1.1General Preliminaries:

Statistical calibration has some similarities with scientific calibration which is the process whereby the scale of a measuring instrument is determined or adjusted on the basis of an informative or calibration experiment but it has a more complicated form .It is a problem of retrospection and some authors call it inverse regression rather than calibration. It is probably best explained by considering a typical univariate calibration problem.

Consider the problem of a chemist wishing to establish a calibration curve to use in measuring the amount of a certain chemical A in samples sent to an analytical Laboratory. There are two method of measurement :an exact but expensive and slow method X and a less expensive and quick method Y. The problem is to find a model that relates Y to X so that measuret of X can be predicted from the measure of Y . The known amounts of chemical A have been determined by an extremely accurate standard method that is slow and expensive (X). The resulting data constitutes the calibration experiment and is used to estimate the calibration curve f .This calibration curve is now ready for use in the second stage of the calibration process which involves prediction. In the second stage. Samples with unknown amounts of chemical A are analysed with the test method and the amount of chemical A predicted for each new sample. For a given sample, one or more measurements using the test method may he made. [1]

1.2 The research Problem:

Her problem of the study lays on two factors which are :
Factor one: finding the standard errors for the estimated model according to logistic regression then finding the (trusted) calibration errors using the regression calibration and then compare between these errors in the models.
Factor two: acknowledge and define the effective factors on the blood cancer disease through the given data

On the other hand the effect of changes in factors like the linear dependency between X & Y sample size on inference through the degree of confidence.

1.3The importance of the Research

The importance of the research lays on study the value of theoretical and applied calibration models by it's different concepts even more acknowledge the effective factors on the blood cancer disease according to given data not forgetting the importance of knowing the changes (increase , decrease) of the standard errors values when we use logistic model and calibration regression model

The study will also help to guide researchers on choosing a simple calibration model.

1.4 Research Objectives

1- estimating the calibration standard errors for the calibration regression model and logistic model and compare between them.
2- building statistic model to describe the research variables in order to acknowledge the effect of these variables on the cancer disease

3-simulated bivariate data with different values β_0 & β_1 in the simple calibration model:

$$Y = \beta_0 + \beta_1 X_i + \varepsilon$$

With the objective of exploring the effect of changes in these parameters on the degree of confidence.

4-investigate the effect of changes in sample size on confidence interval estimation .

1.5Research Hypotheses:

1. There is no significant differences for the calibration errors of the logistic sample and calibration regression sample
2. There is no significant effect for variable age on the variable y
3. There is no significant effect for variable pcv on the variable y
4. There is no significant effect for variable mch on the variable y
5. There is no significant effect for slope on confidence interval for expected value of x
6. There is no significant effect for sample size on confidence interval for expected value of x

1.6 Research Methodology:

Simulation has been used through the MATLAB , STATA and SPSS program.

1.7ResearchLimits:

Special limits: blood cancer patients - Khartoum hospital

Temporal limits: the research data has been taken in period between August 2011 to February 2015

1.8ResearchData:

1-Actual data from Khartoum hospital

2-Simulated data.

1.9 Structure of Research:

This research contains five chapter : the first chapter includes an general preliminaries, a problem ,the importance, objective, assumptions, limitation , data and the methodology of the research addition to pervious studies and research.

The second chapter mathematical Formulation of the Univariate Calibration problem ,the Classical and Inverse Approaches to Calibration,using Matlab program for linear regression calibration.

The third chapter contains the theoretical frame work, stata programming, blood cancers, variables of research, application aspect.

The fourth chapter contains amonte carlo experiment , generation of the population of (X , Y),sampling and confidence intervals, Analysis of results.

The fifth chapter contains the results that have been findings and recommendations.

1.10 Previous Studies:

Here are some researches and studies used the calibration and logistic models:

1- In Dec(1991) Christine Osborne (University of Bath) conducted a study entitled (Statistical Calibration: A Review)

In this paper reviews the wide variety of approaches to both univariate and multivariate calibration. In particular, in univariate calibration, it considers the classical, inverse, Bayesian and non-parametrica pproaches together with the approaches via tolerance regions. In multivariate calibration, it considers the ridge regression, multiple linear regression, partial least squares regression and principal components regression approaches together with the Bayesian and profile likelihooda pproaches.A n extensive bibliographyi s provided

2- In Dec (1997) J. AITCHISON (University of Hong Kong) conducted a research at (A calibration problem in statistical diagnosis: The system transfer problem)

In this research we see the a statistical diagnostic system devised for a particular clinic may require appreciable modification when either the method of measurement of any of the diagnostic features changes within the clinic, or the system is to be applied to another clinic where different methods of measurement are used. In either circumstance the transfer can be effectively made only on the basis of information from a calibration experiment designed to establish the relationship between the different methods of measurement. Even with such calibration information a naive method of calibration commonly adopted is shown to yield conclusions which can be radically different from those of a method taking full account of the calibration unreliability. An application to a particular problem of clinical diagnosis is used to illustrate the analysis.

3-Aug(1996) Marie-Anne Gruet (Institut National de la Recherche Agronomique) conducted a study entited (A NONPARAMETRIC CALIBRATION ANALYSIS) .

In this paper we discuss a new approach to solve calibration problems in a nonparametric setting. This approach is appealing because it yields estimates of the required quantities directly. The method combines kernel and robust estimation techniques. It relies on strong approximations of the estimating process and the extreme value theorem of Bickel and Rosenblatt. Using these results, we first obtain robust pointwise estimates of the parameters of interest. Second, we set up asymptotic simultaneous tolerance regions for many unknown values of the quantity to be cali- brated. The technique is illustrated on a radiocarbon dating problem. The nonparametric calibration procedure proves to be of practical, as well as theoretical interest; moreover, it is quick and simple to implement.

4-Vov(1997*)* Chi-Lun Cheng and John W. van Ness*(*Institute of Statistical Science Academia Sinica & University of Texas at Dallas *)* conducted a research at (Robust Calibration)

This article presents robust methods for the random calibration problem. Many calibration tech- niques are based on regression models or measurement-error models. Prediction from such mod- els is known to be highly nonrobust, and robust techniques should prove quite valuable. Robust- calibration procedures are procedures that work well even if there is some contamination in the data or if the model assumptions used in deriving the procedure are not quite true for the given data. Several approaches to robustifying calibration are compared theoretically, by Monte Carlo simulation, and on real data.

5- James W. Hardin , Henrik Schmiediche & Raymond J. Carroll(University of South Carolina , Texas A&M University) conducted a study entitled *(*The Regression Calibration Method for Fitting Generalized Linear Models with Additive Measurement Error)

This paper discusses and illustrates the method of regression calibration. This is a straightforward technique for fitting models with additive measurementerror.

We present this discussion in terms of generalized linear models (GLMs) following the notation defined in Hardin and Carroll (2003). Discussion will include specified measurement error, measurement error estimated by replicate error-prone proxies, and measurement error estimated by instrumental variables.

The discussion focuses on software developed as part of a small business innovation research (SBIR) grant from the National Institutes of Health (NIH). The authors