# **Appendix-1: Questionnaire**

**“Effect of Primary Education on Birth Control”**

**Questionnaire for Data Collection**

## **A. Identity of the couple:**

1) Name of Husband:

2) Name of Wife:

3) Address: Village: PS:

 Upazila: District:

4) Age of Wife: Year Month Days

5) Age of Husband: Year Month Days

6) Date of Marriage: Year Month Days

7) Religion:

 Islam

 Hindu

 Christian

 Buddhist

8) Educational Qualification of Husband:

 Illiterate

 Primary

 Secondary

 Higher Secondary

 Graduate

9) Educational Qualification of Wife:

 Illiterate

 Primary

 Secondary

 Higher Secondary

 Graduate

10) Whether the Husband is working: YES NO

11) Whether the Wife is working: YES NO

12) Monthly income of the couple:

13) Family Status: Single Family Joint Family

14) Number of Children: Son of

 Daughter of

15) Older Child’s Age: Year Month Days

## **B. Question about Birth Control Methods:**

1) Are you aware of Birth Control Methods? YES NO

2) Which methods of Birth Control have you taken?

 Permanent: Tubectomy

 Vasectomy

 Temporary: IUD

 Implant

 Tablet

 Injection

3) Place of Procedure:

4) Date of Procedure:

5) Did you get financial help while taking the Procedure: YES NO

# **Appendix-2: Calculations:**

## **Supplement Table 1: O, E, and O2/E are calculated in the table below:**

This table provides observed and expected values used to analyze the relationship between educational qualifications and service recipients through statistical tests.

|  |  |  |
| --- | --- | --- |
| O | E | O2/E |
| 5 | 4.725 | 5.3 |
| 4 | 4.275 | 3.7 |
| 10 | 8.4 | 12 |
| 6 | 7.6 | 4.7 |
| 40 | 34.125 | 47 |
| 25 | 30.875 | 20.24 |
| 15 | 26.25 | 8.6 |
| 35 | 23.75 | 51.6 |
| 14 | 10.5 | 18.7 |
| 6 | 9.5 | 3.8 |
| Total |  | 175.6 |

 **(Based on the study)**

**Null hypothesis H0**: There is no relationship between service users and educational qualifications.

**Alternative hypothesis H1**: There is a relationship between service users and educational qualifications.

We know that,

χ2 = ∑ O2/E – N where the degree of freedom

 = 175.6 – 160 (2-1)(5-1)

 = 15.6 = 1 × 4

 = 4

 O = Observed value

 E = Expected value

 N = Total number of observation

At the 5% level of significance, the tabulated value of χ2 with 4 d.f is 9.488.

**Comment**: At the 5% level of significance the calculated value of χ2 with 4 d.f is 15.6 which is the greater than tabulated value. So, we may reject the null hypothesis. Finally, there is a relationship between service users and educational qualifications.

**Supplement Table 2: Details of the relationship of service recipients with Birth Control Methods:**

This table represents the distribution of birth control methods among male and female service recipients, highlighting the gender-based adoption of permanent and temporary methods.

|  |  |  |
| --- | --- | --- |
| **Type of Service** | **Gender-Based Service Recipients** | **Total** |
| **Male** | **Female** |
| Permanent | 32 | 38 | 70 |
| Temporary | 52 | 38 | 90 |
| **Total** | 84 | 76 | N = 160 |

 **(From the study)**

**Supplement Table 3: O, E, and O2/E are calculated in the table below:**

This table presents the observed and expected values used for statistical analysis of the relationship between gender and the type of birth control method adopted.

|  |  |  |
| --- | --- | --- |
| O | E | O2/E |
| 32 | 36.75 | 28 |
| 38 | 33.25 | 43.43 |
| 52 | 47.25 | 57.23 |
| 38 | 42.75 | 33.8 |
| Total |  | 162.5 |

 **(Based on the survey)**

**Null hypothesis H0**: There is no relationship between the type of birth control methods and service users.

**Alternative hypothesis H1**: There is a relationship between the type of birth control methods and service users.

We know that,

χ2 = ∑ O2/E – N where the degree of freedom

 = 162.5 – 160 (2-1)(2-1)

 = 2.5 = 1 × 1

 = 1

 O = Observed value

 E = Expected value

 N = Total number of observation

At the 5% level of significance, the tabulated value of χ2 with 1 d.f is 3.84.

