STAT 252 R1

LAB 1

DONG, Boyuan

Stat252 lab1

1.

(a)

The purpose of the study is using the data to evaluate the usefulness of MRI in the diagnosis of pulmonary hypoplasia by determining whether there are significant differences between LLSIR readings for normal and hypoplastic lungs.

(b)

If there are any misdiagnosis of hypoplasia among the 50 fetuses, it might cause the differences between LLSIR reading for normal and hypoplastic lungs less than the fact. The conclusion of the usefulness of MRI may be incorrect.

(c)

It’s an observational study, as all the data are provided, no experiment in this case.

The LLSIR readings of the hypoplasia lungs is much lower than that of normal lungs.

2.

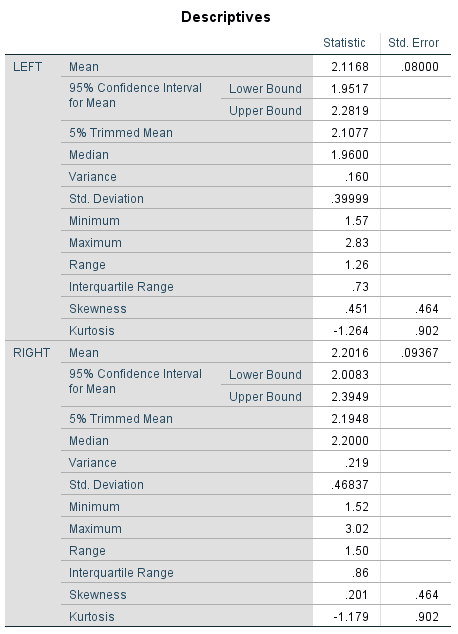
MeanLEFT=2.1168. MeanRIGHT=2.2016

SDLEFT=0.39999 SDRIGHT=0.46837

The mean of the LLSIR of left lungs is a little lower than that of right lungs.

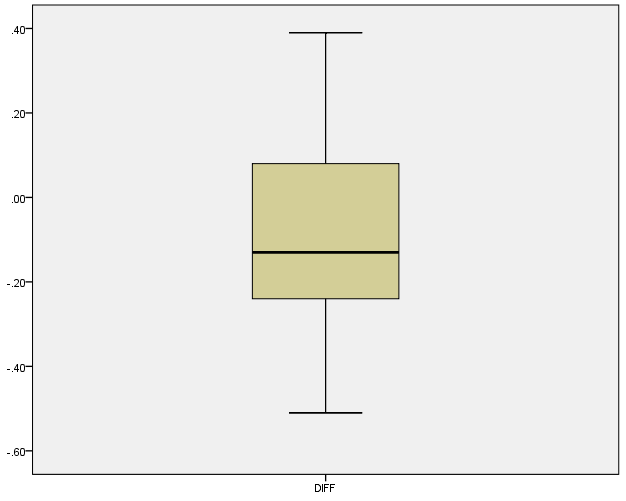
The standard deviation of the LLSIR of left lungs is lower than that of right lungs.

Difference is insignificant.



3.

The shape of the distribution is right skewed, not symmetric. There is no outliers of this Boxplot of differences.



4.

Null hypothesis: the mean LLSIR for left normal lungs is the same of the mean LLSIR for right normal lungs.

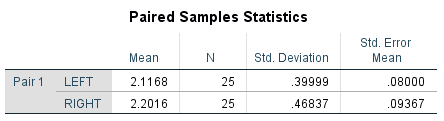
Alternative hypothesis: the mean LLSIR for left normal lungs is different from the mean LLSIR for right normal lungs.

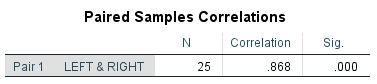
The test statistic value is -1.821

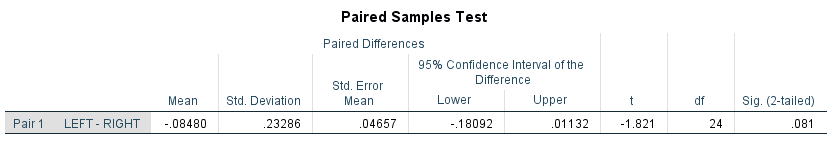
The distribution of the test statistic under the null hypothesis follows a chi-square distribution with degree of freedom 24.

The P-value is 0.081

0.1>P-value>0.05, It’s moderate to suggestive evidence against H0, there is insufficient evidence that the mean LLSIR for left normal lungs is different from the mean LLSIR for right normal lungs.

