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ON THE EVALUATION OF NON-PROBABILITY SAMPLING AND LOGISTIC REGRESSION MODEL USED IN DRUG ADDICTION

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ABSTRACT

This paper presents Fundamental Ideas of Non-Probability Sampling with an application. The application based on the prediction of drug addicted students of Islamic University, Kushtia-7003. For this purpose primary data are to be collected by using Network Sampling (for drug addicted) and Purposive Sampling (for non drug addicted) techniques. We fit the logistic Regression Model to predict the drug addicted or non drug addicted student based on their monthly family income and own expenditure. This project also provides the relationship among the financial status and academic qualification of the respondent's parents and addiction also.

KEYWARDS: Introduction, Literature review, Methodology (Networking and purposive sampling, Logistic Regression Model), Results and Analysis, Summary and Conclusion.

I. INTRODUCTION

Our knowledge, our attitudes and our action are based to a very large extent on samples. This is equally true in everyday life and in scientific research. Survey researchers routinely conduct studies that use different methods of data collection and inference. Over about the last 60 years most have used a probability-sampling framework. More recently, concerns with rising costs have led some to wonder whether non-probability sampling methods might be an acceptable alternative, at least under some conditions. There is a wide range use of non-probability designs that include case-control studies, clinical trials, evaluation research design, intercept surveys, and opt-in panels, to name a few. Non-probability sampling has become especially prevalent as more and more surveys have moved online.

Drug addiction is not a recent problem in Bangladesh. But it has been rising. In recent years Drug Addiction has significantly increased in Bangladesh. This agent of human devastation has spread its tentacles worldwide and also in our country. Drug abuse directly influences the economic and social aspects of a country. There are millions of drug-addicted people in Bangladesh. These are generally youths and young men between 15-30 years of age and come from all strata of the society. But there are young people below 15 years of age and men and women over 30. And they are from all strata of the society. Some take drug as a pursuit of pleaser and later on it turns into an addiction. The drugs are very expensive. To predict the addicted people, Logistic regression analysis (LRA) is a popular and widely used analysis. LRA extends the techniques of multiple regression analysis to research situations in which the outcome variable is categorical. In practice, situations involving categorical outcomes are quite common. This is a situation where the response variable has only two possible outcomes, generally called "success" and "failure" and denoted by 1 and 0. Actually the response is essentially qualitative or dichotomous (e.g., success/failure or yes/no or died/lived).

2. METHODOLOGY

2.1 Introduction

In a survey the methodology for collecting information is of great importance. The reliability of results of a survey depends on the appropriate study methodology. Sampling is important component of methodology. A scientific and systematic design is mandatory to attain a valid conclusion and fulfill its objective. This study was conducted in various steps that constitute methodology all together.

2.2 Data Collection procedure

Here, we use primary data and the data for the study were collected by the direct interview from different respondents by network sampling (for drug addicted student) and purposive sampling (for non drug addicted student) techniques.

2.3 Network Sampling

Some populations that we are interested in studying can be hard-to-reach or are hidden because they exhibit some kind of social stigma, illicit or illegal behaviors, or other traits that makes them socially marginalized. These include populations such as drug addicts, homeless people, individuals with AIDS/HIV and prostitutes. Network sampling is a non-probability based sampling technique that can be used to gain access to such populations. This type of

sampling technique works like chain referral.

2.4 Purposive Sampling

Purposive sampling is a non-probability sampling technique where we select units to be sampled based on our knowledge and personal judgment. This type of sampling technique is also known as Judgmental Sampling and Authoritative sampling.

Purposive sampling is used in cases where the specialty of an authority can select a more representative sample that can bring more accurate results than by using other probability sampling techniques.

The main objective of purposive sampling is to produce a sample that can be considered ‘‘representative’’ of the population.

2.5 Logistic Regression Model

Logistic regression analysis (LRA) is a popular and widely used analysis. LRA extends the techniques of multiple regression analysis to research situations in which the outcome variable is categorical. In practice, situations involving categorical outcomes are quite common. This is a situation where the response variable has only two possible outcomes, generally called “success” and “failure” and denoted by 1 and 0. Actually the response is essentially qualitative or dichotomous (e.g., success/failure or yes/no or died/lived).

3. ANALYSIS AND RESULT

3.1 Introduction

Statistical analysis is a component of data analytics. Statistical analysis involves collecting and scrutinizing every data sample in a set of items from which samples can be drawn.

