

HS Graduation and Piped Water

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Hypothesis/Approach

- Concept: Does lack of piped water have negative effects on children's school performance?
- Idea: compare school performance (graduation rate primarily) of students in rural schools in communities **with piped water** to performance of students in rural schools in communities **without piped water**.



Data Collection

- Targeted regions with greatest # of un-piped villages (YK, Norton Sound, and Interior) .
 - *All* un- piped communities in YK, Interior, and Norton Sound considered.
 - Similar number of piped communities in regions were selected in convenience sample.
- Restricted to communities off the road system



Data Collection/Exclusions

- Handful of additional un-piped villages (4) from Bristol Bay and Northwest Arctic included
- Schools (& communities) restricted to those serving *only* one type of community (piped or un-piped).
- Correspondence schools or boarding schools excluded.
- Enrollment data obtained from each school



Sample Description

- 84 schools identified
- 76 with enrollment data
- 74 with consistent enrollment data
- All 74 schools had at least one student enrolled in each year of 2011-2015
- Biggest: (Hooper Bay) 115 9th-12th enrolled in 2015
- 9th-12th enrollment: mean = 26.5, median = 23



Sample Description

	Piped	Un-Piped	Combined
All Regions	38	37	75
Interior	4	8	12
Norton Sound	10	5	15
YK	24	20	44
Other	0	4	4



