

# Body temperature investigation

DAPR1 staff

Note: this is not a report, but a live programming lecture transcript!

## 1 Checklist for ensuring an Rmd file successfully knits to PDF

- Did you install `tinytex`? If not,

```
install.packages("tinytex")
tinytex::install_tinytex()
```

- Ensure the metadata are correctly written:

```
---
title: "Write your title here"
author: "Your exam number"
output: bookdown::pdf_document2
toc: false
---
```

- Your code chunk labels should not have any underscores or spaces.

Replace anything like these:

```
```{r plt freq distr}

...

```{r plt_freq_distr}

...

```

To be one of these:

```
```{r plt-freq-distr}

...

```{r pltFreqDistr}

...

```

- Ensure there are no unicode symbols copied and pasted in your file.

For example,  $\alpha$  should be written within an equation as `$$\alpha$`. All those symbols should be written within equations blocks (delimited by dollars).

Another example is  $\cup$  for  $P(A \cup B)$ . This should be written as `$$P(A \cup B)$$`

Another example is  $H_0$ , which should be written `$$H_{0}$$`

## 2 Body temperature data

We will be using data comprising measurements on body temperature and pulse rate for a random sample of  $n = 50$  healthy subjects. The data are stored at the following address: <https://uoepsy.github.io/data/BodyTemp.csv>

We are interested in estimating what is the average body temperature for healthy individuals. Next week, we will investigate if this is significantly different from the commonly thought value of  $37^{\circ}\text{C}$ .

It would be extremely time-consuming and costly to take everyone's body temperature. Instead, the data were collected for a simple random sample of healthy humans and we will use the average body temperature of this sample to estimate the true population mean.

### 2.1 Simple random sampling (SRS)

Simple random sampling is a type of sampling technique. Sampling techniques are used by companies, researchers and individuals for a variety of reasons. Sampling strategies are useful when conducting surveys and answering questions about populations. There are many different methods researchers can use to obtain individuals to be in a sample. These are known as sampling methods.

Simple random sampling is, unsurprisingly, the simplest form of probability sampling: every member in the population has an equal chance of being selected in the sample. Individuals are usually selected by a random number generator or some other mean of random sampling.

The biggest benefit of SRS is it removes bias, as everyone has an equal chance of being selected. Furthermore, the sample is representative of the population.

### 2.2 Questions of interest

We are going to investigate the average body temperature for all healthy humans.

- This week: What is the average body temperature for healthy humans?
- Next week: Has the average body temperature for healthy humans changed from the long-thought  $37^{\circ}\text{C}$ ?

## 3 Introduction

The data available at <https://uoepsy.github.io/data/BodyTemp.csv> comprise measurements of the body temperature (**BodyTemp**, in Celsius) and pulse rate (**Pulse**) for a sample of 50 healthy individuals. We are interested in estimating the mean body temperature for all healthy humans and testing whether this is different from the commonly thought value of  $37^{\circ}\text{C}$ . As such, for the purpose of this investigation we will only focus on the variable **BodyTemp**.

## 4 Analysis

Figure 1 shows that the body temperatures of the sample of 50 healthy individuals follow roughly a bell-shaped distribution, with most values between  $36.5$  and  $37.5^{\circ}\text{C}$  and fewer in the tails of the distribution. No values were lower than  $35.75$  or larger than  $38.22$ . The average body temperature in the sample was  $36.81^{\circ}\text{C}$ , see Table 1, with a SE of  $0.06$  and 95% CI  $[36.69, 36.93]$ . Hence, we are 95% confident that the average body temperature for a healthy individual is between  $36.69^{\circ}\text{C}$  and  $36.93^{\circ}\text{C}$ .

At the 5% significance level, we tested whether the average body temperature of healthy individuals was significantly different from the commonly thought value of  $37^{\circ}\text{C}$ . The sample data provide very strong evidence against the null hypothesis and in favour of the alternative one that the mean body temperature is different from the hypothesised value of  $37^{\circ}\text{C}$ ,  $t(49) = -3.14, p = .003$ , two-sided.

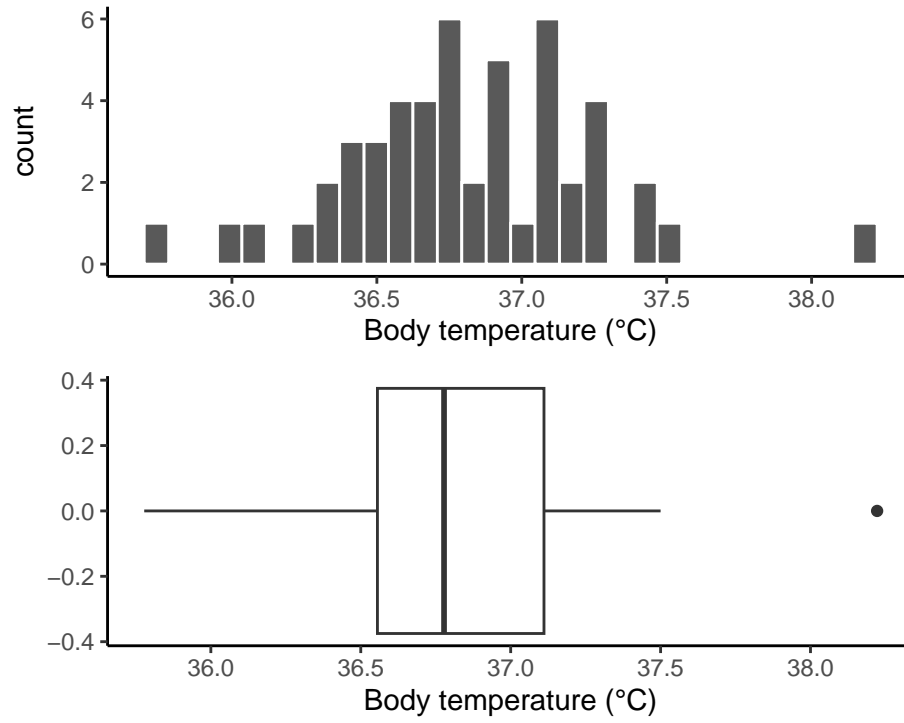


Figure 1: Distribution of body temperatures (°C)

Table 1: Descriptive statistics of body temperatures (°C)

n	M	SD	Min	Max
50	36.81	0.43	35.78	38.22

## 5 Discussion

To be added in the next weeks...