

PREDICTING DEMOGRAPHIC AND SOCIO-ECONOMIC FACTORS OF MORBIDITY: AN APPLICATION OF LOGISTIC REGRESSION MODEL

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Abstract

In this paper an attempt has been made to trace the demographic and socio-economic factors of morbidity and to assess the prevalence of multi-morbidity among the elderly persons in a particular area. To meet these objectives binary multiple logistic regression model has been adopted. In addition basic statistical tools have also been employed to study the morbidity pattern in the study area. The most common morbidities in the study area were High Blood Pressure, Arthritis, Cataract, Diabetes, Loss of teeth, and Alzheimer. No significant differences in occurrence of multi-morbidities had been noticed with respect to sex. Overall prevalence of multi-morbidity was found to be 80percent. Logistic regression model showed that sex, residential status, education and cigarette smoking were the most important predictors of multi-morbidity. The analyses have been carried out using statistical software SPSS.

Keywords: Elderly, Morbidity, Logistic regression Model.

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1. Introduction:

Population world-wide is increasing. Improvement in life-expectancy and decline in birth rate are resulting in a big change in the population age structure. Projection says that one billion elderly persons (*i.e* ≥ 65 years) will live in the world by the year 2020, 71 percent of whom will live in less economically developed countries (Solomons et al., 2001). Ministry of Social Justice (MSJE) illustrated that number of people in India will increase in the elderly age group (*i.e* 60 and above) to 198 million by 2030 (MSJE, 2008). From morbidity sense, in our country at least 50 percent of the elderly persons have continual morbidities (Bhatt et al., 2001).

Prevalence of continual adverse health conditions is now familiar among the elderly persons and it is supposed to increase (Wolff et al., 2002). Naturally, chronic morbidities will build up with ageing and present as numerous morbidities. Multi-morbidity is termed as concurrent occurrence of numerous adverse health situations in the same person (Van Dan et al., 2006). In Europe (Van Dan et al., 2008), Australia (Britt et al., 2008), and also in the United States (Guralnik, 1996) the prevalence of multi-morbidity has regularly been examined. Various studies have observed the circulation of multi-morbidity among the elderly persons in developed countries (Van Dan et al., 2008, Britt et al., 2008, Guralnik, 1996) but in developing countries literature on multi-morbidity is partially available. In India, it is reported that 8.3percent of the elderly persons have more than three diseases (Joshi et al., 2003). Another study reported that the number of chronic morbidities per persons was 2.77 in average among the elderly persons of rural India (Purty, 2006). A study conducted in China depicted that 21.7 percent of elderly persons suffer at least two diseases and 15.9 percent suffer three or more diseases (Zhou, 2011).

2. Objectives:

The objectives of this paper are to assess the prevalence of multi-morbidity among the elderly persons of Jorhat district, Assam and also to examine the demographic and socio-economic factors which have some effect on multi-morbidity.

3. Material and Methods:

A cross sectional study using multi-stage random sampling procedure was conducted among the elderly persons (60 years and above) in Jorhat district, Assam during

December 2017 to March 2018. According to census report 2011, the number of persons belong to age 60 and above is 6.7 percent in Assam against national figure of 8.6 percent. Again, in this context among 35 states and Union Territories of the country the state stood in the sixth position from the below. It indicates morbid condition in the state is not up to the mark. So, considering the homogeneity in the population structure with respect to the factors under study Jorhat district is considered purposively. As proper sampling technique has been adopted to select the study subjects the findings may be generalized.

The study comprised of 400 elderly persons from both rural and urban settings. Since the primary objective of this study is to determine the prevalence of morbidity among the study subjects and other objectives are related to it, the sample size formula developed by Cochran (1963) for large populations has been adopted and the formula for the same is given by -

$$n = \frac{z^2 pq}{e^2}$$

Where, z is the abscissa of the normal curve that cuts off an area at the tails. The z value contains the area under the normal curve. $(1 - \alpha)$ is the desired confidence level which is 95 percent for our case, p is the proportion of elderly persons having some morbid condition which is 43 percent (NSSO, 2006) and

$q = 1 - p$, $e = 0.05$ is the level of precision, it is also known as sampling error.

