

# Study of Association of Mean age at Marriage and Labor Force Participation



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UNIT CODE:

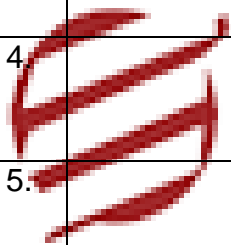
DUE DATE:

GROUP NUMBER:

GROUP DATA SET:

GROUP MEMBERS: (list the members of your group as shown in iLearn)

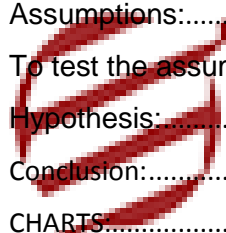
|    | Student ID | Student Name<br>(First name, Last name) | Contribution – did each group member contribute to the group part of the project?<br>Write <b>yes</b> or <b>no</b> next to each student. |
|----|------------|---|--|
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| 2. |            |   |  |
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**EssayCorp** 5 years ★★★★★

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### Description of variables used in the Analysis:

| Variable    | Description   |
|-------------|---|
| hhincome_sq | Total Household Income(Square Root of Income \$)  |
| Nchild      | Number of Children  |
| Age         | Age of Respondent (Years)   |
| Sex         | Sex of Respondent (Male=1, Female=2)  |
| Race        | Race, (White=1, Black=2, Other=3)   |
| Marst       | Marital Status (Married=1, Spouse Present, Unmarried=2;Spouse Ansent, Separated=3, Divorced=4, Widowed=5, Single/Never Married=6) |
| Agemarr     | Age at Marriage   |
| Marron      | Number of previous Marriages  |
| Labforce    | Labour Force Status (Not Applicable=0, Not in Labour Force=1, In Labour Force=2)  |
| Wkswork1    | Weeks Worked Last Year  |
| Hrswork1    | Hours Worked Last Week  |
| Uhrswork    | Usual hours worked per week   |

**Introduction:** Data reveals to find;

1. Relation between age at marriage and labour force participation.
2. Relation between age at marriage and Race.
3. To study distribution of data using box plot for mean age at force marriage and Labour force participation.

### Research Questions:

1. Is there any relation/difference between age at marriage and Labour participation?

2. Is there any relation/difference between age at marriage and race?

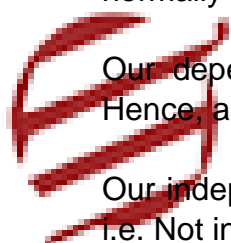
**Method:**

1. Is there any relation/difference between age at marriage and Labour participation?

We use Independent sample t test to determine if a difference exist between means of two independent groups is statistically significant or not.

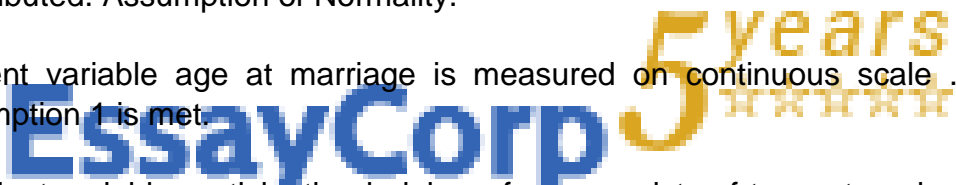
**Assumptions:**

1. We should have one dependent variable which is measured at continuous scale.
2. We should have one independent variable which consists of two categories or matched pairs.
3. Dependent variable, which is is age at marriage should be approximately normally distributed. Assumption of Normality.



Our dependent variable age at marriage is measured on continuous scale . Hence, assumption 1 is met.

Our independent variable participation in labour force consists of two categories i.e. Not in Labour force and In labour force. Hence, assumption 2 is met.



