STATISTICAL STUDY FOR DISABILITY PHENOMENON IN BENGHAZI AREA

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Abstract

Disability is a common problem in any society that has a major impact on the disabled person, his family and his society. It requires a lot of investigations and analyses especially with the growing size and scope of this problem. The main object of this study is identify the demographic and socio-economic factors that have an effect on the acquired disability. A systematic random sample had been drawn from the department of disabled affairs in Benghazi area. In order to achieve our aim, multiple logistic regression is used.

Keywords: Logistic regression and Acquired disability.

الخلاصــة :

تعتبر ظاهرة الإعاقة من أهم ظواهر المجتمع الصحية والاقتصادية والاجتماعية التي تنعكس آثارها السلبية على الفرد المعاق بصفة خاصة وعلى المجتمع بصفة عامة ومن أجل ذلك كانت هذه الدراسة التحليلية عن ظاهرة الإعاقة المكتسبة حيث كان الهدف الاساسى لهذه الدراسة تحديد أهم العوامل الديموغرافية والاقتصادية والاجتماعية المؤثرة في الإعاقة المكتسبة. ولتحقيق هذا الهدف تم سحب عينة عشوائية منتظمة من قسم شؤون المعاقين في مدينة بنغازي وتم استخدام أسلوب الانحدار المنطقي المتعدد " Multiple Logistic Regression "لتحليل البيانات من خلال البرنامج الإحصائي (SPSS)وبعد التحليل تم الحصول على النتائج التالية :نتائج نموذج الانحدار المنطقي للإعاقة المكتسبة 1. :العمر من العوامل المهمة في الإصابة بالإعاقة المكتسبة فمع زيادة العمر تزداد فرصة الاصابة بالإعاقة المكتسبة ، حيث تكون الإعاقة نتيجة لمرض أو لنوع من أنواع الحوادث 2. .وجود ارتباط عكسى بين مدة الإصابة بالإعاقة والإعاقة المكتسبة 3. .فرصة الإصابة بالإعاقة المكتسبة تزداد إذا كان مكان حدوث الإعاقة البيت والطريق و المنطقة الرعوية أو الزراعية وبذلك ظهور مثل هذه الإعاقة يرتبط بالمكان 4. .انتشار الإعاقة المكتسبة بين المصابين بالشلل والعمى والخذل والتخلف العقلي ، كذلك تنتشر عند غير المتزوجين .

1. INTRODUCTION

A lot of researches and scientific studies are made in all fields on healthy people but there are disabled people, **(Groups of special needs)** who constitute part of the society, have the right to be treated equally and their special needs have to be fulfilled by their society. Society is responsible for their welfare in all aspects of life and should help them to play positive roles amongst other normal healthy people of the society. This can be achieved by creating an appropriate environment that suits their special needs and meets their abilities and requirements. Generally, disability is a common phenomenon which is not limited to a certain society or a certain environment, and the problem of disabled people is aggravated all over the world. This comes as a result of the new technology and the risk behind it that affects human being. Therefore, it is very important to tackle this problem and limit it by using the best available scientific methods in the domains of protection and habilitation.

The statistics in this field show that 10% of world inhabitants were disabled and 80% of them live in the developing countries. It is worth mentioning that there are more than fifteen millions disabled in the Arab world. [**An Encyclopedia of the Disabled (1981)**]

Libya is one of the first developing countries that has collected statistics data regarding disabled people through its national censuses. Those efforts have been carried out in order to spotlight and limit the disability phenomenon.

The expression of disability and disabled person is differently expressed according to the political and economical system of the society. Disabled person is a person who experiences certain disadvantages in life and is not able to discharge the obligation required of him and play the role expected of him in society [**WHO (1980) and Park (1994)**].

In Libya according to law number five in 1987 for disabled people article two, a disabled person is defined as a person who is suffering from a permanent impairment precluding him totally or partially, from performing work or behaving normally in the community regardless of whether due to his mental, psychological, sensorial or physical impairment and irrespective of whether it be congenital or acquired.

This study is based on data collected from the department of disabled affairs in Benghazi. To achieve the objectives of the present study this paper consists of five Sections. Section one consists of an introduction about the disability phenomenon. Section two presents the problem statement of the study. In Section three sample selection and description of the variables are presented. Section four includes the methodology of this study whereas Section five is mainly concerned with the analysis and results.