The rural group consisted of 234 elderly persons (male: 132, female: 102) and the urban group consisted of 166 (male: 78, female: 88)

The pre-designed and pre-tested questionnaire was used to collect data. The questionnaire included information on demographic, socio-economic and some life style habits such as consuming tobacco, drinking alcohol and smoking cigarette.

4. Study variables:

(i) Dependent Variable:

Here we have taken morbidity as dependent variable. To determine the occurrence of morbidity, all respondents were asked if he or she had any of the following ailments viz, High Blood Pressure (Hypertension), Diabetes, any type of Heart Disease, Arthritis, Cataract, Asthma, Dementia, Alzheimer, Stroke or Thrombosis, Osteoporosis, Renal or urinary infection, Cancer, Liver or Gall bladder disease, Loss of teeth, Dermatology or Skin disease, Paralysis, Accidental injury, Fall injury, Asthma and Bronchitis. To determine the occurrence of morbidities all these morbidities were assessed as in International Classification of Diseases (ICD-10)

For descriptive analysis, occurrence of morbidity is divided into four groups. They are-

a) Elderly persons having no morbidity, b) Elderly persons having one morbidity, c) Elderly persons having two morbidities and d) Elderly persons having three or more morbidities.

For binary logistic regression, elderly person having one or no morbidity is taken as '0' and multi-morbidity (having two or more morbidities) is as '1'.

(ii) Independent Variables:

Independent variables are chosen from existing theoretical framework (Banjare et al., 2014) as well as observations of the researchers. The new variables incorporated considering their importance under study are - residential status, financial status (as socio-economic factors), and consuming alcohol (as life style habits).

So, different demographic, socio-economic factors and some life style habits taken as independent variables are -

(a) Demographic factors- Age, Sex, Marital status.

Here age is divided into four groups viz.,(i) 60-64, (ii) 65-69, (iii) 70-74 and (iv)75 and above. Sex is divided into two groups viz,(i) male and (ii) female. Marital status is

divided into five groups namely (i) married (ii) unmarried (ii) widow (iii) widower (iv) divorcee.

(b) Socio-economic factors –Education, residential status, and financial status.

Education is divided into four categories, viz.(i) illiterate (ii) Primary (iii) middle (iv) HSLC (v) HS (vi) Degree and above. Residential status is divided into two groups-(i) rural (ii) urban. Financial status is divided into two groups namely (i) financially independent (ii) financially dependent.

(c) Life style habits

In this study we have considered some factors which have the elevated risk of morbidity. International Agency for Research on Cancer in 2007 expressed that smokeless tobacco is common in India, Pakistan and Bangladesh. Accort et al., (2002) concluded that use of tobacco as well as smokeless tobacco leads to chronic heart disease. The risk factors we have considered here are as follows—i) smoking cigarette (yes-1, No- 0),ii) consuming alcohol (yes-1, No- 0), iii) chewing tobacco ((yes-1, No- 0)

5. Statistical Analysis:

Here a descriptive analysis is administered to assess the socio-economic discrepancies in the occurrence of multi-morbidity. Next, binary multiple logistic regression model is applied to work out the factors responsible for the prevalence of multi-morbidity among the elderly persons of the study area. Logistic regression is employed to estimate a dependent variable based on the independents. Logistic regression applies maximum likelihood estimation after transforming the dependent into a logit variable. So, logistic regression estimates the probability of certain event whether occurring or not.

The binary multiple logistic model adopted here is:

$$\ln\left(\frac{p}{1-p}\right) = \alpha + \beta_1x_1 + \beta_2x_2 + \beta_3x_3 + \dots \dots \dots \beta_ix_i + e$$

Where p ($y = 1$) is the probability of occurrence of multi-morbidity; $\beta_1, \beta_2, \beta_3, \dots, \beta_i$ are the beta coefficients; $x_1, x_2, x_3, \dots, x_i$ refers to the independent variables and e is the error term.

The survey data was analyzed using descriptive and logistic regression analysis. The chi-square test of Independence of Attributes has been used to study the association between morbidity and different characteristics such as demographic, socio-economic and some life style habits. $P < 0.05$ or < 0.01 testified the result significant. SPSS software was used for analysis of data.

