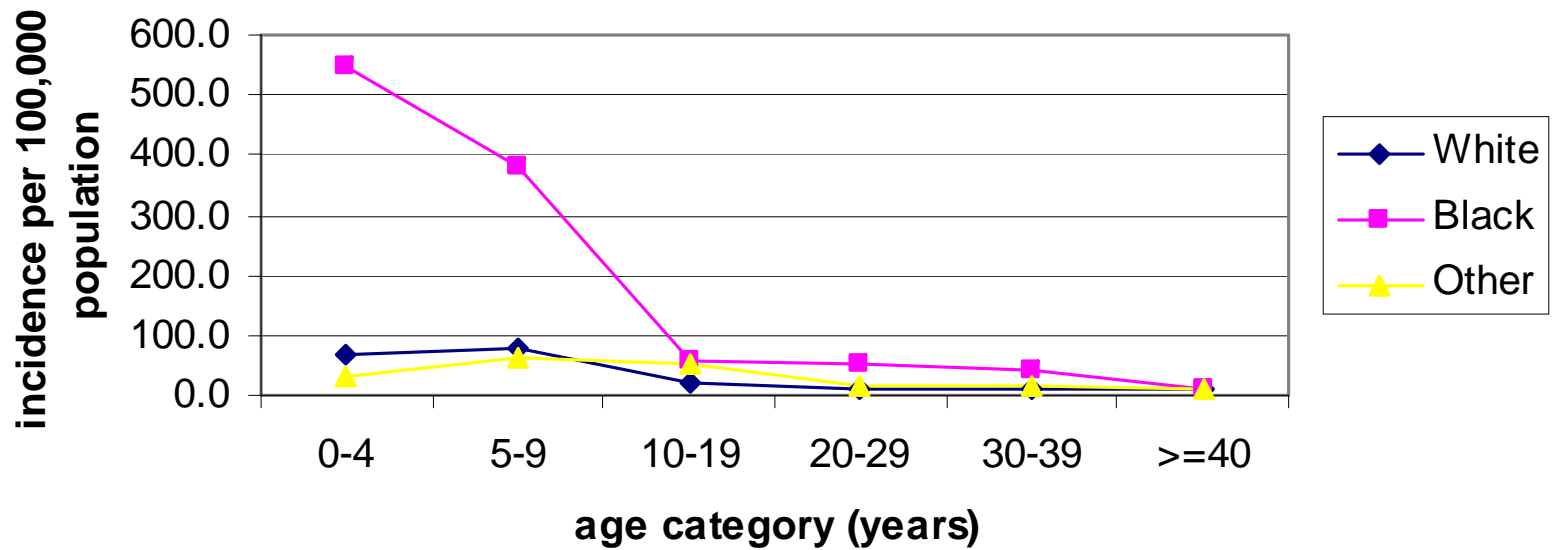


***Shigella* Incidence Rates by Race and Age Category in Baltimore City, 2002**





***Shigella* Incidence Rates by Race and Age Category in Baltimore County, 2002**





Multiple Logistic Regression Analysis

	Adj. Odds Ratio (95% CI)	P Value
Year (2002 vs. 1998-2001)*	16.16 (14.09 to 18.52)	< 0.0001
Age category**	0.57 (0.56 to 0.59)	< 0.0001
<hr/>		
Year (2002 vs. 1998-2001)*	53.48 (40.34 to 70.91)	< 0.0001
Age category***	0.77 (0.72 to 0.82)	< 0.0001
Year*Age category	0.68 (0.63 to 0.73)	< 0.0001

*Grouped 1998, 1999, 2000, & 2001 together as the reference group and 2002 as the comparison year.

**Age divided into categories: 0-4 years=1, 5-9 years=2, 10-19 years=3, 20-29 years=4, 30-39 years=5, 40-49 years=6, 50-59 years=7, & 60 years or above=8.



Multiple Logistic Regression Analysis (cont'd)

	Adj. Odds Ratio (95% CI)	P Value
Year (2002 vs. 1998-2001)*	18.19 (15.73 to 21.03)	< 0.0001
Race (0=white, 1=black)	7.64 (6.71 to 8.70)	< 0.0001
Year (2002 vs. 1998-2001)*	5.18 (4.12 to 6.50)	< 0.0001
Race (0=white, 1=black)	1.72 (1.32 to 2.25)	< 0.0001
Year*Race	7.07 (5.16 to 9.67)	< 0.0001

*Grouped 1998, 1999, 2000, & 2001 together as the reference group and 2002 as the comparison year.



Conclusion and Public Health Implication

- *Shigella* infections affecting mostly African American children < 5 years old in 2002
- Age group with highest incidence rate observed is in agreement with day care attendees
- Crowded living conditions, dilapidated housing and poverty may also influence the rates of *Shigella* infection
- To treat or not to treat
- Vaccine (not currently available)
- Prevention target: hygiene education (hand washing)
- Detection bias
- An underestimate of true burden



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