3.2 Checking the Impact of the Running Year on Addiction:

Graphical Analysis

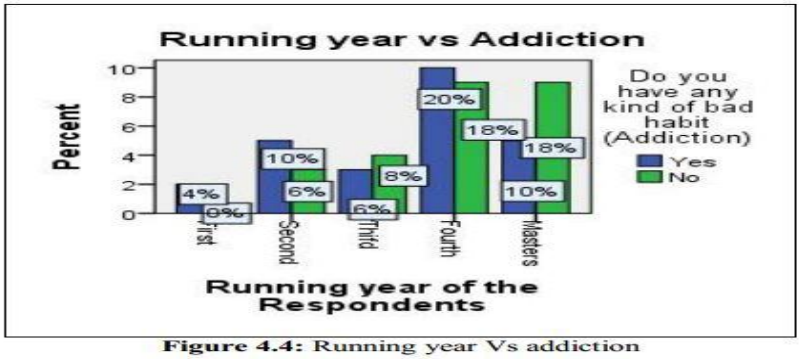

Figure 4.4: Running year Vs addiction

From figure 4.4, it can say that the 4th year student are more drug addicted (about 20%) than the student of other years.

3.3 Checking the Impact of Father's Academic Qualification on addiction

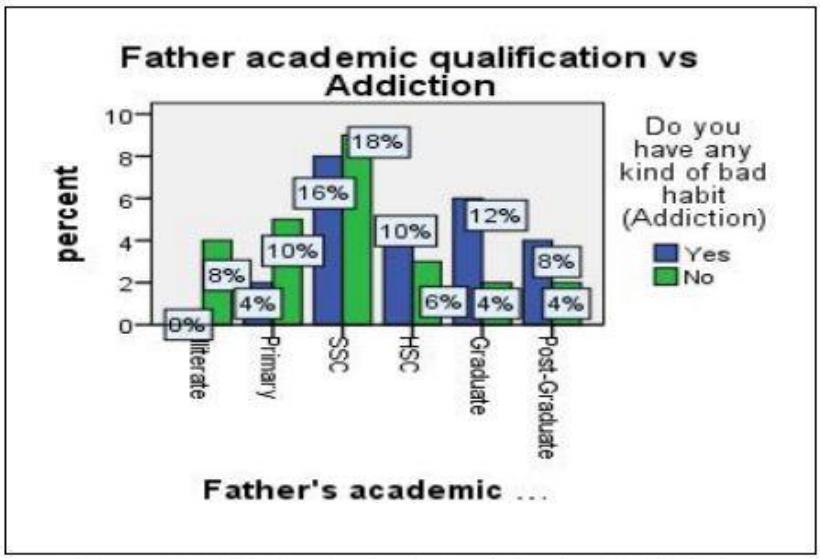

Figure 4.8: Father's Academic Qualification Vs Addiction

From figure 4.8, it can say that the students whose father is SSC passed are more addicted (about 16%) than others.

3.3 Checking the Impact of Mother's Academic Qualification on addiction

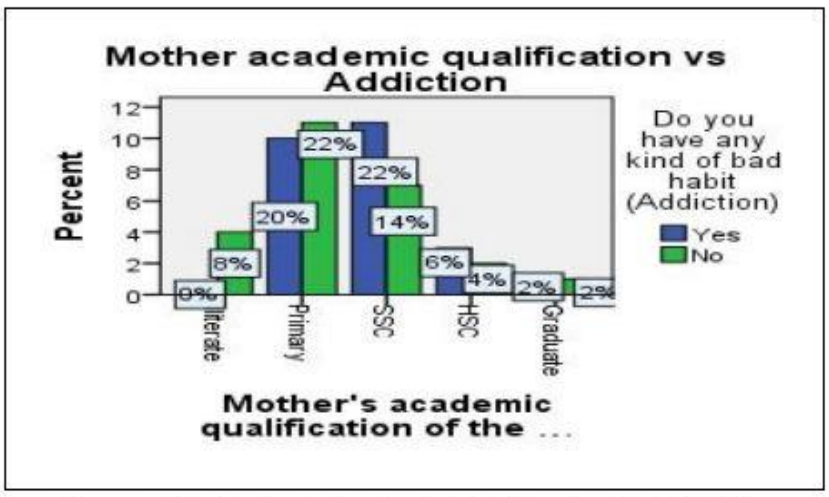

Figure 4.12: Mother's Academic Qualification Vs Addiction

From figure 4.12, it can say that the students whose mother is SSC passed are more drug addicted (about 22%) than others and next primary passed (about 20%).

3.4 Descriptive Analysis of the Family Income (Monthly)

Table 4.4: Frequency table of the respondent's family income (monthly).