6. Results and Analysis:

Table 1: Socio –economic and demographic characteristics of the elderly population of the study area

| Variables | Total respondents (N) | percentage |
|--------------------|-----------------------|------------|
| Residential status | | |
| Rural | 234 | 58.5 |
| Urban | 166 | 41.5 |
| Sex | | |
| Male | 210 | 52.5 |
| Female | 190 | 47.5 |
| Age | | |
| 60-64 | 176 | 44.0 |
| 65-69 | 107 | 26.8 |
| 70-74 | 80 | 20.0 |
| 75 and above | 37 | 9.2 |
| Marital status | | |
| With partner | 249 | 62.2 |
| Without partner | 151 | 37.8 |
| Caste | | |
| General | 251 | 62.8 |
| OBC/MOBC | 128 | 32.0 |
| SC/ST | 21 | 5.2 |
| Education | | |
| Illiterate | 29 | 7.2 |
| Primary | 38 | 9.5 |
| Middle | 63 | 15.7 |
| HSLC | 96 | 24.0 |
| HS | 55 | 13.8 |
| Degree and above | 119 | 29.8 |
| Religion | | |
| Hindu | 331 | 82.7 |
| Muslim | 42 | 10.5 |
| Sikh/Jain | 27 | 6.8 |
| Economic status | | |
| Low | 95 | 23.8 |
| Medium | 273 | 68.2 |
| high | 32 | 8.0 |
| Financial status | | |
| Independent | 260 | 65.0 |
| Dependent | 140 | 35.0 |
| Total | 400 | 100.00 |

Table 1 shows the sample feature of the elderly population of the study area. Out of a sample of 400 elderly persons 210 (52.7 percent) are male and 190 (47.5 percent) were females. In case of age structure 60-64 age group comprises of 44.0 percent elderly persons followed by the age group 65-69 with 26.8percent and 70-74 age group with 20.0percent. 9.2percent elderly belongs to the age group 75 and above. The community with partner comprises of 62.2 percent and without partner comprises of 37.8 percent in case of marital status. In case of educational status degree and above completed was found to be 29.8 percent followed by HSLC completed with 24.0 percent, Middle completed with 15.7 percent, H.S completed with 13.8percent and primary completed with 9.5 percent. Illiteracy rate was found to be 7.2 percent. In case of economic status only 8.0 percent belongs to high economic status, followed by 23.8 percent in Low and 68.2 percent belongs to medium economic status. While examining caste composition General caste have highest share with 62.8 percent, followed by OBC/ MOBC with 32.0 percent and SC/ST have 5.2 percent only.

Table 2: Sex wise prevalence of morbidities among the elderly persons of the study area

| Sl.no. | Chronic morbidities | Total respondents | Male respondents | Female respondents | p-value |
|--------|----------------------------|-------------------|------------------|--------------------|---------|
| | | (in percentage) | (in percentage) | (in percentage) | |
| 1 | High Blood Pressure | 56.0 | 57.2 | 54.7 | > 0.05 |
| 2 | cataract | 50.2 | 46.2 | 54.7 | > 0.05 |
| 3 | Arthritis | 48.0 | 45.2 | 51.1 | > 0.05 |
| 4 | Alzheimer | 35.2 | 32.4 | 38.4 | > 0.05 |
| 5 | Diabetes | 35.0 | 37.1 | 32.6 | > 0.05 |
| 6 | Loss of teeth | 30.8 | 28.6 | 33.2 | > 0.05 |
| 7 | Osteoporosis | 20.0 | 17.6 | 22.6 | > 0.05 |
| 8 | Heart disease | 16.2 | 16.2 | 16.3 | > 0.05 |
| 9 | Fall injury | 16.0 | 14.8 | 17.4 | > 0.05 |
| 10 | Asthma | 15.5 | 14.8 | 16.3 | > 0.05 |
| 11 | Skin disease | 14.5 | 11.9 | 17.4 | > 0.05 |
| 12 | Renal or urinary infection | 13.8 | 13.3 | 14.2 | > 0.05 |
| 13 | liver or gall bladder | 10.5 | 11.0 | 10.0 | > 0.05 |
| 14 | Depression | 7.8 | 8.1 | 7.4 | > 0.05 |
| 15 | Bronchitis | 7.0 | 7.1 | 6.8 | > 0.05 |
| 16 | Stroke | 6.2 | 6.7 | 5.8 | > 0.05 |
| 17 | Accidental injury | 5.8 | 4.8 | 6.8 | > 0.05 |
| 18 | Cancer | 5.2 | 4.8 | 5.8 | > 0.05 |
| 19 | Dementia | 4.0 | 1.4 | 6.8 | * |
| 20 | paralysis | 3.8 | 3.3 | 4.2 | > 0.05 |