**Comment**: At the 5% level of significance the calculated value of χ2 with 1 d.f is 2.5 which is the smaller than tabulated value. So, we may accept the null hypothesis. Finally, there is no relationship between the type of birth control methods and service users.

**Supplement Table 4: Details of the relationship of income with the number of children:**

This table illustrates the correlation between income levels and the number of children among service recipients, showing the distribution across income groups

|  |  |  |
| --- | --- | --- |
| Number of Children | Income Group | Total |
| 4000-5000 | 5000-6000 | 6000-7000 | 7000+ |
| 0-4 | 26 | 28 | 8 | 2 | 64 |
| 4-5 | 37 | 20 | 2 | 1 | 60 |
| 6-7 | 14 | 7 | 0 | 1 | 22 |
| 8-9 | 13 | 0 | 0 | 1 | 14 |
| **Total** | 90 | 55 | 10 | 5 | N = 160 |

 **(From the study)**

**Supplement Table 5: O, E, and O2/E are calculated in the table below:**

This table presents statistical data used to examine the relationship between income levels and the number of children among service recipients.

|  |  |  |
| --- | --- | --- |
| O | E | O2/E |
| 26 | 36 | 18.77777778 |
| 28 | 22 | 35.63636364 |
| 8 | 4 | 16 |
| 2 | 2 | 2 |
| 37 | 33.75 | 40.56296296 |
| 20 | 20.625 | 19.39393939 |
| 2 | 3.75 | 1.066666667 |
| 1 | 1.875 | .533333333 |
| 14 | 12.375 | 15.83838384 |
| 7 | 7.5625 | 6.479338843 |
| 0 | 1.375 | 0 |
| 1 | .6875 | 1.454545455 |
| 13 | 7.875 | 21.46031746 |
| 0 | 4.8125 | 0 |
| 0 | .875 | 0 |
| 1 | .4375 | 2.285714286 |
| Total |  | 181.4893437 |

 **(Based on the study)**

**Null hypothesis H0**: There is no relationship between income and the number of children.

**Alternative hypothesis H1**: There is a relationship between income and the number of children.

We know that,

χ2 = ∑ O2/E – N where the degree of freedom

 = 181.4893437 – 160 (4-1)(4-1)

 = 2.5 = 3 × 3

 = 9

 O = Observed value

 E = Expected value

 N = Total number of observation

At the 5% level of significance, the tabulated value of χ2 with 9 d.f is 16.9.

**Comment:** At the 5% level of significance the calculated value of χ2 with 9 d.f is 21.4893437 which is the greater than tabulated value. So, we may reject the null hypothesis. Finally, there is a relationship between income and the number of children.

**Income distribution of service recipients:**

The income distribution of 160 service users from Sylhet, Moulvibazar, Habiganj, and Sunamganj are given below:

**Supplement Table 6:** This table provides a breakdown of service recipients' income levels, highlighting the number and percentage in each income category.

|  |  |  |
| --- | --- | --- |
| Amount of Monthly Income | Number of Service Users | Percentage |
| 4000-5000 | 90 | 56% |
| 5000-6000 | 55 | 35% |
| 6000-7000 | 10 | 6% |
| 7000+ | 5 | 3% |
| Total | 160 | 100 |

 **(From the study)**

 From the above table 1, it can be seen that the number of service recipients belonging to the income category (4000-5000) is 90 which is 56% of the number. Also, Mode is located in this group.