2. PROBLEM STATEMENT

The complexity of modern life with all its technological and industrial advancement in various fields has resulted in an increased number of victims amongst them disabled people. For instance, the improvement in means of transportation and the increase of car accidents give rise to the number of disabled people. The acceleration rate of industrialization and the use of machines in this modern age in many daily life activities can be another source of occupational injuries that may cause different kinds of disability. There are other social factors contribute to the high rate of the disability phenomenon in society, such as heredity and various diseases. Disability is a common problem in any society that has a major impact on the disabled person, his family and his society. It requires a lot of investigations and analyses especially with the growing size and scope of this problem. This increase is accompanied various forms of disability resulting from complexities of social life and its rapid development. Hence, the phenomenon of disability raises, even at international level, many basic questions regarding the factors affecting or leading to it.

Libya as any other country has a number of disabled people owing to the industrial development, which has led to the excessive use of machinery. It should be noted that Libya during history was a battlefield of several wars, which left behind a lot of land mines. These mines have led to a considerable number of disabled people. In addition, there are disabled people due to other reasons such as heredity, diseases and congenital causes. According to the previous text, the government of Libya has paid more attention to this international phenomenon by establishing a lot of disabled habilitation centers in order to decrease the number of disabled people in the country. To study the various dimensions of the disability phenomenon this analytical and statistical study has been carried out in order to investigate the demographic and socio-economic factors that have an influence on disability phenomenon.

2.1. The aim of the Study

The main object of the present study is to identify the demographic and socio-economic factors that have an effect on the acquired disability.
Hypothes of the Study is there is no relationship between the demographic and socio- economic factors and the acquired disability.

3. DESCRIPTION OF DATA

3.1. Source of data and sample selection

The data of this study was collected from the department of disabled affairs of the social security institution (Benghazi). The department of disabled affairs was established in 1982 and it is specialized in executing the disabled habilitation programs, such as health care, financial support and other matter concerning the disabled welfare. according to disabled law and its issued rules.

The units in the population are available and the ordering of it is essentially random so the systematic sampling technique applied to draw a sample of 2726 person which represented 40 % of the population size.

3.2. Description of variables

The total number of variables in this study is 21, some of these variables are quantitative and most of them are qualitative with two or more distinct categories. Different variables and their different categories are discussed in brief below.

Demographic variables

Age (X_1): this variable is a quantitative one hence it can be included in the analysis directly.

Sex (X_2): this variable is a binary one so it has been included in the analysis by coding **one** for male and **zero** for female.

Socio – economic variables

Education level (X_3): this variable has **8** categories. These categories are (i) children under 6-years **(under education age)**, (ii) primary Education, (iii) secondary Education, (iv) university Education, (v) higher, (vi) write and read only, (vii) a graduates or student in one of the habilitation centers (viii) illiterate or can not be educate due to disability. Each category is considered as separate and **7** dummy variables D_1, D_2, D_3, D_4, D_5, D_6, D_7 respectively will be needed to represent the variable in the analysis.

Family income (X_5): this variable is a quantitative variable hence it can be included in the analysis directly.

Area (X_6): this variable is a binary variable so it has been included in the analysis by coding **one** for urban area and **zero** for rural area.

Condition of residence (X_7): this variable is a binary variable and has been included in the analysis by coding **one** for suitable and **zero** for un- suitable.

Type of residence (X_8): this variable is a binary variable so it is included in the analysis by coding **one** for stay with the family and **zero** for stay in disabled center.

There are 7 types of disabilities:

(i) **Blindness (X_9)**; (ii) **Deafness (X_{10})**; (iii) **Muteness (X_{11})**; (iv) **Mental retardation (X_{12})**; (v) **Paralysis (X_{13})**; (vi) **Amputation (X_{14})** and (vii) **Paresis (X_{15})**. Each type of these disabilities includes in the analysis as binary variable by coding **one** if the disability is present and **zero** if it absent.

There are two causes for disability:

First **congenital disability (X_{16})** and second **acquired disability (X_{17})** which is classified into (i) due to labor hard **(X_{17}a)**; (ii) due to non-vaccination **(X_{17}b)**; (iii) due to disease **(X17c)** and (iv) due to accidents **(X_{17}d)**. Each cause can be consider as binary variable by coding **one** if the cause is present and **zero** if it absent.