*significant at 1 percent level.

P-values are based on chi-square test of Independence of Attributes as explained in the methodology.

The table 2 shows the prevalence of morbidities among the elderly persons of the study area. The elderly respondents were asked if they had been suffering any morbidity listed above which was diagnosed by a physician. Medical reports, doctor's prescriptions were also verified during the period of interview. It depicts from the table that the most common disorders were High Blood Pressure (HBP) (56.0 percent), cataract (50.2 percent), Arthritis (48.0 percent), followed by Alzheimer (35.2 percent) and Diabetes (35.0 percent). Dementia was significantly higher among the females than males ($p < 0.01$). High Blood Pressure and Diabetes were high among the male elderly than their female counterparts. Cataract, Arthritis, Alzheimer, Loss of teeth, skin disease and urinary infection were more among the female elderly than their male counterparts. Khokhar et al., (2001) found a high prevalence of Arthritis among the females in their studies. This reflects that women suffer the tough days by doing household works without rest.

Table 3: Residential area wise Prevalence of morbidities with respect to sex among the elderly persons of the study area

| Chronic morbidities | Total male respondents (in percentage) | | | Total female respondent (in percentaeg) | | |
|--------------------------------|---|-------|---------|--|-------|---------|
| | Rural | urban | p-value | Rural | Urban | p-value |
| Arthritis, Rheumatism | 34.8 | 62.8 | * | 36.3 | 62.8 | * |
| Stroke or thrombosis | 2.3 | 14.2 | * | 1.0 | 14.1 | * |
| Heart disease | 8.3 | 29.5 | * | 8.8 | 29.5 | * |
| diabetes | 31.1 | 47.4 | ** | 14.7 | 47.4 | * |
| Any lung disease or Bronchitis | 4.5 | 11.5 | > 0.05 | 2.0 | 11.5 | * |
| Asthma | 8.3 | 25.6 | * | 10.8 | 25.6 | ** |
| Depression | 4.5 | 14.1 | * | 4.9 | 14.1 | > 0.05 |
| High blood pressure | 40.2 | 82.1 | * | 35.3 | 82.1 | * |
| Alzheimer | 31.1 | 34.6 | > 0.05 | 35.3 | 34.6 | > 0.05 |
| Cancer | 3.0 | 7.7 | ** | 2.0 | 7.7 | ** |
| Dementia | - | 3.8 | ** | - | 3.8 | * |
| Liver or gall bladder | 9.1 | 14.1 | > 0.05 | 2.9 | 14.1 | * |
| Osteoporosis | 12.1 | 26.9 | * | 15.7 | 26.9 | * |
| Renal or urinary infections | 3.0 | 30.8 | * | 2.0 | 30.8 | * |
| cataract | 37.9 | 60.3 | * | 52.9 | 60.3 | > 0.05 |
| Loss of all natural teeth | 15.2 | 50.3 | * | 25.5 | 51.3 | > 0.05 |
| Accidental injury | 5.3 | 3.8 | > 0.05 | 7.8 | 3.8 | > 0.05 |
| Injury due to fall | 6.1 | 29.5 | * | 11.8 | 29.5 | > 0.05 |
| Skin disease | 6.1 | 21.8 | * | 11.8 | 21.8 | > 0.05 |
| paralysis | - | 10.3 | * | - | 9.0 | * |

*significant at 1 percent level. **significant at 5 percent level

P-values are based on chi-square test of Independence of Attributes as explained in the methodology.

