UCI Community College Honors Research Conference

Males and Females have different COVID-19 Infection and Fatality rates in New York City (Mar through April 2020)

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INTRODUCTION

- Novel Coronavirus (COVID-19) is caused by SARS-CoV-2.
  - 7th coronavirus. Predecessors include SARS and MERS

At-risk demographics:

- Neonates (newborns)
- Elderly
- Those with underlying illnesses
- Learning more will better enable health professionals to assess infection survival and to identify potential treatments.

- Males accounted for 60% of initial Chinese infections.
- Early study in Wuhan indicated a 2.7:1 male to female fatality ratio.
- Question: Do infection and fatality rate discrepancies between the sexes extend to populations beyond those in China?
- Early-pandemic hotspot: New York, New York

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METHODS

To answer the question: Daily data collected from NYC Health website

- Male COVID-19 infections
- Male fatalities due to COVID-19

- Female COVID-19 infections
- Female fatalities due to COVID-19

Normalization of infection and fatality rates:

$$\text{male or female infection rate} = \frac{\text{male or female COVID} - 19 \text{ infections}}{\text{citywide male or female population}}$$

$$\text{male or female fatality rate} = \frac{\text{male or female COVID} - 19 \text{ fatalities}}{\text{male or female COVID} - 19 \text{ infections}}$$

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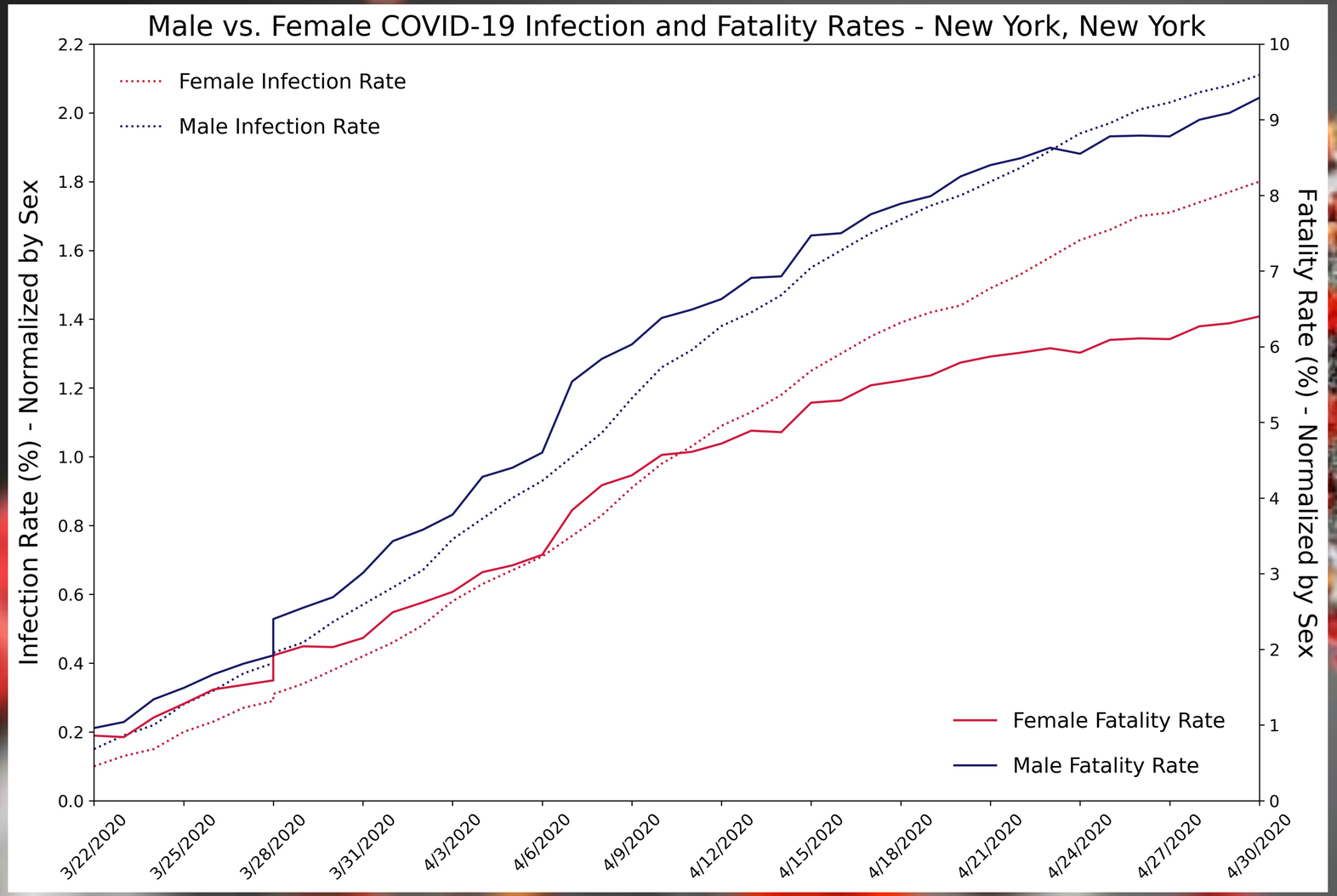
METHODS and RESULTS



z-tests for independent proportions conducted to determine associations between:

- Male vs. female inf. rate:
  - Significantly different: $p<0.0001$, $z= -33.05$
- Male vs. female fat. rate:
  - Significantly different: $p<0.0001$, $z= -21.74$

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METHODS and RESULTS

Curves of infections by sex vs. fatalities by sex (fatality rate by sex) were plotted and individually analyzed.