Table 3.1 Distribution of disabled by disability causes.

Disability causes	**Congenital (X_{16})**	**Due to labor hard (X_{17}a)**	**Due to non - vaccination (X_{17}b)**	**Due to disease (X_{17}c)**	**Due to accidents (X_{17}d)**
No. of male	862	20	8	537	256
Percent	51.2	1.2	0.5	31.9	15.2
No.of female	544	19	4	406	70
Percent	52.2	1.8	0.4	38.9	6.7
Total	1406	39	12	943	326
Percent	51.6	1.4	0.4	34.6	12

It is observed from table 3.1 that the congenital disability was the first cause of disability with 51.6 percent and its percentage among males and females were 51.2 percent and 52.2 percent respectively. The disability due to disease occurred in the second order 34.6percent and it was higher among females 38.9 percent than males 31.9 percent. Third order was due to accidents with 12 percent and it was higher among males 15.2 percent than females 6.7 percent. The disability due to labor hard came in fourth order 1.4 percent. The final order of disability causes was due to non-vaccination 0.4 percent**.**

The disability happened place (X_{18}) this variable has **5** categories. These categories are house, road, the work place, agrarian or pastoral area and others. Each category is considered as separate and **4** dummy variables D_{12}, D_{13}, D_{14}, D_{15}, respectively will be need to represent the variable in the analysis.

Duration of disability (X_{19}) this variable is a quantitative variable hence it can be included in the analysis directly.

In order to study family history we have to look at tow variables:

1- Number of disabled in the family (X_{20}) this variable is quantitative one and has been included in the analysis directly.

2- Parents relatively (X_{21}) this variable is binary variable so it included in the analysis by coding **one** if Parents relatively is present and **zero** if it absent.

4. METHODOLOGY

4.1. Introduction

To study our objectives, logistic regression analysis is used to identify the factors (variables) which have effect on the disability.

In the last twenty-five years logistic regression has become increasingly popular. This popularity is largely due to its applicability in a wide variety of situations [**O'Gorman and Woolson (1991)**]. Logistic regression analysis was utilized to assess whether school difficulties in the third school grade are related to the risk of overweight and obesity in young adulthood [**Lissau and Sorensen**

(1993)]. **Maaskant *et al* (1994)** predicted through logistic regression analysis in study on residents of institutions and group homes for people with mental handicap that age, gender and aetiological diagnosis do not have significant predictive power for the level of care dependent. **Samuelsson *et al* (1996)** founded through logistic regression analysis that functional outcome regarding physical independence was favorable in most patients. Motor impairment and white matter disease were the strongest predictors of a poor functional outcome. **Truffert *et al* (1998)** utilized the logistic technique to study the relationship between perinatal management and survival without disability. **Szlyk *et al* (1998)** predicted through logistic regression analysis that education was the primary predictor of employment in study to gain information about the employment status of legally blind patients. **O'Reilly *et al* (1998)** used logistic analysis to determine the relative importance of quadriceps function, structural change and psychological status with respect to disability in subjects with knee pain. **Zwerling *et al* (1998)** predicted through logistic regression analysis that poor sight and poor hearing as well as work disabilities in general are associated with occupational injuries among older workers.

4.2. Logistic Regression Model

For logistic regression the dependent random variable Y is a dichotomous variable taking the value one with probability p and the value zero with probability 1-p. Such a random variable is called a Bernoulli variable [**Kleinbaum et al (1987) and Chap (1998)**]. This variable has the simple discrete probability distribution:

$$p_r(Y = y,\ p) = p^{\ y}(1 - p)^{\ 1-y}\ ; \qquad y = 0,1 \qquad (4.1)$$

Suppose that there are *n* individuals and *k* independent variables $x_1, x_2, \dots, x_k$. These independent variables may be quantitative, categorical or a mixture of the two [**Retherford and Choe (1993)**].