Table 3 depicts that prevalence of Arthritis, Stroke, Heart disease; Diabetes, Asthma, Depression, High Blood Pressure, Cancer, Dementia, Osteoporosis, Renal or Urinary infection and Paralysis are significantly high among the urban elderly. Again, prevalence of Cataract, Loss of teeth, fall injury, and skin disease are significantly high among the urban male elderly than their rural counterparts. Occurrence of accidental injury is high among the rural female elderly than their urban counterparts though the difference is insignificant.

Fig.1 Sex wise prevalence of morbidities among the elderly persons

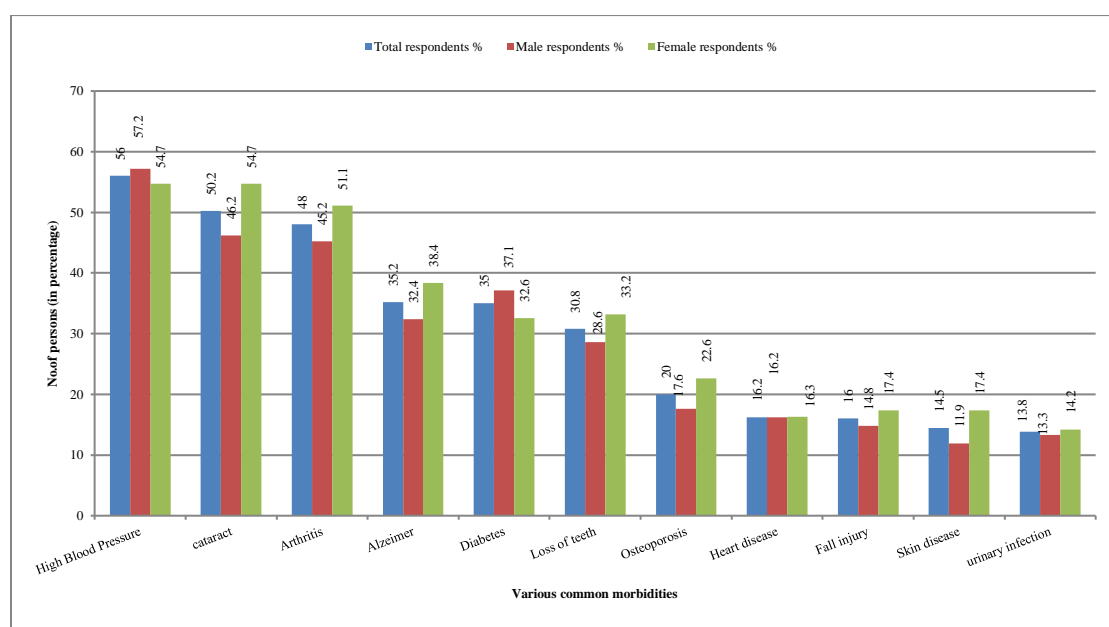


Fig.1 shows that the most common disorders among the elderly persons of the study area were High Blood Pressure, Cataract, Arthritis followed By Alzheimer, Diabetes, Loss of

Teeth, Osteoporosis, Heart disease, HBP and Diabetes were high among the male elderly. Similarly some diseases namely Cataract, Arthritis, Alzheimer etc. were found to be more among the female elderly than their male counterparts.