**Types of income-based service recipients:**

**Supplement Table 7**: This table represents income-based classifications of service recipients, showing their median income and other relevant statistical measures

|  |  |  |  |
| --- | --- | --- | --- |
| Amount of Monthly Income | Number of Service Usersfi | MedianXi | fiXi2 |
| 4000-5000 | 90 | 4500 | 1822500000 |
| 5000-6000 | 55 | 5500 | 1663750000 |
| 6000-7000 | 10 | 6500 | 422500000 |
| 7000+ | 5 | 7500 | 281250000 |
| Total | 160 |  | 4190000000 |

 **(From the study)**

**Supplement Table 8**: This table provides statistical computations related to income distribution, including cumulative frequency and logarithmic calculations.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| fi | Xi | fi (log Xi) | C.F | fi Xi | fi/ Xi |
| 90 | 4500 | 328.7891262 | 90 | 405000 | .02 |
| 55 | 5500 | 205.7199479 | 145 | 302500 | .01 |
| 10 | 6500 | 38.12913357 | 155 | 65000 | .001538461 |
| 5 | 7500 | 19.37530632 | 160 | 37500 | .000666666 |
| Total |  | 592.013514 |  | 810000 | .032205127 |

 **(From the study)**

It is necessary to check what kind of format the population figures shown in Tables 2 and 3 are.

We know that, if the format of variable **X** is of **log Normal** type and the parameter is **µ**, then the following properties will be true.

1. Arithmetic mean > Median > Mode
2. Geometric mean = Median
3. ½ ln[E(x).H.M(x)] = ln[E(x)]
4. β 1 > 0
5. β 2 = 3

Proof for conditions (i) and (ii):

1. Arithmetic mean:

 A.M = X̅ = 1/N ∑fiXi  = 810000/160 = 5062.5

B. Geometric mean:

 G.M = Antilog 1/N∑fi(logXi) = Antilog $\frac{ 592.013514}{160}$ = 5012.84715

C. Harmonic mean:

 H.M = $\frac{1}{\frac{1}{N}∑fi/Xi }$ = $\frac{160}{.032205127}$ = 4968.153052

D. Median: Here,

 Median = L1 + $\frac{\frac{N}{2}-fc }{fm}$ × c L1  = Lower limit of the median class

 = 4000 + $\frac{80-0}{90}$ × 1000 N = Total number of observation

 = 4888.9 fc = Cumulative frequency of the class preceding the

 median class

 fm = Frequency of the median class.

 C = Class length

E. Mode:

Mode = L1 + $\frac{∆1}{∆1+∆2}$ × c Here, L1 = Lower limit of the mode class

 = 4000 + $\frac{90}{90+35}$ × 1000 ∆1 = Differences between the frequency of the mode class

 = 4720 and the preceding mode class

 ∆2 = Differences between frequency of the mode class

 and the succeeding mode class

 C = Class length

**Supplement Table 9:** This table presents key statistical measures such as arithmetic mean, geometric mean, and standard deviation for analyzing income distribution.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| (Xi-X̅) | fi | fi (Xi-X̅)2 | fi (Xi-X̅)3 | fi (Xi-X̅)4 | fi (logXi) | fi (logXi)2 |
| -562.5 | 90 | 28476562.5 | -1.601806641 × 1010 | 9.010162353 × 1012 | 328.7891262 | 1201.13655 |
| 437.5 | 55 | 10527343.75 | 4605712891 | 2.01499939 × 1012 | 205.7199479 | 769.4672177 |
| 1437.5 | 10 | 20664062.5 | 2.970458984 × 1010 | 4.27003479 × 1013 | 38.12913357 | 145.3830827 |
| 2437.5 | 5 | 29707031.25 | 7.241088867 × 1010 | 1.765015411 × 1014 | 19.37530632 | 75.08049898 |
| Total | 160 | 89375000 | 9.070312499 × 1010 | 2.302270507 × 1014 | 592.013514 | 2191.067349 |

 **(Based on the study)**

We know that, µ r = 1/N∑fi (Xi-X̅)r , r = 0,1,2,3,4,….

