

Week 1 – Homework

Submitted by – Dhanashree N P

Note: Homework done using R Studio.

Q1. What is the mean birth weight for babies of non-smoking mothers?

Ans: 3.509500

Q2. What is the mean birth weight for babies of smoking mothers?

Ans: 3.134091

Q3. What is the mean head circumference for babies of non-smoking mothers?

Ans: 35.05

Q4. What is the mean gestational age at birth for babies of smoking mothers?

Ans: 38.95

Q5. What is the maximum head circumference for babies of non-smoking mothers?

Ans: 39.00

Q6. What is the minimum gestational age at birth for babies of smoking mothers?

Ans: 33.00

Q7. Based on the dataset you have, out of the two, which one would be a better bet:

- Pregnancy period in smoking mothers is shorter
- Pregnancy period in non-smoking mothers is shorter

Ans: 1st option. Pregnancy period in smoking mothers is shorter.

Q8. Justify the above choice in a few words.

Ans:

The mean gestational period for smoker = 38.95, non smoker = 39.45.

The min gestational period for both are the same = 33

The max gestational period for smoker = 45, non smoker = 44

As the data is normal, it is easier to compare two groups with respect to their mean values.
Mean represents the central tendency of the data.

Q9. What is the baby birth weight range for babies of smoking mothers?

Ans:

Min = 1.92, Max = 4.57

Range = 2.65

Q10. In your own words describe what the value of the above range for baby's birthweight tells us about smoking versus non-smoking mothers?

Ans:

Smoking mothers: Baby Birthweight Range = 2.65

Non-smoking mothers: Baby Birthweight Range = 1.9

There is higher variability in the baby birthweights for smoking mothers. However it is to be noted that range considers only the max/min values and not the spread of values.

Q11. Are head circumference data for babies of smoking mothers normally distributed?

Ans: Yes

Test results: $W = 0.95365$, $p\text{-value} = 0.3724$

Q12. What is the significance value for the above on the Shapiro-Wilk test?

Ans: 0.3724

Q13. What is the standard score (Z-score) for head circumference of 35.05 ($X=35.05$) in non-smoking mothers?

Ans: 0

Q14. How are birth weight data of non-smoking mothers skewed?

Ans: Median Mean

3.385 3.510

Positively skewed. $\text{Mean} > \text{Median}$

Q15. Are birth weight data for babies of smoking mothers normally distributed?

Ans: Yes

Shapiro-wilk test results

$W = 0.98242$, $p\text{-value} = 0.9495$

Q16. What is the significance value for the above on the Shapiro-Wilk test?

Ans: 0.9495

Q17. Based on the dataset you have, how confident can you be in saying that a baby's birth weight will be ± 1 standard deviation from the mean?

Ans: As birthweight follows normal distribution from looking at Shapiro Wilk test results, I'm **68.27%** confident that a baby's birth weight will be ± 1 SD from then mean.

Q18. Based on the dataset you have, what is the probability that the birth weight for a baby of a smoking mother will be less than 4.2 kg?

Ans: 0.95449 (from z-score table) or [0.9543497 (using R Studio)]

Q19. Are data for length of baby of non-smoking mothers normally distributed?

Ans: Yes

Shapiro Wilk test results

$W = 0.91225$, $p\text{-value} = 0.07037$

Q20. What is the significance value for the above on the Shapiro-Wilk test?

Ans: 0.07037

Q21. What is the standard score for the length of a baby of 48.5cm for non-smoking mothers?

Ans: -1.014091

Q22. Based on the dataset you have, what is the probability that the length of baby for non-smoking mothers will be more than 55 cm?

Ans: 0.162715 (from R-Studio) or 0.16354 (z-score table)