Bin	8000	13000	1800	23000	28000	33000	38000	43000	More
Frequency	7	11	8	13	1	5	1	2	2

Maximum	Minimum	Average
50000	30000	18650

Graphical Representation

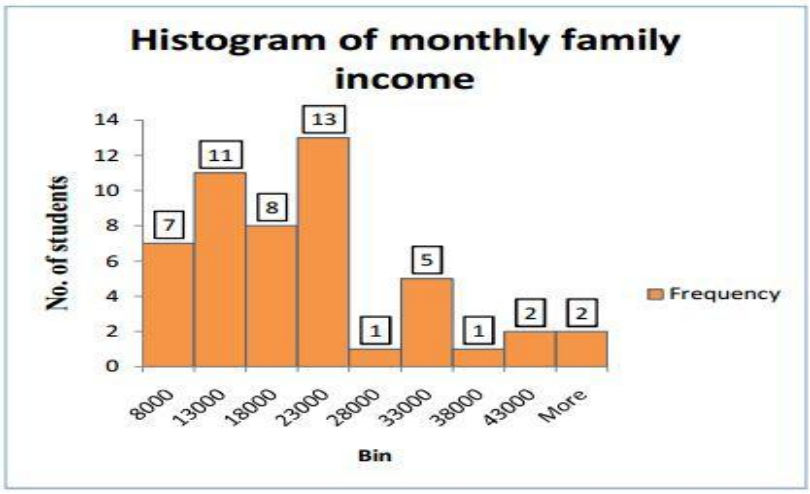

Figure 4.13: Histogram of Family Income (Monthly)

From the above frequency table 4.4 and figure 4.13, it is observed that the maximum income is 50000 taka and minimum income is 3000 taka. The average income is 18650 taka. The maximum respondent's family income is 23000 taka.

3.5 Checking the Impact of Family Income (Monthly) on Addiction

Graphical Representation

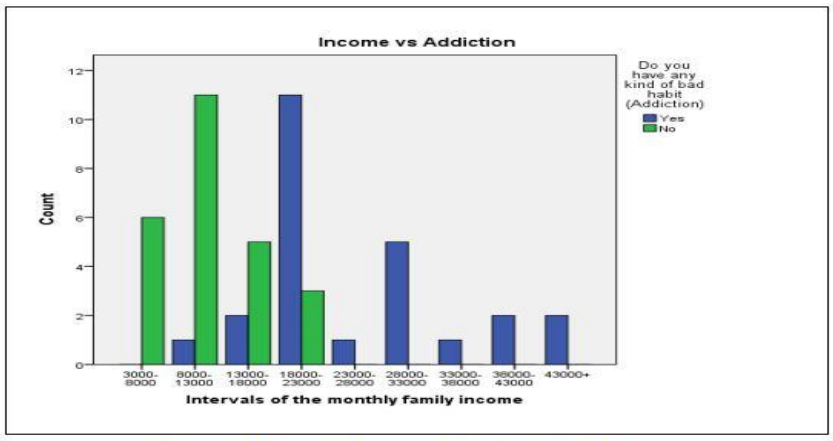

Figure 4.14: Family Income (Monthly) Vs Addiction

From figure 4.14, it is observed that the students at family income level (3000-8000) taka are not drug addicted, at (18000-23000) taka large numbers of students are drug addicted and very few are not drug addicted and income 23000 taka or more they are pure drug addicted So it can say that, as income increase the number of drug addicted student's increases.

3.6 Descriptive Analysis of the Respondent's Expenditure (Monthly)

Table 4.5: Frequency table of the respondent's expenditure (monthly).

Bin	3000	5000	7000	More	Maximum	Minimum	Average
Frequency	19	23	7	1	8000	2000	3940

Graphical Representation

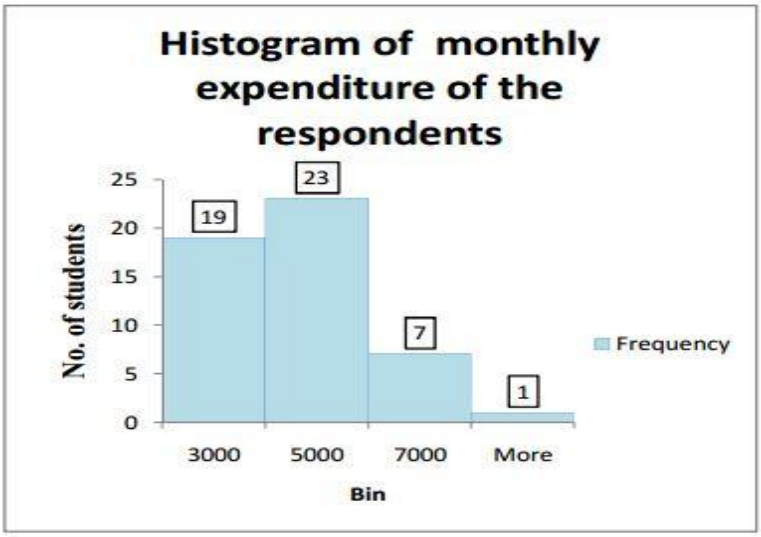

Figure 4.15: Histogram of respondent's expenditure (monthly)