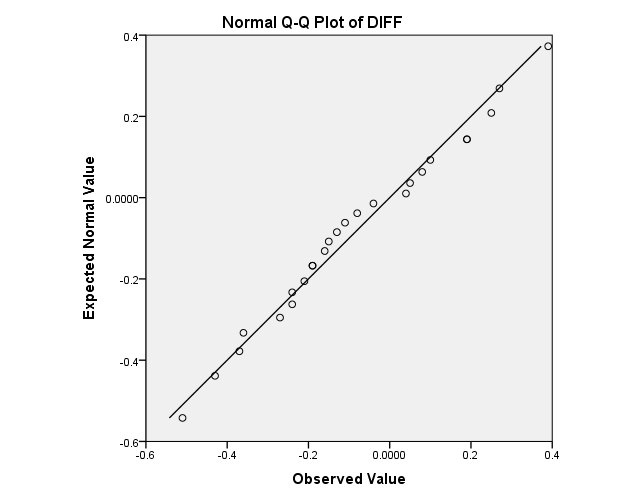






5.

The observations fall very close to the line. There is very little indication of non-normality.



6.

(a)

The mean of LLSIR for normal lungs is 2.1592 which is much larger than 1.4768, for hypoplastic lungs. The standard deviation of LLSIR for normal lungs is 0.41967 is much larger than 0.17160 , for hypoplastic lungs.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Descriptives** | | | | | |
|  | TYPE | | | Statistic | Std. Error |
| LLSIR | 1.00 | Mean | | 2.1592 | .08393 |
| 95% Confidence Interval for Mean | Lower Bound | 1.9860 |  |
| Upper Bound | 2.3324 |  |
| 5% Trimmed Mean | | 2.1512 |  |
| Median | | 2.0850 |  |
| Variance | | .176 |  |
| Std. Deviation | | .41967 |  |
| Minimum | | 1.55 |  |
| Maximum | | 2.93 |  |
| Range | | 1.38 |  |
| Interquartile Range | | .75 |  |
| Skewness | | .303 | .464 |
| Kurtosis | | -1.212 | .902 |
| 2.00 | Mean | | 1.4768 | .03432 |
| 95% Confidence Interval for Mean | Lower Bound | 1.4060 |  |
| Upper Bound | 1.5476 |  |
| 5% Trimmed Mean | | 1.4732 |  |
| Median | | 1.4700 |  |
| Variance | | .029 |  |
| Std. Deviation | | .17160 |  |
| Minimum | | 1.16 |  |
| Maximum | | 1.86 |  |
| Range | | .70 |  |
| Interquartile Range | | .24 |  |
| Skewness | | .275 | .464 |
| Kurtosis | | -.125 | .902 |

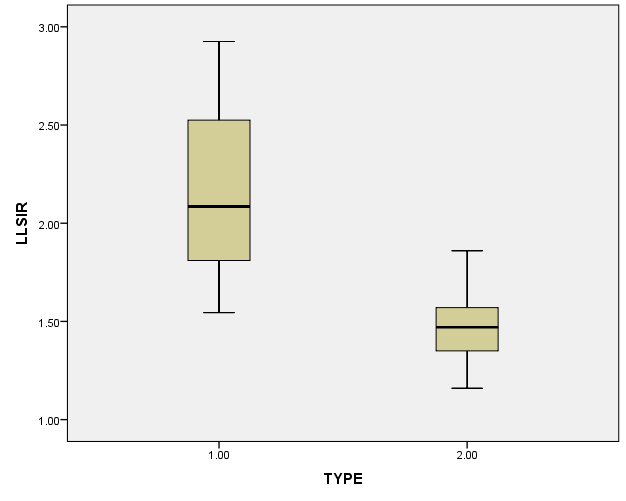
(b)

There is a clear difference in the spreads. The center of distribution of normal lungs is much higher than pypoplastic lungs’.

Normal lungs’ distribution spreads more than hypoplastic lungs’.

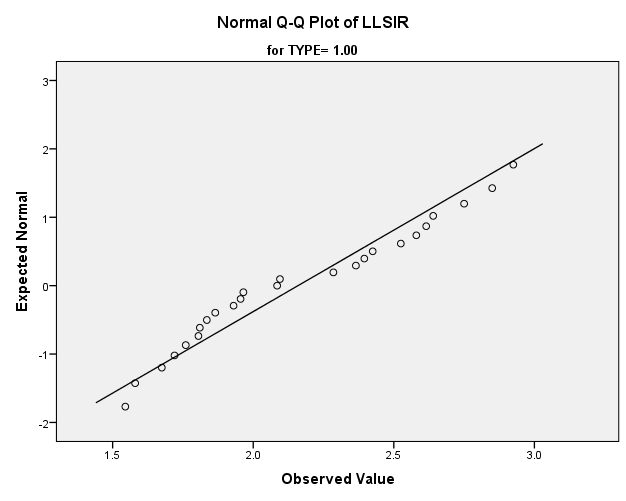
The distribution of normal lungs is right skewed, the distribution of hypoplastic lungs is a little right skewed.

