Milestone 2

Student Name: Zihan Ma

Class Name: ALY6010: Probability Theory and Introductory Statistics

Instructor: Tom Breur

03/19/2023

**Comparing the Present of People Fulfill the Official Daily Movement Suggestion in England between 2005 and 2007**

**Introduction:**

This report examines the variations in the percentage of adults engaging in recommended physical activity levels in England from 2005 to 2007. The Dataset provided, named LBOI\_07.02\_12\_09\_V1, contains information on the ratio of adults participating in recommended physical activity levels for each local authority in England for 2005 and 2007. We will use inferential statistics and hypothesis testing to answer the following questions:

1. This report examines the variations in the percentage of adults engaging in recommended physical activity levels in England from 2005 to 2007.
2. In 2005, was there a significant difference between the proportion of adults engaging in recommended physical activity levels in England and a predefined target (e.g., 12%)?
3. In 2007, was there a significant difference between the proportion of adults engaging in recommended physical activity levels in England and a predefined target (e.g., 12%)?

The rationale for employing a two-sample test for the first question is that it involves a comparison of the proportions of adults engaging in recommended physical activity levels across two years. A two-sample test allows us to compare these groups to identify significant differences.

For the second and third questions, we use one-sample tests to compare the proportions of adults participating in recommended physical activity levels in a year against a predefined target (12%). One-sample tests determine whether a significant discrepancy exists between the observed proportion and the predetermined target.

**Hypothesis Testing and Results:**

**Question 1:**

Null hypothesis (H0): There is no significant difference in the percentage of adults engaging in recommended physical activity levels in England between 2005 and 2007.

Alternative hypothesis (H1): There is a significant difference in England's percentage of adults engaging in recommended physical activity levels between 2005 and 2007.

Test: Paired t-test

Text

Description automatically generatedResults:

t = 7.4186, df = 314, p-value = 1.114e-12

95 percent confidence interval: (0.6264322, 1.0786515)

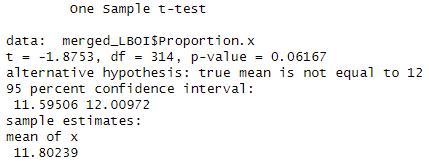
mean difference: 0.8525419

Interpretation: We **reject** the null hypothesis because the p-value (1.114e-12) is substantially lower than the significance level (α = 0.05). This indicates a significant difference in the proportion of adults engaged in recommended physical activity levels between 2005 and 2007 in England.

**Question 2:**

Null hypothesis (H0): In 2005, the proportion of adults engaged in recommended physical activity levels was equal to 12%.

Alternative hypothesis (H1): In 2005, the proportion of adults engaged in recommended physical activity levels was not equal to 12%.

Test: One-sample t-test

Results:

t = -1.8753, df = 314, p-value = 0.06167

95 percent confidence interval: (11.59506, 12.00972)

mean of x: 11.80239

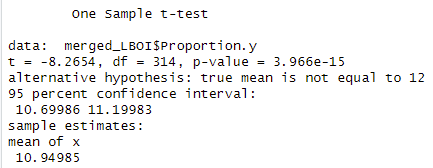
Interpretation: We **do not reject** the null hypothesis since the p-value (0.06167) exceeds the significance level (α = 0.05). The proportion of adults engaged in recommended physical activity levels in 2005 is not significantly different from 12%.

**Question 3:**

Null hypothesis (H0): The proportion of adults participating in recommended levels of physical activity in 2007 is equal to 12%.

Alternative hypothesis (H1): The proportion of adults participating in recommended levels of physical activity in 2007 is not equal to 12%.

Test: One-sample t-test

Results:

t = -8.2654, df = 314, p-value = 3.966e-15

95 percent confidence interval: (10.69986, 11.19983)

mean of x: 10.94985

Interpretation: We **reject** the null hypothesis because the p-value (3.966e-15) is significantly lower than the significance level (α = 0.05). The proportion of adults engaged in recommended physical activity levels in 2007 substantially differs from 12%.

**Result:**

Our analysis revealed a significant difference in the proportion of adults participating in recommended physical activity levels between 2005 and 2007 in England. On average, the proportion of adults engaging in guided physical activity increased by approximately 0.85% from 2005 to 2007, which suggests that there may have been an increase in public health efforts or other factors that encouraged more people to engage in physical activity during this period.

In 2005, the proportion of adults participating in recommended physical activity levels in England did not significantly differ from the set target of 12%. However, by 2007, the proportion of adults participating in recommended physical activity levels significantly differed from the 12% target, with a lower average ratio of 10.95%. This indicates that, although there was an overall increase in the proportion of adults participating in physical activity between 2005 and 2007, the target of 12% was not met in 2007.

**Conclusion:**

In conclusion, our examination of the LBOI Dataset revealed a significant rise in the proportion of adults engaged in recommended physical activity levels in England between 2005 and 2007. However, the 12% target for participation was not met in 2007. These findings suggest that there may be room for further improvement in public health efforts and policies to encourage more adults to engage in recommended levels of physical activity. This could be the reason which led to the end of this indicator. (LBOI Indicator 7.2 - The proportion of adults participating in recommended levels of physical activity 2012) Further research could explore the factors contributing to increased physical activity participation and identify strategies for achieving the target participation rate.

**References:**

(2012). Compendium – LBOI section 7: Lifestyle, including diet, smoking, and physical activity. [Dataset]. <https://digital.nhs.uk/data-and-information/publications/statistical/compendium-local-basket-of-inequality-indicators-lboi/current/section-7-lifestyle-including-diet-smoking-and-physical-activity>

NHS. (2012, September 27). LBOI Indicator 7.2 - The proportion of adults participating in recommended levels of physical activity. NHS choices. Retrieved March 19, 2023, from https://digital.nhs.uk/data-and-information/publications/statistical/compendium-local-basket-of-inequality-indicators-lboi/current/section-7-lifestyle-including-diet-smoking-and-physical-activity/lboi-indicator-7-2-the-proportion-of-adults-participating-in-recommended-levels-of-physical-activity