From the frequency table 4.5 and figure 4.15, it is observed that the maximum expenditure is 8000 taka and minimum expenditure is 2000 taka. The average expenditure is 3940 taka. The maximum respondent's expenditure is 5000 taka.

3.7 Checking the Impact of Respondent's Expenditure (Monthly) on Addiction: Graphical Representation

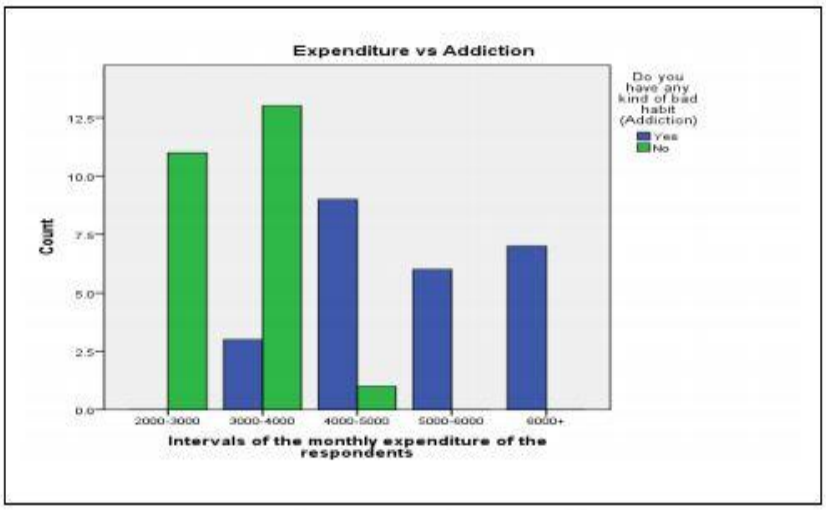

Figure 4.16: Respondent's Expenditure (Monthly) Vs Addiction

From figure 4.16, we see that the students whose expenditure at level (2000-3000) taka are not drug addicted and as expenditure increases the number of drug addicted students increases, that means students at higher expenditure are highly drug addicted.

3.8 Logistic Regression Model

To fit logistic regression model, we use addiction as response variable, monthly family income and monthly respondent's expenditure as predictor variable. Since the response variable is binary, it has two outcomes. So we code the two cases as 0 for non drug addicted and 1 for drug addicted respondents.

Table 4.6: Estimated coefficients table.

Coefficient	$\hat{\beta}_i$
Intercept	-7.456
Family income	0.071
Respondent expenditure	0.2936

Table 4.7: Odds ratio table.

Coefficient	$\hat{O}_R = e^{\hat{\beta}_i}$
Intercept	0.00000753
Family income	1.000388
Respondent expenditure	1.0059

3.8.1 Prediction

Table 4.8: Prediction table based on family income and expenditure.

Input		Output in probability	Drug addicted
Income	Expenditure		
25000	5000	0.9999915	Yes
20000	5000	0.9999412	Yes
26000	5000	0.9999943	Yes
30000	4000	0.9995631	Yes
20000	4000	0.9793377	Yes
10000	3000	0.002729	No
8000	2500	0.000066	No
7000	2500	0.000045	No
8000	3000	0.00125	No
12000	2500	0.000314	No

Table 4.8, showed that if I input the value of higher income and expenditure in the fitted model, then the output value is approximately 1, which indicates the respondent is drug addicted. And if I input the value of lower income and expenditure in the fitted model, then the output value is approximately 0, which indicates the respondent is not drug addicted.

4. SUMMARY AND CONCLUSION

From this study, it is conclude that the 4th year students are more drugs addicted than the student of other years. It is also observed that the academic qualification of most of the father at S.S.C level and mother at primary level. Very few parents are graduate level. Most of the respondent's family incomes are within 13000 to 23000 taka and own expenditure is in the interval 3000 to 4000 taka. From this study it can also say that the students at rich family are more drugs addicted than the poor family students. That means as income and expenditure increases the number of drug addicted students increases. So drug addiction of the respondent linearly related with family income and own expenditure.

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