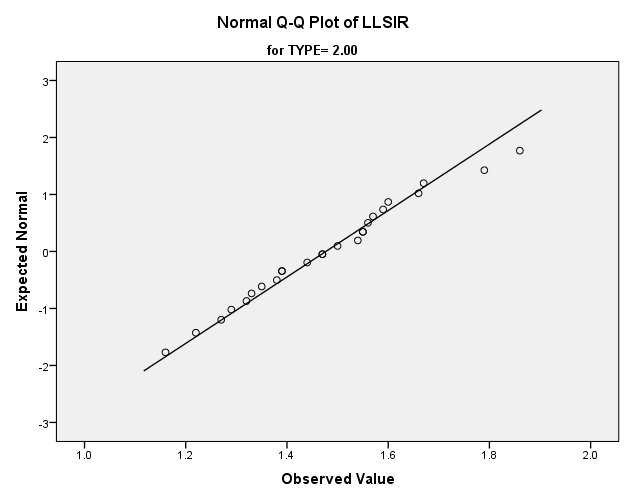
There are no outliers for both boxplots.



(c)

For the hypoplastic lungs’ normal Q-Q plot of LLSIR the points fairly fit the normal distribution, normality seems to be satisfied. The normal lungs’ normal Q-Q plot of LLSIR the points not that close than the hypoplastic lungs’ but almost fit the line as well, so the normality seems to be satisfied, too.





7.

(a)

The mean of LNLLSIR for normal lungs is 0.7517 much larger than 0.3834, for hypoplastic lungs. The standard deviation of LNLLSIR for normal lungs is 0.19373 is much larger than 0.11607 which is for hypoplastic lungs.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Descriptives** | | | | | |
|  | TYPE | | | Statistic | Std. Error |
| LNLLSIR | 1.00 | Mean | | .7517 | .03875 |
| 95% Confidence Interval for Mean | Lower Bound | .6717 |  |
| Upper Bound | .8317 |  |
| 5% Trimmed Mean | | .7515 |  |
| Median | | .7348 |  |
| Variance | | .038 |  |
| Std. Deviation | | .19373 |  |
| Minimum | | .44 |  |
| Maximum | | 1.07 |  |
| Range | | .64 |  |
| Interquartile Range | | .35 |  |
| Skewness | | .087 | .464 |
| Kurtosis | | -1.279 | .902 |
| 2.00 | Mean | | .3834 | .02321 |
| 95% Confidence Interval for Mean | Lower Bound | .3355 |  |
| Upper Bound | .4313 |  |
| 5% Trimmed Mean | | .3832 |  |
| Median | | .3853 |  |
| Variance | | .013 |  |
| Std. Deviation | | .11607 |  |
| Minimum | | .15 |  |
| Maximum | | .62 |  |
| Range | | .47 |  |
| Interquartile Range | | .16 |  |
| Skewness | | -.008 | .464 |
| Kurtosis | | -.286 | .902 |

(b)

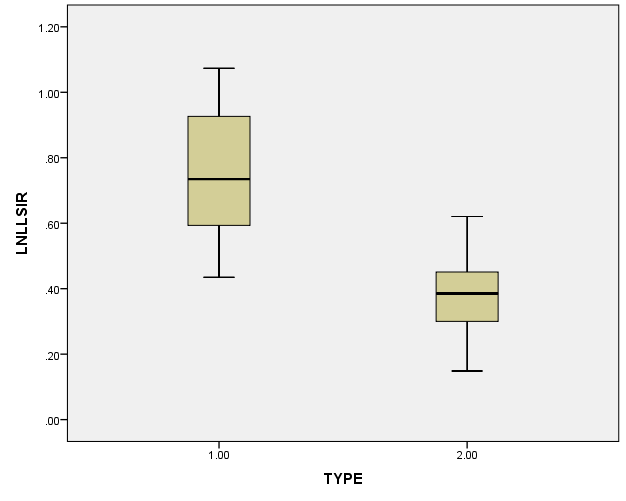
There is a clear difference in the spreads.

The center of distribution of normal lungs is much higher than pypoplastic lungs’.

