

Background

- Mumps is a viral infection characterized by parotid swelling. Since 2006, mumps cases and outbreaks have been increasingly associated with college campuses (CDC 2017).
- Most college-associated cases have occurred in students who have completed the two-dose measles-mumps-rubella (MMR) vaccine series appropriately, but other risk factors have not been well studied in this population.
- The Indiana State Department of Health (ISDH) responded to an outbreak of mumps in a small, private university in 2016. Outbreak control measures included a large vaccination effort, which administered catch-up and third doses and reached approximately half of all students and staff (Albertson et al. 2016).



Figure 1. Child with mumps infection, displaying characteristic symptoms of salivary gland swelling (CDC 1976).

Methods

- An eight question anonymous survey was administered to attendees of the two university outbreak vaccination clinics to assess previous vaccination, receipt of a third dose, known case exposures, and risk factors for exposure.
- The ISDH integrated survey data with risk factor, vaccination, and exposure information from investigations of mumps cases at the university.
- Associations between survey factors and risk of mumps infection were analyzed using chi-square and Fisher's exact tests in SAS 9.4 (SAS Institute, Cary, NC).

Results

- Of 2,010 total surveys administered, complete survey or risk factor information was available for 1,427 (71.0%) individuals. Of these, 25 (1.8%) were investigated as confirmed or probable mumps cases.
- Responders were aged 17 years to 66 years (mean: 23 years; median: 20 years)
- Twenty-one (1.5%) non-case respondents, likely staff members or graduate students, reported mumps infection during childhood.
- Of those surveyed, 115 (8.2%) non-cases and 18 (72.0%) cases reported a known exposure to a confirmed or probable case of mumps.

Table 1. Characteristics of cases and non-cases surveyed for mumps risk factors. P – probability of chi-square or Fisher's exact test, as appropriate.

Characteristics	Case N (%)	Non-case N (%)	P
Age Group			0.09
<18	0(0.0)	4(0.3)	
18-25	25(100.0)	1193(85.1)	
26-34	0(0.0)	56(4.0)	
35-49	0(0.0)	83(5.9)	
≥50	0(0.0)	56(4.0)	
Unknown	0(0.0)	10(0.7)	
Permanent Residence			0.13
Indiana	9(36.0)	741(52.9)	
Non-Indiana	14(56.0)	609(43.4)	
Unknown	2(8.0)	52(3.7)	
Exposure Risk Factors			
Sorority or Fraternity Affiliation	18(72.0)	680(48.5)	0.02
Athletic Team/Group	2(0.1)	325(23.1)	0.10
Other Group/Club	5(0.4)	420(29.9)	0.33
Dormitory Residence	2(8.7)	311(22.2)	0.12
Exposure to Known Case	18(72.0)	115(8.2)	<0.01
MMR Vaccination Status			0.33
0 MMR doses	0(0.0)	52(3.7)	
1 MMR dose	1(4.0)	10(0.7)	
2 MMR doses	21(84.0)	1071(76.4)	
3+ MMR doses	2(8.0)	6(0.4)	
Unknown	1(4.0)	263(18.8)	

- **Known exposure to a confirmed or probable case was significantly associated with becoming a mumps case (OR: 28.8; 95%CI: 11.8-70.3) as was sorority or fraternity affiliation (OR: 2.7; 95% CI: 1.1-6.6).**
- Connections with one particular fraternity were reported by 56% of cases, independent of membership in that organization.

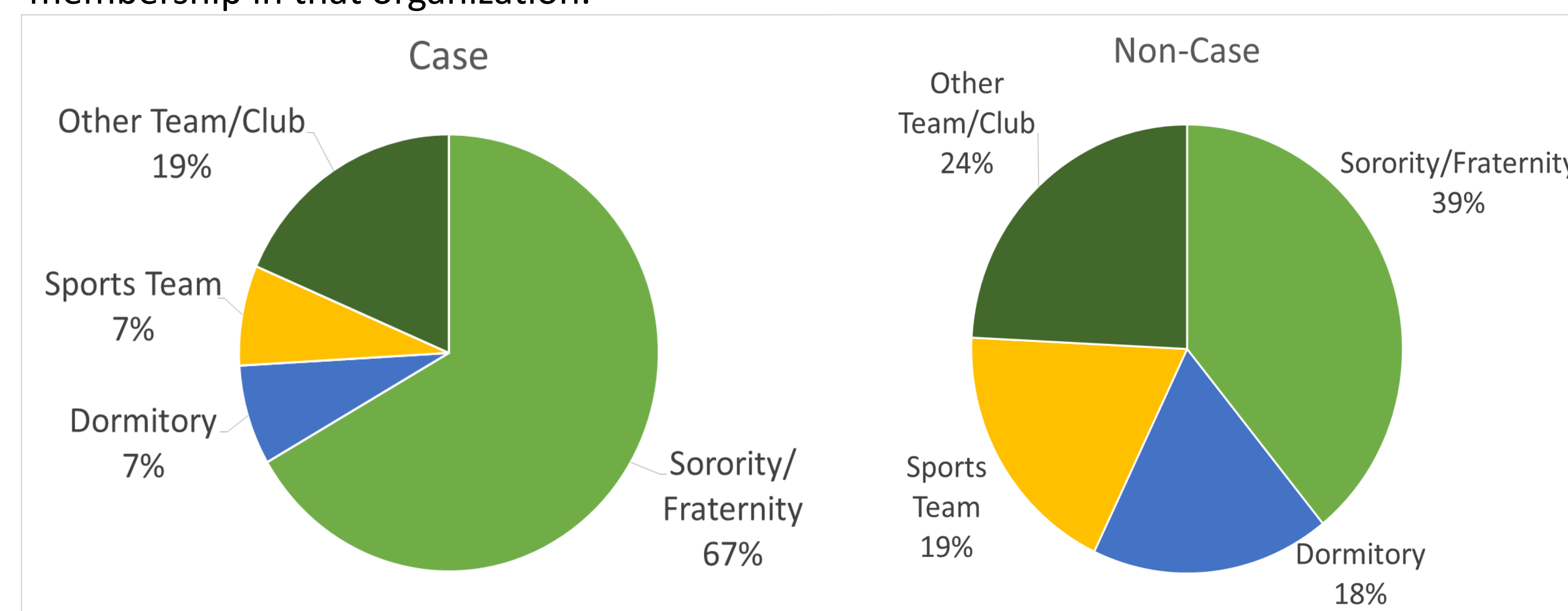


Figure 2. Affiliations reported by all surveyed individuals. Sorority and Fraternity affiliation was higher among mumps cases than among non-cases who attended the vaccination clinics. Other organizations reported included musical groups (choirs, bands, etc.), on- and off-campus workplaces, and service and leadership organizations.

Conclusions

- Sorority and fraternity affiliation was significantly correlated to developing mumps in this outbreak, however, much of this association could be accounted for by the large association with one particular fraternity.
- These results indicate a continued need to focus on case and contact risk factor identification, better exclusion enforcement and surveillance for contacts of cases, and targeted educational outreach to high-risk groups identified during investigations.
- As students may not be forthcoming with risk factor information to public health officials, alternative routes, such as anonymous surveys or interviews independent of parental presence, are likely to be useful.
- A limitation of this study was the inability to capture more specific exposure data from non-cases implicated in other outbreaks among vaccinated persons, such as sharing smoking devices and large household size.

Acknowledgments

This research was possible thanks to the dedicated efforts of the Marion County Public Health Department, Butler University Health Services, and the ISDH Laboratories, Field Epidemiologists, Public Health Preparedness and Emergency Response Division and Epidemiology Resource Center.

References

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