Introduction

1 Introduction
- Course Materials
- Software
- References
- Getting Help

2 Statistics
- Defining Statistics
- Two Motivating Scenarios
- Sample Versus Population

Goals of This Course

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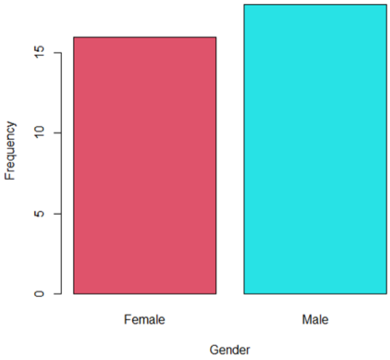

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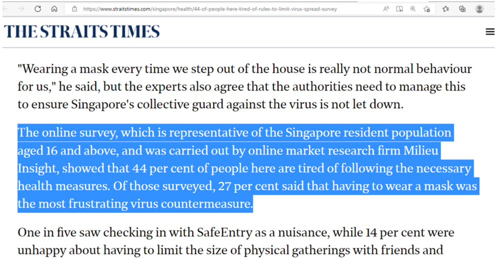
https://www.straitstimes.com/singapore/health/44-of-people-here-tired-of-rules-to-limit-virus-spread-survey
THE STRAITS TIMES

"Wearing a mask every time we step out of the house is really not normal behaviour for us," he said, but the experts also agree that the authorities need to manage this to ensure Singapore's collective guard against the virus is not let down.

The online survey, which is representative of the Singapore resident population aged 16 and above, and was carried out by online market research firm Milieu Insight, showed that 44 per cent of people here are tired of following the necessary health measures. Of those surveyed, 27 per cent said that having to wear a mask was the most frustrating virus countermeasure.

One in five saw checking in with SafeEntry as a nuisance, while 14 per cent were unhappy about having to limit the size of physical gatherings with friends and

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    - analyse appropriately real-world datasets using R
    - solve some statistical questions

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    - analyse appropriately real-world datasets using R
    - solve some statistical questions

5. Have practical experience in
    - formulating statistical questions,
    - answering these questions
    - communicating the findings to a non-technical audience.

How We Shall Try To Achieve These Goals

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- Formulas and mathematics are kept to a bare minimum.
- Use R to do most of the computations.
- Focus on
  - understanding the logic behind statistical decisions,
  - and interpretation of output from the software.

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Canvas

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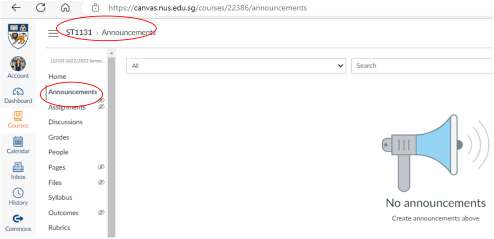

https://canvas.nus.edu.sg/courses/22386/announcements

ST1131 › Announcements

No announcements

Create announcements above

Lectures

- There are pre-recorded lectures and live lectures.

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- Before attending any live lecture, please finish all the previous lectures for better understanding.

Tutorials

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- Tutorials will be conducted physically by Ms Wong Yean Ling.

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R

- R is free. Either RGui or RStudio is accepted.

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- You **will be tested** on how to use R to produce the output (numerical/graphical).

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Recommended Book

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- Two thirds of the topics follow closely to the content of this book.

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- Book a time slot for consultation.

Facilitators and Emails

- Lecturer: Ms Daisy Pham, staptkc@nus,edu.sg

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- Tutor: Ms Wong Yean Ling, stawyl@nus.edu.sg

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- Student tutor: each is to support two groups of 5-6 students each.

Topics

1. Introduction to R programming
2. Exploratory Data Analysis (EDA)
3. Collecting Data
4. Probability
5. Random Variables (Discrete and Continuous Random Variables)
6. Sampling Distribution
7. Statistical Estimation
8. Hypothesis Testing
9. Linear Regression
10. Some Limitations of Linear Regression (extra topic if time permits)

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Statistics is used in almost all domains today.

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- Even if you never use statistics in your job, it's important to understand statistics. Why?

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  - Will customers buy this new products?
  - Does smoking lead to lung cancer?

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- The information that we gather is collectively called **data**.
    - Smoking habits of patients, whether they developed lung cancer or not, age, gender, etc.
    - A poll of randomly selected customers from Starbucks for example, on whether they like the new flavor of coffee or not.

What is Statistics?

Definition 1 (Defining Statistics)

Statistics is the art and science of designing studies and analyzing data that those studies produce. Its ultimate goal is to translate data into knowledge, that allows us to make informed and objective decisions.

Using Statistics

Overall, there are 4 steps to investigating questions using statistics:

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- Formulate a *Statistical Question*.
- Collect data. *Design*
- Analyze data. *Description*
- Interpret results. *Inference*

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- Data could be retrieved from HDB's website.
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- Then, based on this data, we not only could use statistics to predict the price but we also could make some inferences about the price.

Design, Describe and Infer in Example 1

- Full data of all the resale-flats that were sold from Jan 1990 until the current month.

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- Produce the estimation and/or statistical statements (*Inference*).

Aspirin and Heart Disease

Example 2 (Does Aspirin Reduce Heart Disease?)

- Heart disease is the most common cause of death in industrialized nations. Does regular aspirin intake reduce death from heart attacks?

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- Is this sufficient evidence for the benefit of aspirin in preventing heart attacks?

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- Inference step: can we infer that in *general*, aspirin can reduce the chances of heart disease?

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- Resale-flat example: the population is all the HDB resale-flats in Singapore. Sample is all flats in the provided data.
- Aspirin example: If the sample has US people with age from 35–65 then the results are for population of US people aged 35 – 65.

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- How we select our sample affects what population we can generalize the results to.

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- When doing so, we have to take into account the randomness in our sample.

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- This is known as *random sampling*.
  - It allows for powerful inferences about the population.
  - It is crucial for performing experiments as well.
- Every time we take a random sample of subjects, it will vary. Hence the statistics will change as well.