Normal lungs’ distribution spreads more than hypoplastic lungs’.

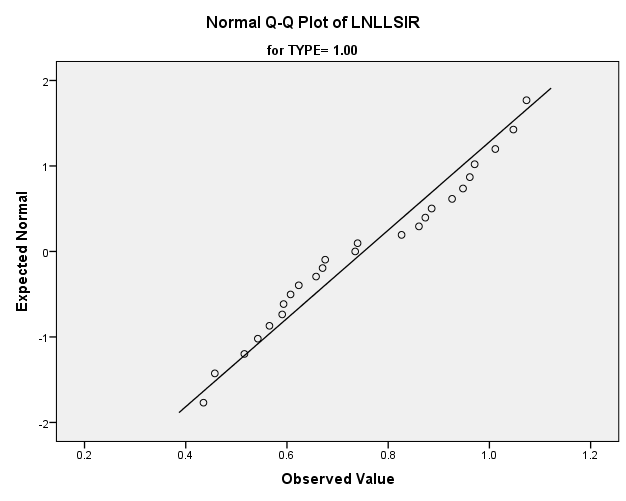
The distribution of normal lungs is a little right skewed, the distribution of hypoplastic lungs is almost perfectly symmetric with just a little left skewed.

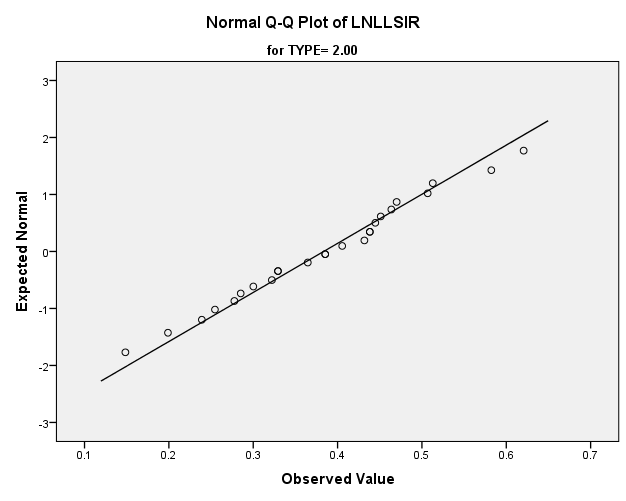
There are no outliers for both boxplots.



(c)

For the hypoplastic lungs’ normal Q-Q plot of LNLLSIR the points fairly fit the normal distribution, normality seems to be satisfied. The normal lungs’ normal Q-Q plot of LNLLSIR the points not that close than the hypoplastic lungs’ but almost fit the line as well, so the normality seems to be satisfied, too.





8.

(a)

Differences in LNLLSIR: Ln(y1)-Ln(y2) =Med(Ln(y1))- Med(Ln(y2)) =0.7517-0.3834=0.3683

The ratio of the medians of LLSIR of normal lungs to that of hypoplastic lungs is edifferences in LNLLSIR=e0.3683=1.4453

(b)

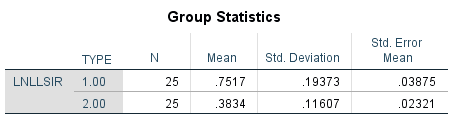
Null hypothesis: the mean LLSIR for left normal lungs is the same of the mean LLSIR for right normal lungs.

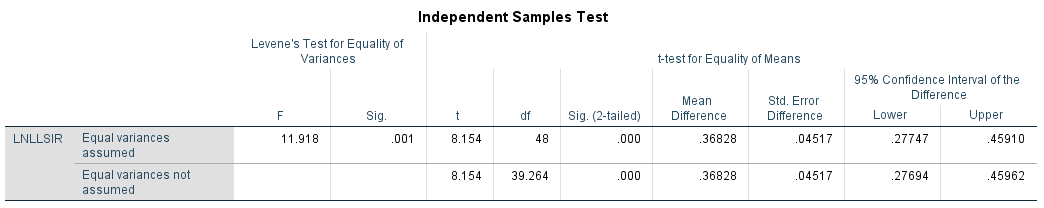
Alternative hypothesis: the mean LLSIR for left normal lungs is different from the mean LLSIR for right normal lungs.

The test statistic value is 8.154

The P-value is 0.000

With 95% confidence, the difference in LNLLSIR between normal and hypoplastic lungs is between 0.27747 and 0.45910





(c)

elower= e0.27747 =1.3198

eupper= e0.45910 =1.5826

With 95% confidence, the ratio of median of LLSIR between normal and hypoplastic lungs is between 1.3198 and 1.5826