Fig.2 Prevalence of multiple chronic morbidities

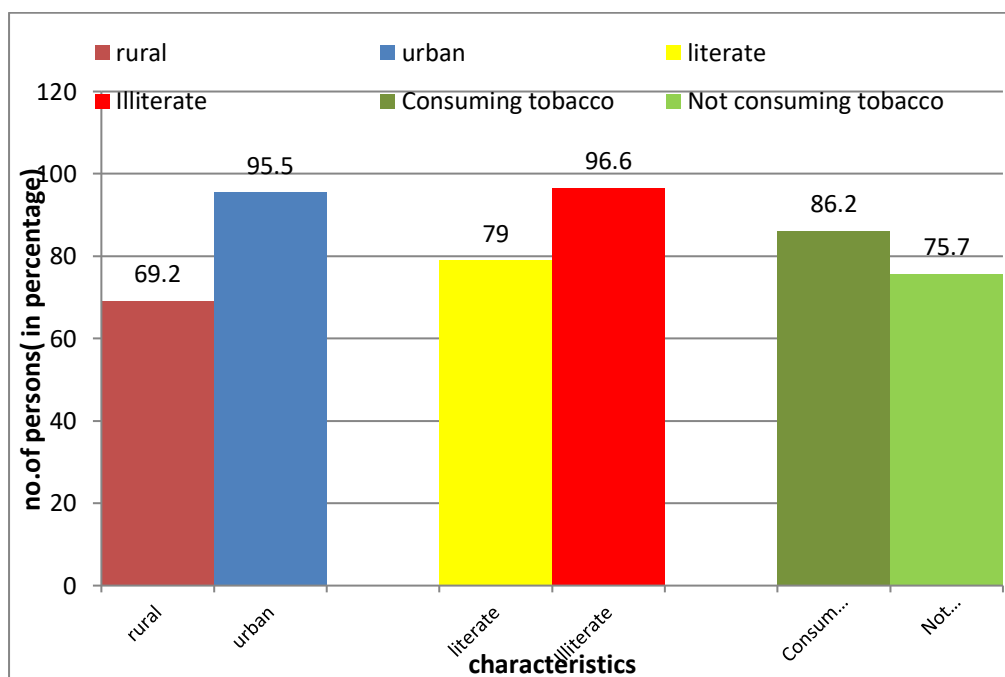


Fig 2 shows prevalence of multiple chronic morbidities among the elderly persons. Prevalence of multi morbidity was not significant in case of age and sex, but it is significantly high among urban elderly, among the illiterate elderly, and among those elderly who consumed tobacco.

Table 4: Age wise prevalence of multi-morbidity of the study population

| No. of chronic morbidity | Age group | | | | | | | | Total |
|--------------------------|----------------------|------------------------|----------------------|------------------------|----------------------|------------------------|----------------------|------------------------|-------|
| | 60-64 | | 65-69 | | 70-74 | | 75 and above | | |
| | Male (in percentage) | Female (in percentage) | Male(in percentage) | Female (in percentage) | Male (in percentage) | Female(in percentage) | Male (in percentage) | Female (in percentage) | |
| No morbidity | 9.5 | 4.9 | 3.9 | 0.0 | 5.3 | 2.4 | 0.0 | 0.0 | 4.5 |
| One morbidity | 16.2 | 21.6 | 11.7 | 10.0 | 10.5 | 7.1 | 23.8 | 18.7 | 15.2 |
| Two morbidity | 17.6 | 10.8 | 13.0 | 13.3 | 7.9 | 4.8 | 4.8 | 12.5 | 11.5 |
| Three or more morbidity | 56.8 | 62.7 | 71.4 | 76.7 | 76.3 | 85.7 | 71.4 | 68.8 | 68.8 |

Table 4 shows prevalence of multi-morbidity by age groups (60-64, 65-69, 70-74, and 75+) and sex according to the number of adverse medical conditions. The rate of prevalence of multi-morbidity gradually increases in the elderly persons in upper age groups. Sex wise multi-morbidity was not significant. About 95.0 percent elderly had at least one morbidity. Overall multi-morbidity was found to be 80.3 percent.

Table 5: Association of various demographic, socio-economic and life style habits with multi-morbidity