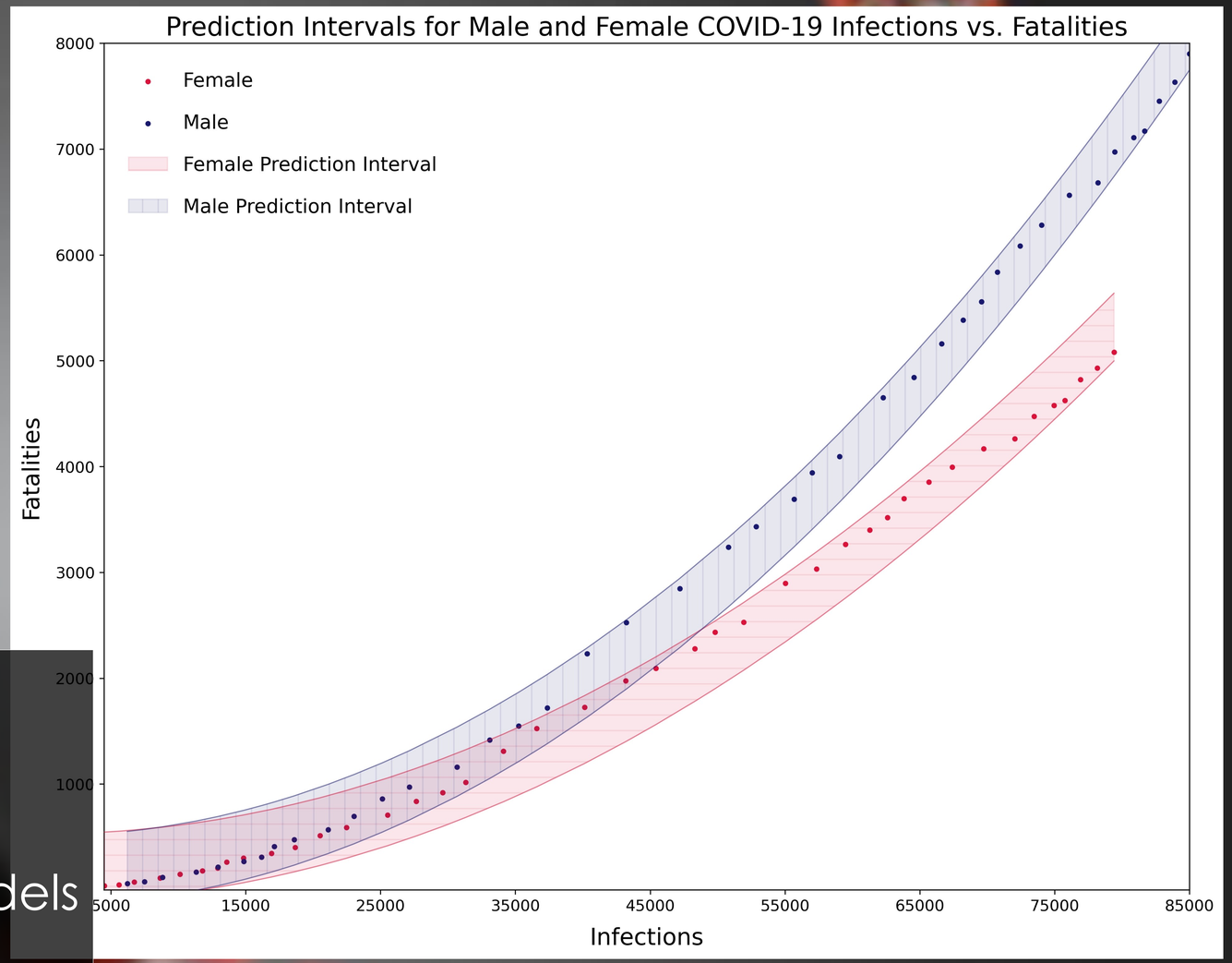
- Quadratic model of linear regression:
  - Male infections vs. fatalities: Significant association: $p < 0.0001$
  - Female infections vs. fatalities: Significant association: $p < 0.001$

Standard error of regression (S):

- Plotted prediction intervals: precision of regression models

Compared two quadratic regression models

- Significant difference: $P < 0.0001$



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DISCUSSION

Males in NYC showed higher infection rates and higher fatality rates than females in March – April 2020

Findings agree with recent studies:

- Study by Jin *et al*: The males who died of COVID-19 were 2.4 times that of females.
- Study by Peckham *et al*: males had 2.84 times the odds of requiring intensive care treatment than females and 1.39 times the odds of dying once admitted to ICT.

Previous coronavirus occurrences show the same sex discrepancy.

Why the discrepancy?

- Females have an increased resistance to infections of all types.
- ACE2 receptor: higher circulation in males.
- More research needed!

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