For the i-th individual it can be written

$$p_i = p\,(Y_i = 1) \quad \text{and} \quad 1 - p_i = p\,(Y_i = 0) \qquad (4.2)$$

The methodology of logistic regression analysis assumes that the relationship between the binary dependent variable and the independent variables is as described by the logistic function which is

$$p_i = \frac{e^{x_i'\beta}}{1 + e^{x_i'\beta}}$$

and

$$1 - p_i = \frac{1}{1 + e^{x_i'\beta}} \qquad (4.3)$$

where $\beta_{(k+1)(1)}$ is the vector of parameters and $X_{n.(k+1)}$ is the vector of independent variables. The ratio between p_i and 1-p_i is called odds ratio [**Studenmund (2001)**]and it is given by

$$Odds = \frac{p_i}{1 - p_i} = e^{x_i'\beta} \qquad (4.4)$$

The odds of an event occurring are defined as the ratio of the probability that it will occur to the probability that it will not. In logistic analysis, the probability of an event occurring can be estimated directly [**Norusis (1993)**].

The natural logarithm for odds is

$$ln\; odds = ln\; \frac{p_i}{1 - p_i} = x_i'\beta \qquad (4.5)$$

this quantity is called the logit of *p* [**Retherford and Choe (1993)**], the last equation is in the form of ordinary multiple regression with ln odds as the dependent variable and it determines the effect of k explanatory variables on this variable. This form is very convenient because it ensures that no matter what values are taken by the explanatory variables, the implied or predicted value of the dependent variable must be positive and less than one [**Intriligator (1978)**]. The logit p is commonly referred to as multiple logistic regression [**Sharma (1996)**].

4.3. Estimation of Parameters and Test of Hypothesis

When the dependent variable can have only two values, the assumptions necessary for hypothesis testing in regression analysis are necessarily violated. For example, it is unreasonable to assume that the distribution of errors is normal. Another difficulty with multiple regression analysis is that predicted values can not be interpreted as probabilities [**Norusis (1993)**]. Ordinary least squares method can not be used to estimate the parameters in logistic regression model because the logit is not defined when $P_i = 0$ or 1 [**Mirer (1983)**].

The maximum likelihood estimation is the most popular technique for estimating the parameters of the logistic model [**Sharma (1996)**]. Let Y_1, $Y_2,\ldots,Y_n$ are dichotomous observations on the n individuals where

$$p_r(Y_i = y_i,\ p) = p_i^{y_i}(1-p_i)^{1-y_i}\ ; \qquad y_i = 0,1 \tag{4.6}$$

the likelihood function is obtained, as the product of the marginal distribution of the Y_i's and it given by

$$\begin{aligned} L\,(Y;\ \beta) &= \prod_{i=1}^{n} p_i^{y_i}\ (1-p_i)^{1-y_i} \\ &= \prod_{i=1}^{n} \left(\frac{p_i}{1-p_i}\right)^{y_i} (1-p_i) \\ &= \prod_{i=1}^{n} (e^{x_i'\beta})^{y_i} \left(\frac{1}{1+e^{x_i'\beta}}\right) \end{aligned} \tag{4.7}$$

and the *ln* of likelihood function is

$$ln\, L(\beta) = \sum_{i=1}^{n} y_i\, x_i'\, \beta - \sum_{i=1}^{n} \; ln\,(1 + e^{x_i'\beta}) \qquad (4.8)$$

the estimate for parameter vector is obtains by maximizing $lnL(\beta)$. It can be obtained by taking the derivative of this *ln* likelihood function with respect to β. This is given by

$$\frac{\partial\, lnL(\beta)}{\partial\, \beta} = \sum_{i=1}^{n} y_i\, x_i \; - \sum_{i=1}^{n} \left(\frac{e^{x_i'\beta}}{1 + e^{x_i'\beta}} \right) x_i \qquad (4.9)$$

setting the vector of partial derivation to zero and then solving the resulting equations to estimate the elements of β vector say (*b*). However, the

resulting equations do not have an analytical solution. Consequently *b* is obtained by maximizing *ln* likelihood function using efficient iterative techniques such as Newton-Raphson method [**Sharma (1996) and Klassen (2000)**]. The logistic coefficients represent the impact of a one-unit change in the independent variable, holding the other explanatory variables constant, on the log of odds, not on the probability itself [**Studenmund (2001)**].