| Characteristics | Total respondent | | Multimorbidity | | | | p-value |
|---------------------|------------------|------------|----------------|------------|------|------------|---------|
| | n=400 | percentage | yes | | No | | |
| | | | n=321 | percentage | n=79 | percentage | |
| Age-group(in years) | | | | | | | |
| 60-69 | 283 | 70.8 | 221 | 78.1 | 62 | 21.7 | >0.05 |
| 70 and above | 117 | 29.2 | 100 | 85.5 | 17 | 14.5 | |
| Sex | | | | | | | |
| Male | 210 | 52.5 | 169 | 80.5 | 41 | 19.5 | >0.05 |
| Female | 190 | 47.5 | 152 | 80.0 | 38 | 20.0 | |
| Residential status | | | | | | | |
| Rural | 234 | 58.5 | 162 | 69.2 | 72 | 30.8 | * |
| Urban | 166 | 41.5 | 159 | 95.5 | 07 | 4.2 | |
| Marital status | | | | | | | |
| With partner | 249 | 62.2 | 198 | 79.5 | 51 | 21.5 | >0.05 |
| Without partner | 151 | 37.8 | 123 | 81.5 | 28 | 18.5 | |
| Education | | | | | | | |
| Literate | 371 | 92.8 | 295 | 79.0 | 78 | 21.0 | ** |
| Illiterate | 29 | 7.2 | 26 | 96.6 | 01 | 3.4 | |
| Financial status | | | | | | | |
| Independent | 260 | 65.0 | 211 | 81.2 | 49 | 18.8 | >0.05 |
| Dependent | 140 | 35.0 | 110 | 78.6 | 30 | 21.4 | |
| Consuming tobacco | | | | | | | |
| Yes | 174 | 43.5 | 150 | 86.2 | 24 | 13.8 | * |
| No | 226 | 56.5 | 171 | 75.7 | 55 | 24.3 | |
| Smoking cigarette | | | | | | | |
| Yes | 23 | 5.8 | 17 | 73.9 | 06 | 26.1 | >0.05 |
| No | 377 | 94.2 | 304 | 80.6 | 73 | 19.4 | |
| Drinking alcohol | | | | | | | |
| Yes | 27 | 6.8 | 23 | 85.2 | 04 | 14.8 | >0.05 |
| No | 373 | 93.2 | 298 | 79.9 | 75 | 20.1 | |

*significant at 1percent level. P-values are based on chi-square test of Independence of Attributes as explained in the methodology.

**significant at 5percent level

Table 5 shows that about 80.3 percent elderly had multiple chronic morbidities. P-value testifies that prevalence of multiple chronic morbidities significantly higher among the urban elderly than the rural elderly, among the illiterates and among those who consumed tobacco. Prevalence of multi morbidity was not significant in case of age and sex.

Table 6: Multi-morbidity results from Logistic Regression Analysis

| characteristics | Unadjusted OR(95percent CI) | | | p-value | Adjusted OR(95percent CI) | p-value |
|---|-----------------------------|------------------------------|----------------------------|---------|------------------------------|---------|
| Age-group(in years) 60-69 70 and above | 1.00 0.612(0.336-1.116) | | | 0.612 | 1.00 0.582(0.306-1.107) | >0.05 |
| Sex Male Female | 1.00 1.060 (0.623-1.803) | | | 0.830 | 1.00 1.598(0.828-3.084) | >0.05 |
| Marital status With partner Without partner | 1.00 0.953(0.541-1.677) | | | 0.953 | 1.00 0.88 (0.479-1.645) | >0.05 |
| Residential status Rural Urban | | 1.00 10.281(4.509-23.438) | | <0.000 | 1.00 11.295(4.827-26.431) | * |
| Education Literate Illiterate | | 1.00 2.038(0.893-4.651) | | 0.091 | 1.00 2.075(0.870-4.950) | >0.05 |
| Financial status Independent Dependent | | 1.00 0.670(0.382-1.175) | | 0.162 | 1.00 0.544(0.282-1.048) | >0.05 |
| Consuming tobacco No yes | | | 1.00 1.971(1.160-3.349) | <0.012 | 1.00 1.822(1.033-3.215) | ** |
| Smoking cigarette No Yes. | | | 1.00 1.552(0.566-4.253) | 0.393 | 1.00 1.950(0.650-5.856) | >0.05 |
| Drinking alcohol No Yes | | | 1.00 0.722(0.228-2.294) | 0.722 | 1.00 0.787(1.033-3.215) | >0.05 |

*significant at 1 percent level. **significant at 5 percent level.

P-values are based on chi-square test of Independence of Attributes as explained in the methodology.

Table 6 presents the outcome of Logistic regression. Among the demographic variables age, sex, marital status have marginal effect on the prevalence of multi-morbidity. The occurrence of multi-morbidity increases steadily in females than males. The odds ratio (OR) of occurrence of multi-morbidity is about 1.598 (CI: 0.828-3.084) times higher for females than males.

