The University of Hong Kong
School of Public Health

Master of Public Health
Advanced Statistical Methods II
May 24, 2023

Assignment 1 – Inference on the prevalence of obesity

(*Submit to Moodle by 23:55, June 3, 2023*)

For public health surveillance purposes, a study has been carried out to assess the prevalence of obesity (defined as BMI>25) among male HKU undergraduates. The study took a random sample of 194 undergraduate males in May 2022, and assessed each of their heights and weights. In total, 21 students were found to be obese.

Answer the following six questions (total 16 marks). Please you submit your answers to Moodle. You may submit your R script to support your working but it will not be marked (optional).

All answers may be given to 2 decimal places, or if quoted as percentages may be rounded to the nearest percentage point.

1. Write down the likelihood function corresponding to a binomial model for the observed data, in terms of the parameter θ representing the population prevalence. [2 mark]

2. Plot a figure, with clear axis label and formatting, showing the likelihood function for θ ranging from 0 to 1. [3 mark]

3. By finding the parameter value which maximizes the likelihood function, or otherwise, quote the maximum likelihood estimate of θ. [2 mark]

4. Using a formula, approximation, or simulation, give the 95% confidence interval of θ. [3 marks]

5. What is the p-value of the maximum likelihood estimate of θ? You may decide the H_0 and use any combination of formulas, approximations or simulations. [4 marks]

6. Write a short paragraph (<u>no more than 2-3 sentences</u>) to convey to the director of the University Health Centre the likely prevalence of obesity among HKU undergraduates, based on some or all of the results above. [2 marks]