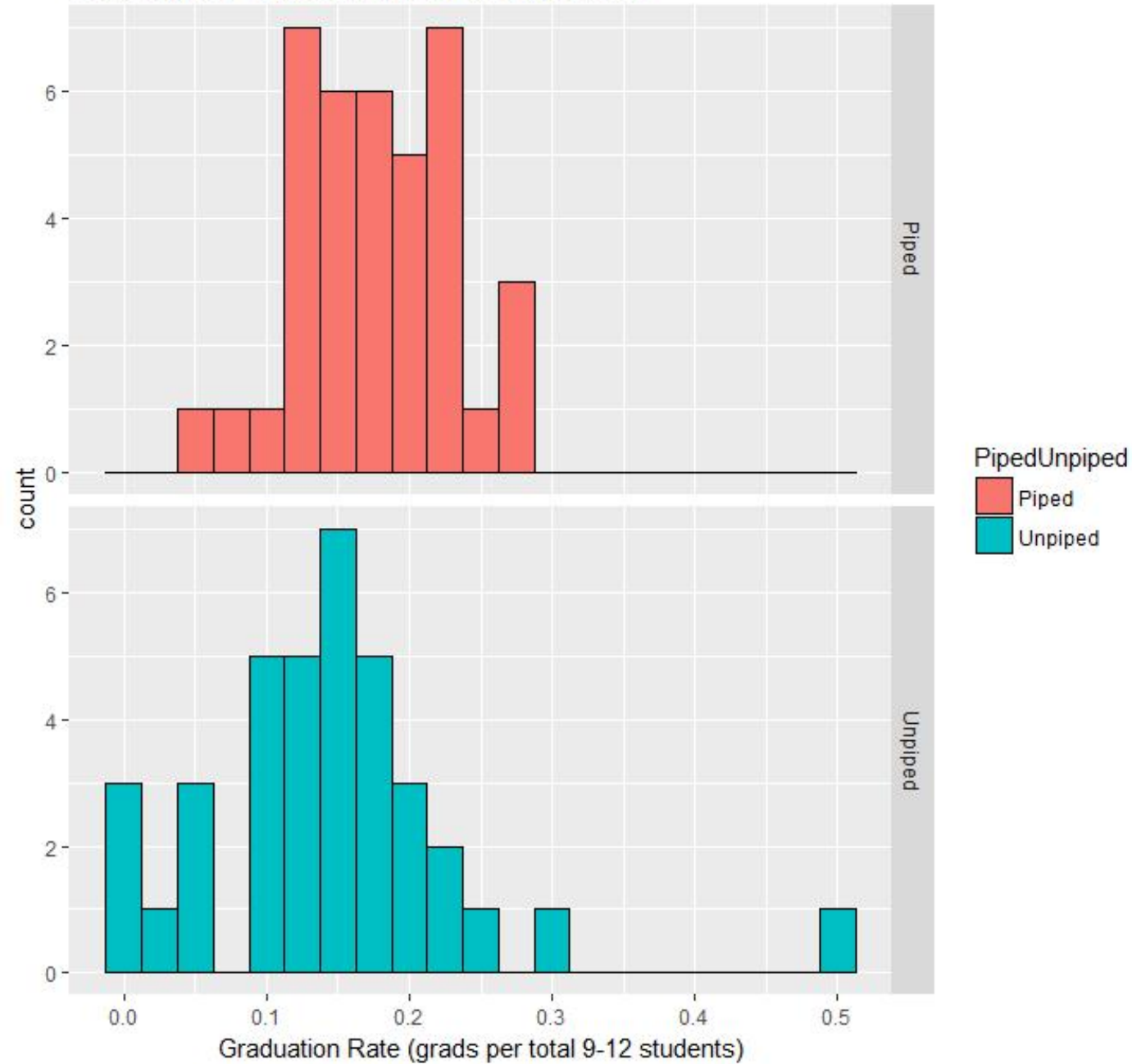
Potential Outcomes

- Graduation Rate:
 - Students graduating 2011-2015 per total student years 2011-2015 (grades 9-12)
 - Example: 10 students graduate each of 2011-2015. 40 students enrolled grades 9-12 each of 2011-2015 => 25% graduation rate
- Graduation Rate among 12th graders