Result of test of normality before transformation of age at marriage (Log Transform)

| Tests of Normality |                     |                                 |     |      |              |     |      |
|--------------------|---------------------|---------------------------------|-----|------|--------------|-----|------|
|                    | Labour Force Status | Kolmogorov-Smirnov <sup>a</sup> |     |      | Shapiro-Wilk |     |      |
|                    |                     | Statistic                       | df  | Sig. | Statistic    | df  | Sig. |
| Age at Marriage    | Not in Labour Force | .186                            | 468 | .000 | .804         | 468 | .000 |
|                    | In Labour Force     | .156                            | 750 | .000 | .835         | 750 | .000 |

a. Lilliefors Significance Correction

Result of test of normality after transformation of age at marriage (Log Transform).

| Tests of Normality |                     |                                 |     |      |              |     |      |
|--------------------|---------------------|---------------------------------|-----|------|--------------|-----|------|
|                    | Labour Force Status | Kolmogorov-Smirnov <sup>a</sup> |     |      | Shapiro-Wilk |     |      |
|                    |                     | Statistic                       | df  | Sig. | Statistic    | df  | Sig. |
| age m              | Not in Labour Force | .127                            | 468 | .000 | .939         | 468 | .000 |
|                    | In Labour Force     | .116                            | 750 | .000 | .945         | 750 | .000 |

a. Lilliefors Significance Correction

To check for assumption of normality, we test it through kolmogorov-smirnov test and Shapiro-wilks test, it is found that K-S test and S-W test found significant ( $P < 0.05$ ) here we reject the null hypothesis. hence, we conclude that dependent variable age at marriage is not normally distributed. When the dependent variable age at marriage at both category of independent variable is not found normally distributed in such case we transform the variable age at marriage. In this case we log transform the age at marriage and obtain the result but still we fail to reject the null hypothesis and conclude that the dependent variable age at marriage is not normally distributed.

#### Hypothesis:

Null Hypothesis:

$H_0$ : the population means of the two groups are equal (i.e.  $\mu_1 = \mu_2$ )

Alternative Hypothesis:

$H_1$ : the population means of the two groups are not equal (i.e.  $\mu_1 \neq \mu_2$ )

#### Descriptive Statistics & Independent Sample t test:

|                 | Labour Force Status | Mean  | Standard Deviation | 95% CI         |
|-----------------|---------------------|-------|--------------------|----------------|
| Age at Marriage | Not in Labour Force | 22.84 | 7.09               | [22.20,23.49]  |
|                 | In Labour Force     | 22.61 | 5.58               | [22.21, 23.01] |

| Group Statistics |                     |     |        |       |       |
|------------------|---------------------|-----|--------|-------|-------|
| Age at Marriage  | Labour Force Status | N   | Mean   | SD    | SE    |
|                  | Not In Labour Force | 468 | 22.844 | 7.091 | 0.328 |
|                  | In Labour Force     | 750 | 22.605 | 5.579 | 0.204 |

| Independent Sample t Test |                             |   |      |                              |        |            |           |            |        |       |       |
|---------------------------|-----------------------------|---|------|------------------------------|--------|------------|-----------|------------|--------|-------|-------|
|                           |                             | Levene's Test for equality of variances |      | t-test for equality of means |        |            |           |            |        |       |       |
|                           |                             | F                                       | Sig  | t-value                      | Df     | Sig 2-tail | Mean Diff | SE of diff | 95% CI |       |       |
|                           |                             |   |      |                              |        |            |           |            |        | Lower | Upper |
| Age at Marriage           | Equal Variances Assumed     | 13.149                                  | 0.00 | 0.653                        | 1216   | 0.514      | 0.239     | 0.3654     | -0.478 | 0.956 |       |
|                           | Equal Variances not assumed |   |      | 0.618                        | 821.07 | 0.536      | 0.239     | 0.3859     | -0.518 | 0.996 |       |

### Conclusion:

Levene's test for equality of variances tests the null hypothesis that the population variances are equal in our case  $p < 0.001$ . hence we have not met the assumption of equality of variances. Assumption of homogeneity of variances is violated as assessed by Levene's test for equality of variances. ( $p < 0.001$ ).