The testing hypotheses about the coefficients in logistic regression based on the Wald statistic. The Wald statistic has a chi-square distribution with degrees of freedom equal to one less than the number of categories and it is the square of the ratio of the coefficient to its standard error. However, Wald statistic has a very undesirable property, when the absolute value of regression coefficient becomes large, the estimated standard error is too large. In this case Wald statistic will be too small, so the null hypothesis that the coefficient is zero will be accepted when in fact it will be rejected. To solve this problem the change in the *ln* likelihood can be used for the test of hypotheses [**Hauck and Donner (1977) and Noruis (1993)**].

4.4.Testing the Difference between two Models

Let there is two logistic regression models which have the same response variable but different sets of independent variables where the first model is nested in the second model. Suppose the likelihood function of the first model is L_1 and the likelihood function of the second model is L_2. The null hypothesis tests whether the two models differ significantly from each other, or whether L_2-L_1 differs significantly from zero. But it is not possible because the sampling distribution of ($L_2 - L_1$) is not known .The statistic for which the sampling distribution is know is $-\ ln\,(\frac{L_1}{L_2})^2$ when $L_1 < L_2$ this can be written as

$$-2\,ln\left(\frac{L_1}{L_2}\right) = (-2ln\,L_1) - (-2ln\,L_2) \qquad (4.10)$$

The quantity $\{2ln\,L_2 - 2ln\,L_1\}$ is distributed as chi-square with degrees of freedom equal to the difference in the number of coefficient to be estimated in the two models [**Retherford and choe (1993)**]. The difference between $-2ln\,L$ for the model with only the intercept and $-2ln\,L$ for the model with the intercept and all independent variables is called model chi-square. The model chi-square tests the null hypothesis that the coefficients for all independent variables are zero [**Noruis (1993)**].

4.5. Goodness of Fit

There are many ways to assess whether or not the model fits the data. One way of these ways is *– 2 ln likelihood* statistic, which has a chi-square distribution with *n-q* degrees of freedom where *q* is the number of parameters in the model [**Sharma (1996)**]. A good model will be has a high likelihood this translates to a small value for *–2 ln likelihood* [**Norusis (1993)**]. In stepwise method the change in *–2 ln likelihood* tests the null hypothesis that the coefficient of the terms removed from the model are zero.

In multiple regression the traditional indicator of fit is R^2 which measures the proportion of variation in the response variable that explained by the independent variables. For the logistic regression, a preferable alternative to R^2 as a measure of goodness of fit is the *likelihood ratio index* [**Pindyck and Rubinfeld (1998)**]. This index is defined as

$$\rho = 1 - \frac{L_{\max}}{L_0}$$

where L_0 represents the value of the *ln* likelihood function when all of the parameters are equal to zero and L_{max} represents the value when of the *ln* likelihood function has been maximized and an adjusted of ρ is given by

$$\rho' = \frac{2\,ln\,L_{\max} - 2\,ln\,L_0 - 2(K+1)}{-2\,ln\,L_0}$$

Another way is 2 × 2 classification tables which based on comparing the predictions to the observed values, classification of observations is done by first estimating the probabilities these probabilities can be use to classify observations in to the two groups. If classification rate 50% this imply that model have good predictive validity [**Sharma (1996)**]. The diagonal element of the table indicate how many cases are correctly classified and off diagonal entries of the table indicate the number of cases not correctly classified [**Norusis (1993)**].

4.6. Selecting Predictor Variables

When the number of independent variables are large in this case we want to identify subsets of these variables that are good predictor of the dependent variable. The logistic regression procedure has several methods available for model selection, which are forward stepwise selection and backward stepwise elimination for automated model building. In this study we use the forward stepwise selection based on likelihood-ratio (LR) statistic which is better criterion than Wald statistic for determining variables to be removed from the model [Norusis (1993)]. The change in $-2ln\,LR$ statistic uses to test the null hypothesis that the coefficient removed term is zero. In forward stepwise the variables are entered to the model one by one and start with the model that cautions only the constant term b_0 then the variable whose maximum *ln* likelihood value is the largest after the constant term is selected to enter the model. Suppose $ln\,L\,(b_0,b_i)$, i = 1,2,…, k be the maximum *ln* likelihood value obtained from fitting i-th independent variable after the constant term b_o is fitted. If it is assumed that X_1 is the variable to enter the model then it must satisfy $ln\,L\,(b_0\,,b_1) = \max ln\,L(b_0\,,\,b_i)$ and it's corresponding the change in $-2ln\,LR$ statistic is significant. After X_1 has entered the model there will be k-1 independent variables not yet in the model. To select the second variable to enter the model, again maximum *ln* likelihood value $ln\,L\,(b_0,\,b_1,\,b_i\,)$ i = 2,3,…, k is computed for each k-1 independent variable [**Lee (1980) and El-Figih (1991)**]. The variable with the largest *ln* likelihood value and its corresponding the change in $-2\,ln\,LR$ is significant, is selected to enter the model. This process continues until no variables are eligible for selected by using the significant of $-2\,ln\,LR$ [**Cohen (1989) and Norusis (1993)**].