 - Students graduating 2011-2015 per total student years 2011-2015 (*12th graders only*). Some issues...
- Attendance Rate: problem - only have % per year (not counts).



Distribution of Graduation Rate of Schools

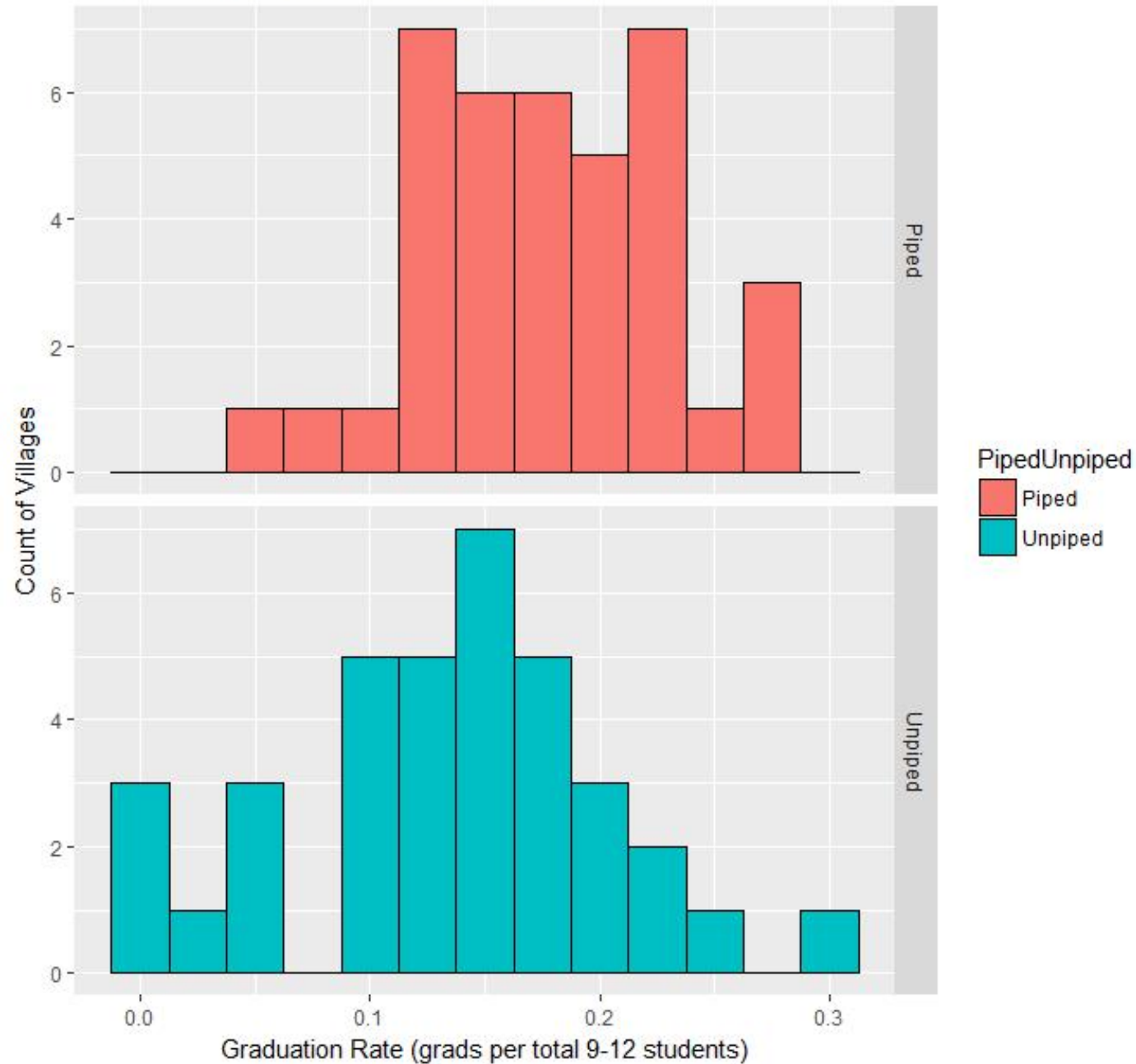
Graduation Rate = # graduated / total 9-12, 5 years of data