Hence,  $p = 0.514$  which is  $p > 0.05$  we do not have a statistically significant mean difference between two groups. Hence, we conclude that the not in labour force and In labour force have statistically significantly different mean age at marriage or we can say mean difference in age at marriage score between not in labour force and in labour force is statistically significant. 95% confidence interval for mean difference is given as [-0.478, 0.956]

There is no statistically significant difference between means ( $p > .05$ ), and therefore, we fail to reject the null hypothesis and conclude that population means of two groups are unequal.

Comment: Independent sample t test is employed to test whether mean age at marriage in two groups viz group 1: not in labour force and group 2: In labour force are same or different. T test suggest that mean age at marriage in two groups are unequal.

**Method:**

2. Is there any relation/difference between age at marriage and Race?

We use Independent sample t test to determine if a difference exist between means of two independent groups is statistically significant or not.

**Assumptions:**

3. 1.We should have one dependent variable which is measured at continuous scale.
4. 2.We should have one independent variable which consists of two categories or matched pairs.
5. Dependent variable, which is is age at marriage should be approximately normally distributed. Assumption of Normality.

Our dependent variable age at marriage is measured on continuous scale . Hence, assumption 1 is met.

Our independent variable participation in labour force consists of two categories i.e. Not in Labour force and In labour force. Hence, assumption 2 is met.

To test the assumption of normality:

| Tests of Normality                    |       |                                 |      |      |              |      |      |
|---------------------------------------|-------|---------------------------------|------|------|--------------|------|------|
|                                       | Race  | Kolmogorov-Smirnov <sup>a</sup> |      |      | Shapiro-Wilk |      |      |
|                                       |       | Statistic                       | df   | Sig. | Statistic    | df   | Sig. |
| Age at Marriage                       | White | .212                            | 1312 | .000 | .863         | 1312 | .000 |
|                                       | Black | .187                            | 159  | .000 | .892         | 159  | .000 |
|                                       | Other | .207                            | 40   | .000 | .886         | 40   | .001 |
| a. Lilliefors Significance Correction |       |                                 |      |      |              |      |      |



kolmogorov-smirnov test and Shapiro-wilks test, it is found that K-S test and S-W test found significant ( $P < 0.05$ ) here we reject the null hypothesis. hence, we conclude that dependent variable age at marriage is not normally distributed.

**Hypothesis:**

Null Hypothesis:

$H_0$ : the population means of the three groups are equal (i.e.  $\mu_1 = \mu_2 = \mu_3$ )

Alternative Hypothesis:

$H_1$ : the population means of the two groups are not equal (i.e.  $\mu_1 \neq \mu_2 \neq \mu_3$ )

Independent Sample t-test

| Group Statistics   |           |      |             |                   |                    |
|--------------------|-----------|------|-------------|-------------------|--------------------|
|                    | Ra<br>ce  | N    | Mean        | Std.<br>Deviation | Std. Error<br>Mean |
| Age at<br>Marriage | Wh<br>ite | 1312 | 18.42<br>15 | 10.19355          | .28142             |
|                    | Oth<br>er | 40   | 18.60<br>00 | 14.05082          | 2.22163            |

5 years  
★★★★★

| Independent Samples Test |                             |   |      |                              |        |                 |                 |                       |   |         |
|--------------------------|-----------------------------|---|------|------------------------------|--------|-----------------|-----------------|-----------------------|---|---------|
|                          |                             | Levene's Test for Equality of Variances |      | t-test for Equality of Means |        |                 |                 |                       |   |         |
|                          |                             | F                                       | Sig. | t                            | df     | Sig. (2-tailed) | Mean Difference | Std. Error Difference | 95% Confidence Interval of the Difference |         |
|                          |                             |   |      |                              |        |                 |                 |                       | Lower                                     | Upper   |
| Age at Marriage          | Equal variances assumed     | 15.350                                  | .000 | -.108                        | 1350   | .914            | -.17851         | 1.65726               | -3.42959                                  | 3.07258 |
|                          | Equal variances not assumed |   |      | -.080                        | 40.261 | .937            | -.17851         | 2.23938               | -4.70355                                  | 4.34654 |

### Conclusion:

Levene's test for equality of variances tests the null hypothesis that the population variances are equal in our case  $p < 0.001$ . Hence we have not met the assumption of equality of variances. Assumption of homogeneity of variances is violated as assessed by Levene's test for equality of variances ( $p < 0.001$ ).