Among the socio-economic variables only the residential status has significant effect on multi-morbidity. The occurrence of multi-morbidity is significantly higher among the urban elderly than their rural counterparts. The Odds Ratio of multi-morbidity occurrence is 10.281(4.509-23.438) times higher for the urban elderly compared to their rural

counterparts. The Odds Ratio of multi-morbidity is about 2.038(0.893-4.651) times higher for illiterate elderly than literate elderly though it is insignificant. Financial status has a marginal impact on multi-morbidity.

Among the life style habits consuming tobacco has a significant effect on multi-morbidity. The elderly persons consuming tobacco about 1.97 times more prone to morbidity than those who do not consume tobacco at all. Smoking cigarette has some effect on multi-morbidity but not significant. Drinking alcohol has marginal impact on multi-morbidity.

Finally, all variables are included to assess the adjusted effect of various demographic, socio-economic and life style habits co-variates on multi-morbidity. Even after controlling all the covariates residential status and consuming tobacco have retained their significant effect on the prevalence of multi-morbidity.

7. Discussion:

The overall prevalence of multi-morbidity was found to be about 80.0percent among the elderly persons of Jorhat district, Assam which is found to be high compared to other studies in India (Banjare et al., 2014, Charlson et al., 1987, Guralnik, 1996, Purty et al., 2006, Rana et al., 2009). From the studies of some other countries recommend that the prevalence of multi-morbidity was 53.8percent in Bangladesh (Khanam et al., 2011), 55percent in Swedish elderly (Merengoni et al., 2008), Australia (Brit, et al., 2008) and 65percent in North America (Guralnik, 1996). This differential may be due to the measure or meaning of multi-morbidity. In our study we found that among the elderly persons high blood pressure, cataract, arthritis, Alzheimer and diabetes were the most common adverse health condition. Arthritis and high blood pressure were found to be most common conditions in other studies too (Merengoni et al., 2008, Khanam et al., 2011). Our study depicts that 56.0percent of the elderly persons are suffering from High Blood Pressure or Hypertension. Studies from Karnataka and Kolkata have also accounted that prevalence of High Blood Pressure was about 30.5percent (By Y et al., 2010) and 40.5percent (Chinnakali et al., 2012).The variation in prevalence levels may be due to diverse environmental factors and may be due to variations in nutritional pattern. Cataract is one of the significant morbidities present in the elderly population in the study area i.e 50.2percent. Cataract is found to be more common in females than their male counterparts. Study from Odisha have also found cataract as an important morbidities

among rural elderly (18.70percent) and its prevalence is more in females compared to the male counterparts (Banjare et al., 2014). The occurrence of multi-morbidity may be high due to increased contact to ultraviolet rays during long hours of work in open fields (Angra et al., 1997). Again eighty percent of loss of sight is due to cataract alone (Mohon et al., 1992).

8. Conclusion:

The overall prevalence of multi-morbidity was about 80.3 percent among the elderly persons of Jorhat district. No significant differences in multi-morbidities had been noticed with respect to sex. We found that High Blood Pressure, Cataract, Arthritis, Alzei mer, and Diabetes were the most common health conditions, similar to other studies (Marengoni et al., 2008). The Prevalence of cataract, arthritis and Alzheimer was higher among the females while High Blood Pressure, Diabetes were higher among the males. The high prevalence of morbidity viewed in this study that there is an urgent need to develop elderly health care services in Assam. Most of the developing countries like India are least prepared to meet the challenges of societies with rapid increase in ageing population (WHO, 2004). The WHO has recently taken initiatives towards elderly-friendly primary health care and has developed “Age-Friendly Primary Health Care Centers Toolkit” aiming at improving the primary health care responses to elderly persons. Effort should be made to educate primary health care workers as regards the particular wants of their elderly patrons, and guidance should be provided to formulate primary health care management procedures more approachable and pleasant to the desires of elderly persons (WHO, 2004).

Since multi-morbidity may cause significant cognitive and functional consequences, researcher and policy makers should work together to develop effective intervention strategies and programs to decrease the burden of multi-morbidity. Additionally, health care model should be developed to meet the needs of elderly people with multi-morbidity in India.

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