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Distribution of Graduation Rate of Schools, 1 Outlier Removed

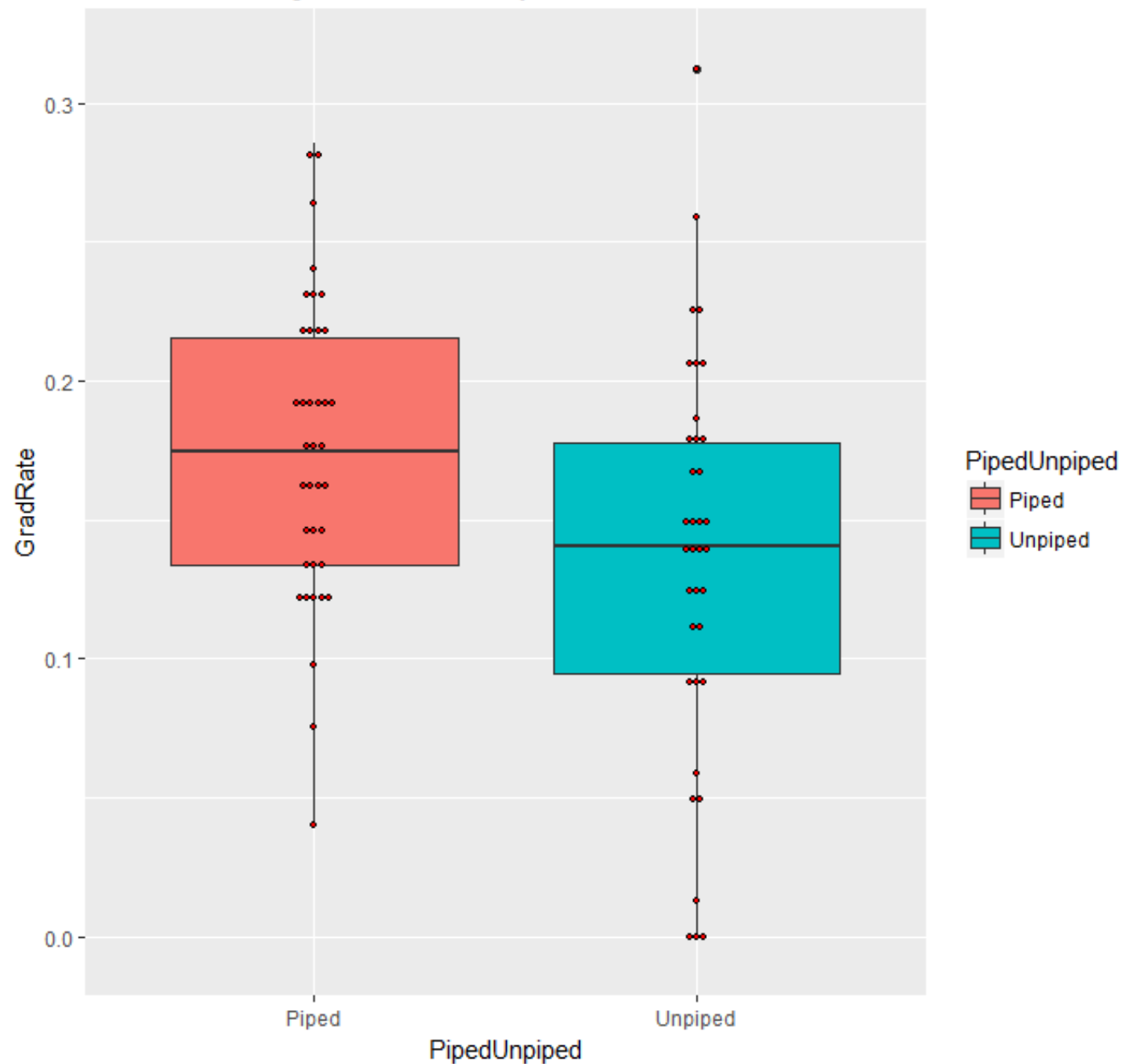
Graduation Rate = # graduated / total 9-12, 5 years of data



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Distribution of Graduation Rate of Schools, without outlier

Graduation Rate = # graduated/total 9-12, 5 years of data



Results

		Piped	UnPiped	Combined
Student-years Enrolled	mean	161	103	132
	std dev	120	84	107
	median	144	78	116
Total Grads	mean	26	15	21
	std dev	18	14	17
	median	22	11	17
Grad Rate	mean	18%	15%	16%
	std dev	6%	9%	8%
	median	18%	14%	16%



Models

- Logistic regression model:
 - Outcome is graduate or not, approximated by proportion graduating of all enrolled student-years grades 9-12.
- Poisson regression model (and quasi-poisson, negative binomial):
 - Outcome is count of graduated students, with person-years at risk
- Variations: Exclude outlier, restrict to schools with at least 50 person-years, limit to 3 main regions, adjust for region



Results

- Logistic regression model:
 - $p = 0.07$ no difference in piped vs un-piped
 - $p = 0.04$ exclude outlier village
 - $p = 0.04$ restrict to villages with at least 50 person-yrs
- Poisson regression model (quasi-poisson, negative binomial):
 - $p = 0.10$ no difference in piped vs un-piped
 - $p = 0.05$ exclude outlier village
 - $p = 0.06$ restrict to villages with at least 50 person-yrs
- Caveat: None of models fit the data super-well.



Conclusions

- Likely a modest difference in proportion graduating HS between villages *with* piped water vs villages *without* pipe water.



Limitations

- Association <> Causation: Lack of piped water may be a marker for other factors influencing likelihood of graduation
- Nearly all villages were in western Alaska (where majority of un-piped villages are).
- Accuracy of school records of enrollment and graduation likely varies by village
- A few villages may be mixture of piped/un-piped
- Other unmeasured factors can influence graduation rates and confound results.



Questions?



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