Hence,  $p = 0.914$  which is  $p > 0.05$  we do not have a statistically significant mean difference between two groups. Hence, we conclude that the Race white, Black and other have statistically significantly different mean age at marriage or we can say mean difference in age at marriage score between Race Black, white and other is statistically significant. 95% confidence interval for mean difference is given as  $[-3.42959, 3.07258]$

There is no statistically significant difference between means ( $p > .05$ ), and therefore, we fail to reject the null hypothesis and conclude that population means of three groups are unequal.

Comment: Independent sample t test is employed to test whether mean age at marriage in three groups viz group 1: Race=white and group 2: Race=Black and group 3: Race=Other are same or different. T test suggest that mean age at marriage in three groups are unequal.

## CHARTS:

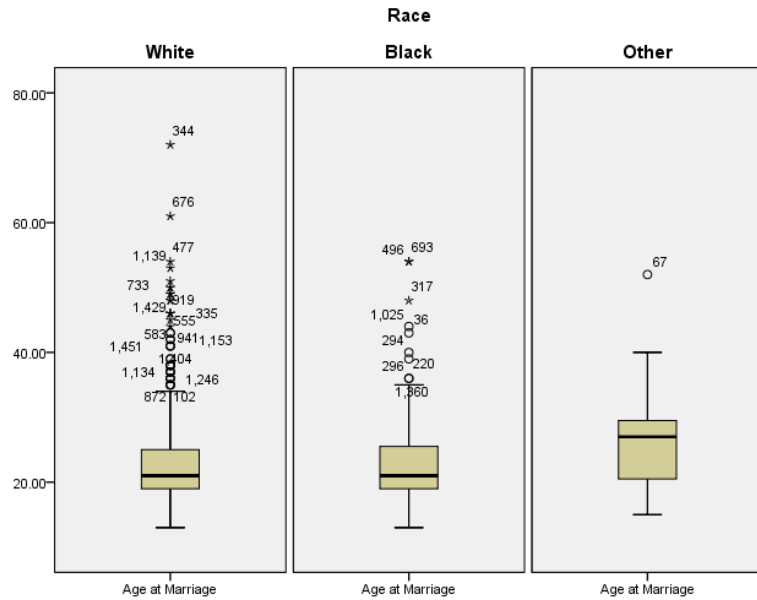
### BOXPLOT

1.Box plot showing distribution of age at marriage as per not in Labour Force and In Labour Force.