5. ANALYSIS AND RESULTS

In this section the multiple logistic regression analysis is used to analyze and examine the effect of the different independent variables on the disability. There are two causes of disability which are (i) congenital disability (ii) disability due to acquired causes (acquired disability). In this analysis, the dependent variable is the disability cause.

Logistic Regression Model for Acquired Disability

The aim of this study is to determine the relationship between the independent variables and acquired disability (X_{17}). The model in this case includes the acquired disability as a dependent variable. The results obtained are given in table 5.1.

Table 5.1. Multiple logistic regression model for acquired disability

Variables	Estimates (B)	S.E	Wald statistic	P-Value	Odd-Ratio
Age (X_1)	9.024	8.691	1.078	0.299	8299.910
Sex (X_2)	-0.077	0.203	0.143	0.705	0.926
Education level (X_3)					
< 6 years (D_1)	0.353	0.406	0.756	0.385	1.423
Primary (D_2)	0.020	0.306	0.004	0.947	1.020
Secondary (D_3)	0.769	0.374	4.236	0.040*	2.158
University (D_4)	0.420	0.566	0.552	0.458	1.522
High (D_5)	1.769	1.044	2.870	0.090	5.862
Write and read (D_6)	0.408	0.760	0.288	0.592	1.503
a graduate or student in one of the habilitation centers (D_7)	0.860	0.429	4.025	0.045*	2.363
Marital status (X_4)					
< 14years (D_8)	0.043	1.059	0.002	0.967	1.044
Single (D_9)	0.299	0.969	0.095	0.757	1.349
Married (D_{10})	-0.677	0.943	0.515	0.473	0.508
Divorced (D_{11})	-11.982	354.435	0.001	0.973	0.000

Family income (X_5)	0.000	0.001	0.011	0.916	1.000
Area (X_6)	0.225	0.282	0.637	0.425	1.252
Condition of residence (X_7)	-0.346	0.385	0.807	0.369	0.707
Type of residence (X_8)	-0.878	0.521	2.834	0.092	0.416
Blindness (X_9)	1.278	0.428	8.923	0.003**	3.590
Deafness (X_{10})	0.108	0.575	0.035	0.851	1.114
Muteness (X_{11})	-0.682	0.694	0.965	0.326	0.506
Mental retardation (X_{12})	0.559	0.370	2.284	0.131	1.749
Paralysis (X_{13})	1.546	0.335	21.289	0.000**	4.692
Amputation (X_{14})	-1.442	1.336	1.166	0.280	0.236
Paresis (X_{15})	0.911	0.342	7.082	0.008**	2.487
place of disability occurrence (X_{18})					
House (D_{12})	3.697	0.252	215.522	0.000**	40.311
Road (D_{13})	17.161	202.693	0.007	0.933	28386862
Work Place (D_{14})	-99.181	436.589	0.052	0.820	0.000
Agrarian-pastoral area (D_{15})	19.934	400.026	0.002	0.960	4.54E+08
Duration of disability (X_{19})	-9.066	8.691	1.088	0.297	0.0001

Constant	-2.318	1.394	2.767	0.096	-
*Significant at .05 significant level			** Significant at .01 significant level		
ρ = 0.79					ρ' = 0.78