When, r = 2,3,4,…

µ 2 = 1/N∑fi (Xi-X̅)2

 = $\frac{89375000}{160}$ = 558593.75

µ 3  = 1/N∑fi (Xi-X̅)3

 = $\frac{9.070312499 }{160}$ × 1010

 = 566894531.2

µ 4 = 1/N∑fi (Xi-X̅)4

 = $\frac{2.302270507}{160}$ × 1014

 = 1.438919067 × 1012

Now, β 1 = µ 32/µ 23 = $\frac{3.213739447}{1.742963195}$ × 1017/1017 = 1.843836667

$\sqrt{β }$1 = 1.357879474

Hence $\sqrt{β }$1 > 0

And,

β 2 = µ 4/µ 22 = $\frac{1.438919067}{3.120269775}$ × 1012/1011 = 4.611521345

Again, [$\frac{Mode}{E(x)}]$ = $\frac{4720}{5062.5}$ = 0.932345679

And, [$\frac{Median}{E(x)}]$ = $\frac{4888.9}{5062.5}$ = 0.965708642

Therefore, [$\frac{Mode}{E(x)}]$ =͂ [$\frac{Median}{E(x)}]$

Now, ½ ln[E(x).H.M(x)]

 = ½ ln[5062.5 × 4968.153052]

 = 8.520209571

And, ln[E(x)]

 = ln[5062.5]

 = 8.529615711

Therefore, ½ ln[E(x).H.M(x)] = ln[E(x)]

The calculated values for sample distribution are,

1. Arithmetic mean: 5062.5
2. Geometric mean: 5012.84715
3. Harmonic mean: 4968.153052
4. Median: 4888.9
5. Mode: 4720

The characteristics of the values mentioned above are,

1. A.M > Median > Mode
2. G.M ≠ Median
3. ½ ln[E(x).H.M(x)] = ln[E(x)]
4. β 1 > 0
5. β 2 ≠ 3

The above-calculated values satisfactorily obey (i), (iii), and (iv) among the 5 properties of **log Normal Distribution.** The remaining two properties ( ii and v ) do not follow the **log Normal Distribution**. So we can say that the distribution of monthly income of 160 service recipients is not **log Normal**.

Now, let us check whether the income of service recipients follows the **log Normal Distn**.

We know that,

µ = x̅ = $\frac{∑fiXi }{N}$ =

And, σ2 = ∑fiXi2/N – (∑fiXi2/N)2

 = 4190000000/160 – (810000/160)2

 = 26187500 – 25628906.25

 = 558593.7503

So, σ = 747.3912966

Therefore, Z = $\frac{x-5062.5}{747.3912966}$

**Supplement Table 10: Class limits, the value of Z, O, E, O2/E are calculated in the table below:**

This table examines whether the income distribution of service recipients follows a normal distribution using statistical tests.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Class limits | The value of Z | Sample SizeO | Normal Probability | Expected ValueE | O2/E |
| <5500.5 | <.59 | 90 | .7224 | 115.584 | 70.0789 |
| 5500.5-6500.5 | .59 to 1.9 | 55 | .2489 | 39.824 | 75.95922 |
| 6500.5-7500.5 | 1.9 to 3.3 | 10 | .02822 | 4.5152 | 22.1474 |
| 7500.5≥ | 3.3≥ | 5 | .00048 | .0768 | 325.5208 |
| Total |  | 160 | 1.0004 | 160 | 493.70632 |

 **(Based on the study)**

**Null hypothesis H0**: The above data does not come from **log Normal Distn**.

**Alternative hypothesis H1**: The above data comes from **log Normal Distn**.

We know that,

χ2 = ∑ O2/E – N where the degree of freedom

 = 493.70632 – 160 (4-1-1)

 = 333.70632 = 4-2

 = 2

 O = Observed value

 E = Expected value

 N = Total number of observation

At the 5% level of significance, the tabulated value of χ2 with 2 d.f is 5.991.

**Comment**: At the 5% level of significance the calculated value of χ2 with 2 d.f is 333.70632 which is the greater than tabulated value. So, we may reject the null hypothesis. Finally, the above data comes from the **log Normal Distn**.