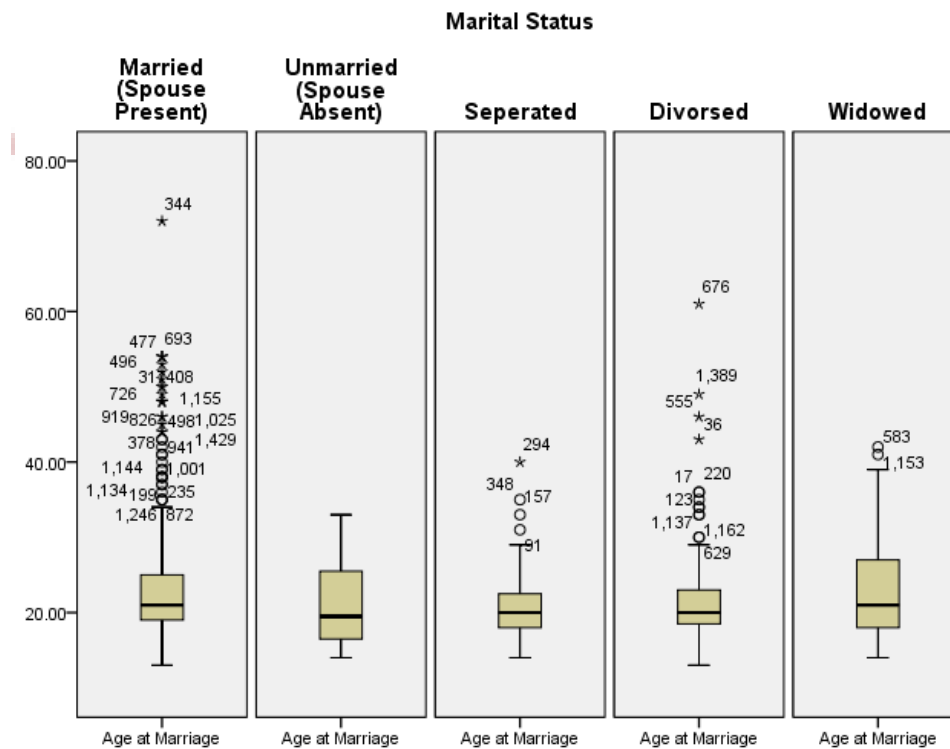


Description: Graph showing Median age at marriage in both the group not in labour force and in labour force. It is seen from the graph that variation in distribution of age at marriage in both the group is seems to be not that much significant by visual inspection.

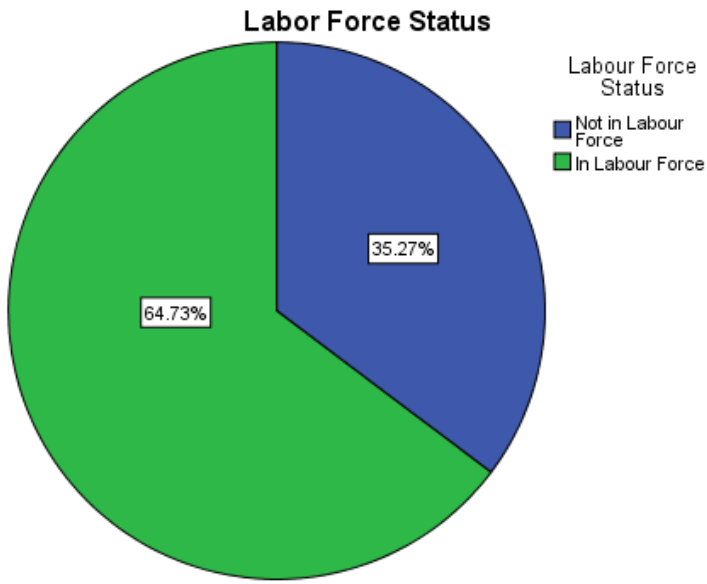
2.Boxplot Showing distribution of Age at marriage with Race



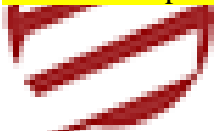
### 3.Boxplot Showing age at marriage with Marital Status



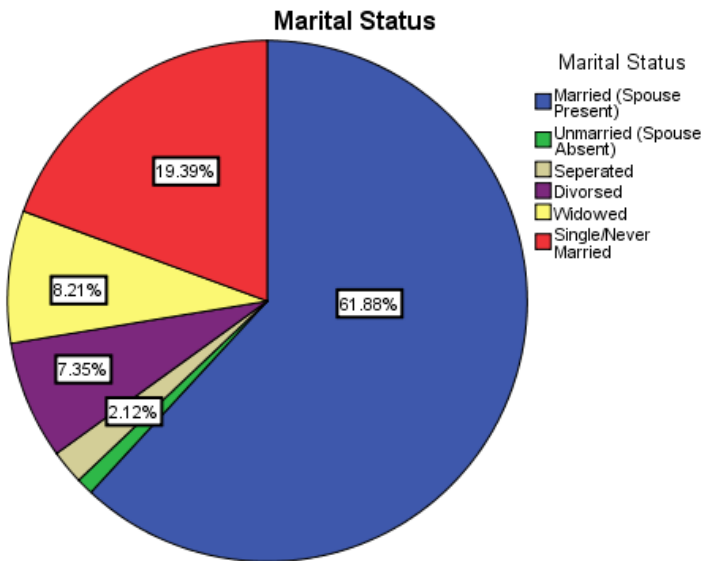
**Pie Chart:**



Description: Percentage of respondent in Not in labour force is 35.27% while percentage of respondent for In labour force is 64.73%. percentage of respondent in lower in not in labour force as compared with In labour force.