From table 5.1 it can be seen that the variables such as secondary education (D_3), the education level [a graduate or student in one of the habilitation centers (D_7)], blindness disability (X_9), paralysis disability (X_{13}), paresis disability (X_{15}) and house (D_{12}) appear to be significant. The coefficients of secondary education and the education level (a graduate or student in one of the habilitation centers) are positive. This indicates that the two levels of education associated with increased odds and log odds of acquired disability. In other words, the acquired disability increases among disabled people whose education level is a graduate or student in one of the habilitation centers or secondary. The variable blindness disability has positive effect on acquired disability i.e.; the odds of acquired disability increase among blind people. The coefficient of paralysis disability is also positive and this means when X_{13} changes from 0 to 1, the odds and log odds of acquired disability increase. This indicates that acquired disability increases among disabled who have paralysis disability. Similarly, the paresis disability has positive effect on acquired disability. In other words, the paresis is associated with increased the acquired disability. It is also found from above table that house is associated with increased odds and log odds of acquired disability compared to other places.

From this analysis the model chi-square statistic is observed highly significant and it is equal to 2999.679 with 29 degrees of freedom. Therefor the null hypothesis that there is no relationship between the demographic and socio-economic factors and the acquired disability is rejected. This indicates that there is a significant relationship between the demographic and socio-economic factors and the acquired disability.

The result shows that the $-2ln\,L$ statistic for the model with all independent variables and constant is 776.646, which is smaller than the $-2ln\,L$ for the model containing only a constant (3776.3248). It is also observed that the value of ρ is 0.79 and an adjusted of it is equal to 0.78. This indicates that the model fits the data very well. From table 5.2 for classification it can be seen that of the disabled who have acquired disability, 92.5% are correctly classified and of the disabled who have congenital disability, 98.3% are correctly classified. Overall, 95.5% of the disabled are correctly classified. This indicates that the model has good predictive validity.

Table 5.2 Classification table for acquired disability

Observed	**Predicted**		**Percent correct**
	Acquired	**Congenital**	
Acquired	1221	99	**92.5 %**
Congenital	24	1382	**98.3 %**
Overall 95.5 %			

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Forward Stepwise Logistic Regression Analysis

Forward stepwise logistic regression analysis used in order to determine the important variables that have significant effect on the acquired disability and to develop a logistic regression model that includes the best set of independent variables. By using this procedure we followed ten steps for the selection of the variables included in the final model. These variables are places of disability occurrence (house and road), age of disabled, duration of disability, agrarian or pastoral area, paralysis disability, blindness disability, marital status (single), paresis disability and mental retardation disability. Table 5.3 contains the estimate coefficients and related statistic of the final step in stepwise logistic regression analysis for acquired disability.

Table 5.3. Summary result for multiple logistic regression model for acquired disability by stepwise method

Variables	**Estimates (B)**	**Change in *-2 Ln LR***	**P-Value**	**Odd-Ratio**
House (D_{12})	3.619	266.703	0.000	37.300
Road (D_{13})	17.433	21.337	0.000	37243947
Age (X_1)	8.843	739.683	0.000	6925.739
Duration of disability (X_{19})	-8.896	907.985	0.000	0.0001
Agrarian-pastoral area (D_{15})	19.036	26.600	0.000	1.85E+08
Paralysis (X_{13})	1.668	38.152	0.000	5.302
Blindness (X_9)	1.573	19.456	0.000	4.821
Single (D_9)	0.566	8.234	0.004	1.762
Paresis (X_{15})	1.031	12.045	0.001	2.804
Mental retardation (X_{12})	0.570	4.481	0.034	1.768

Constant	-3.203	-	-	-
$\rho = 0.79$			$\rho' = 0.78$	

From table 5.3 it is observed that the coefficients of places of disability occurrence (house, road and agrarian-pastoral area) are positive. This means that compared to other places, house, road or agrarian- pastoral area is associated with increased odds and log odds of acquired disability. In other words, the cause of disability is acquired if disability occurrence place is house, road or agrarian-pastoral area. The acquired disability increases at agrarian or pastoral area more than the house and road. It is also observed in the analysis the age of disabled has high significant positive effect on acquired disability i.e.; when the disabled age increases and other independent variables remain constant the odds and log odds of acquired disability increase. This indicates that the intensity of acquired disability is found higher among high age. The coefficient of duration of disability is negative so the odds of acquired disability increase as duration of disability decreases. It is also found from the table that paralysis disability has positive effect on the acquired disability. This means that the paralysis disability is associated with the increase of acquired disability. The coefficient of blindness disability is positive and this indicates that acquired disability increases among blind people. The paresis disability is associated with increase of acquired disability. It is also observed that the coefficient of mental retardation is positive this means that when X_{12} changes from 0 to 1 with controlling for the effects of other independent variables, the odds and log odds of acquired disability increase. In other words, acquired disability increases among disabled people who have mental retardation. The result reveals that acquired disability increases among paralytics more than disabled who have blindness, paresis disability or mental retardation. It is found in this analysis that coefficient of marital status (single) is positive. This means that single disabled are more likely to have acquired disability.