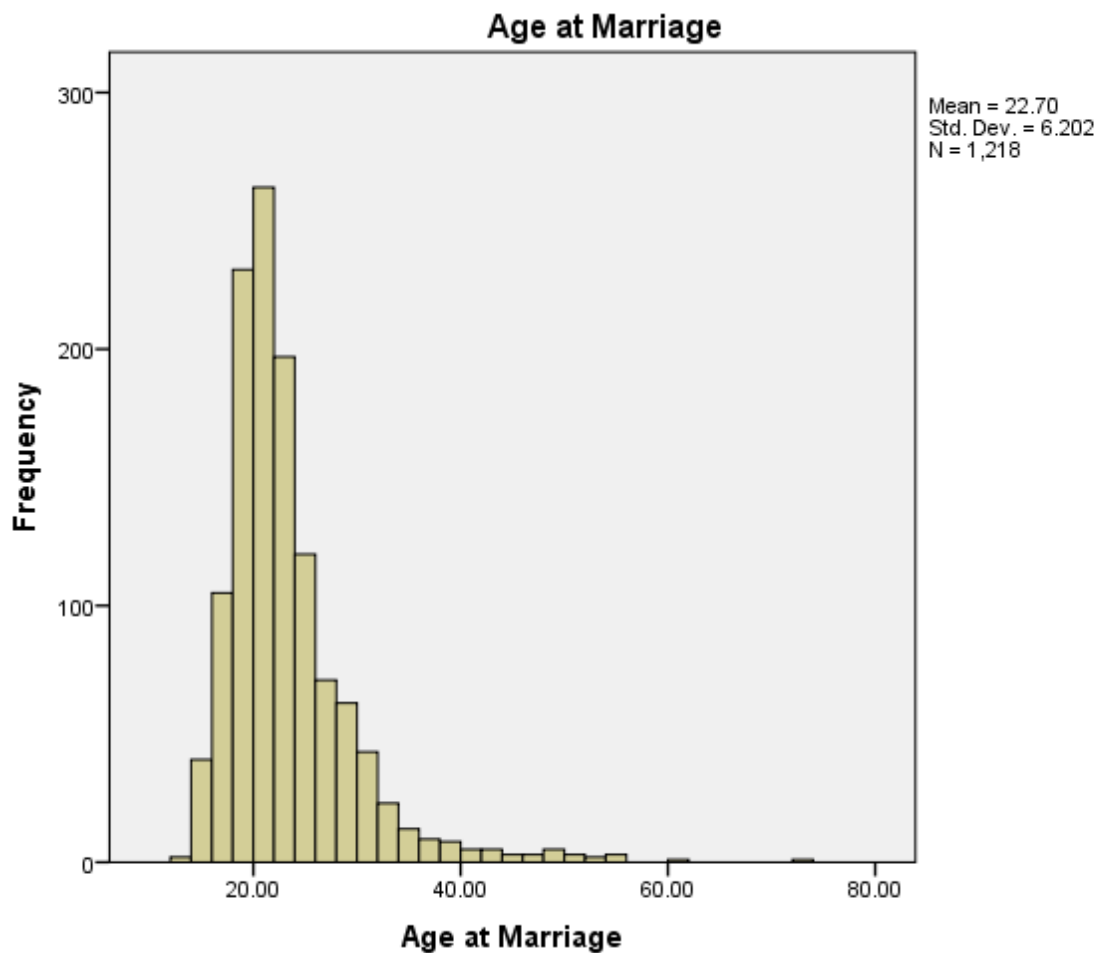
**EssayCorp**



Description: Percentage of married respondent were 61.88%, while percentage of never married were 19.30%. percentage of widowed were 8.21%. percentage of divorced were 7.35% and percentage of separated were 2.12. sample comprise of 2/3<sup>rd</sup> sample of married respondent and 1/5<sup>th</sup> respondent were never married.