The equation of the logistic regression model in terms of the log of the odds can be written as

$$Z = -3.203 + 3.619\ D_{12} + 17.433\ D_{13} + 8.843\ X_1 - 8.896\ X_{19} + 1\ 9.036\ D_{15} + 1.668\ X_{13} + 1.573\ X_9 + 0.\ 566\ D_9 + 1.031\ X_{15} + 0\ .570\ X_{12}$$

where Z is ln odds of the acquired disability.

The analytical result shows that model chi-square statistic is highly significant [p ($x^2 \geq 2980.5238$) = 0.000] with ten degrees of freedom so the null hypothesis (there is no a relationship between the demographic and socio-economic factors and the acquired disability) is rejected. This means that there is a significant relationship between the demographic and socio-economic factors and acquired disability.

The $-2ln$ likelihood statistic for the model with all independent variables and constant is 795.801, which is less than the $-2ln\ L$ for the model containing only a constant (3776.3248). Results also show that the value of ρ is 0.79 and an adjusted of it is equal to 0.78. From table 5.4 for classification it is observed that of the disabled who have acquired disability, 92.7% are correctly classified and of the disabled who have congenital disability, 98.4% are correctly classified. Overall, 95.6 % of the disabled are correctly classified. This indicates that the model fits the data very well

Table 5.4: Classification table for acquired disability for stepwise method.

Observed	Predicted		Percent correct
	Acquired	Congenital	
Acquired	1223	97	**92.7%**
Congenital	22	1384	**98.4 %**
Overall 95.6 %			

6 . CONCLUSION AND SUMMARY

The complexity in modern age with all its technological and industrial development in various fields has led to the increase of disability phenomenon.

The main object of the present study is to identify the demographic and socio-economic factors which have an effect on the acquired disability. The quantitative variables included in the analysis directly while some of the qualitative variables included in the analysis as dummy variables.

In order to achieve our aim of the present study the logistic regression analysis used to develop a model describes the relation between the demographic and socio-economic factors and the acquired disability. The analytical results revealed that:

The stepwise forward logistic regression method is also used to develop a model for acquired disability and the analysis reveals that:

1. The age of disabled has positive effect on acquired disability. This means that the disabled with increasing in the age are more subject to be affected by acquired disability.
2. The acquired disability increases as duration of disability decreases.
3. The cause of disability is acquired if the place of disability occurrence is house, road or agrarian-pastoral area.

4. The acquired disability increases among paralytics and it is also increases among blind people. The paresis disability is associated with increase of acquired disability and acquired disability increases among disabled people who have mental retardation.
5. The single disabled are more likely to have acquired disability. It is also revealed in the analysis that the variables sex, education level, family income, area, condition of residence, type of residence, deafness, muteness, and amputation disability do not have significant effect on acquired disability.

Finally, we can summarize the results of this study as follows: the age of disabled has a significant effect acquired disability, mental retardation, paralysis disability and paresis disability. In general, disability focuses on the age group 14-64 and the average of disabled age is about 34.92, this result is approximately similar to that of Hola (1998). Disability is prevailed more among males than females. This result agreed with HS, Algeria (1994) and HS, Libya (1997). The variable marital status also has a significant effect on acquired disability. It can be said that illiteracy spreads among disabled people and the percentage of single disabled is higher. This result agreed with Hola's (1998). Duration of disability has a significant effect on acquired disability. In general, percentage of disability in urban areas is more than rural areas. This result agreed with that of HS, Libya (1997) whereas differs from Nawar's (1981

There is also a significant association between disability causes and type of disability as well as between disability causes and area. However, there is no association between causes of disability and sex. This result agreed with Nawar's (1981).

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