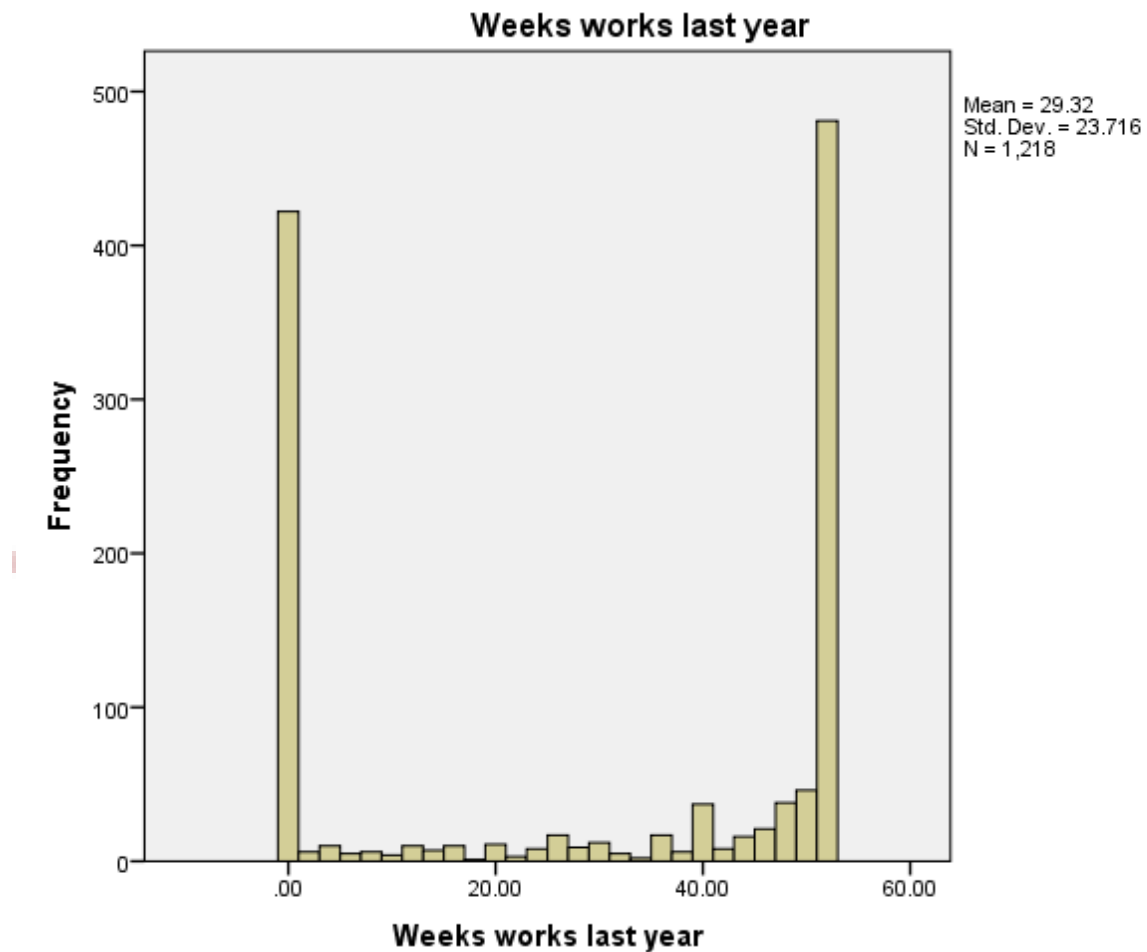
### Histogram:

Age at Marriage



Description: Distribution of Age at marriage is seems to be positively skewed. Mean age at marriage is 18.30 years with standard deviation of 10.56 years, showing large variability in sample values and skewness is -0.226.

Weeks works Last Year:



Description: Distribution of weeks works last year is seen to be bimodal, with mean weeks works last year to be 29.85 weeks with standard deviation of 23.25 showing large variability in sample values and skewness is -0.335.