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A MULTIPLE LINEAR REGRESSION ANALYSIS ON TOTAL COST INCURRED FOR THE TREATMENT AMONG ALCOHOL PATIENTS IN COIMBATORE

Article Particulars

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Health is the Greatest Gift, Contentment the Greatest Wealth, Faithfulness the Best Relationship
– Buddha

Abstract

Alcohol is one of the causes of morbidity and mortality around the world. This paper examines a multiple linear regression analysis on total cost incurred for the treatment among alcohol patients in Coimbatore. A survey method was adopted to collect data from 486 participants using interview schedule. Multiple linear regression models were used to analyze the data. The result showed that cost has increased significantly (at different levels) with an increase in the sample respondents' educational status, monthly income, total value of income from all sources and number of health problems from which they suffered.

Keywords: *Alcohol, Multiple linear regression, health problems, medical care, Indirect Costs, primary-care*

Introduction

The cost of illness is dependent on many variables. These include the type of disease, the number and severity of complications as well as the demographic characteristics of the study population. In a heterogeneous society like India, with great disparity in earning, access to medical care, as well as, differing quality of care, it is

very crucial that all factors are taken into account to get the correct picture. The lack of medical records makes it even more difficult to carry out such studies (Kapur, A.,2001). Direct economic costs of disease are those generated by the resources used in treating or coping with a disease, including expenditure for medical care and the treatment of the illness (hospital care, physician services, nursing home care, drugs and other medical needs). These direct costs are often easily measured by surveys and studies. Recently, researchers have also advocated the inclusion of direct non-medical costs, including the transportation costs of patients and costs of care-giving by family members (Sam K. G.et al.,2009).

Review of Literature

Table 1 Studies of Alcohol use in India
- Combined populations (urban, rural, etc.,)

Author	Year	Place	Urban/ rural	Sample size	Screening instruments	Crude rate (%)	Remarks
Gururaj et al	2006a	Bangalore	Combined population	28507	Study specific questionnaire	13	Alcohol users in Urban, Rural, Town and Slum
Gururaj, et al	2004a	Bangalore	Combined population	10168	Structured questionnaire	9	Alcohol users in Urban, Rural, Town and Slum population
Varma et al	1980	Punjab	Combined population	1,031	Structured questionnaire	23.7	Urban and rural
Dube and Handa	1971	Uttar Pradesh	Rural	16,275	2 Stage interview	2.3	Alcohol and drug abuse
Thacore et al	1975	Lucknow	Combined population	2,696	prepared schedule	19	Urban and rural habitual excessive drinking

Directs Costs

Direct costs to individuals and their families include medical care, drugs, and other supplies. Patients may also have to bear other personal costs, such as increased payments for health, life and automobile insurance. Direct costs to the healthcare sector includes hospital services, physician services, and lab tests for the treatment. Costs range from relatively low – cost Items, such as primary-care consultations and hospital outpatient episodes, to very high-cost items, such as long hospital inpatient stays for the treatment of complications.

Indirect Costs (Costs of Lost Production)

A number of patients may not be able to continue working or work as effectively as they could before the onset of their condition. Sickness, absence, disability, depression can cause loss of productivity. This includes the loss of earnings from morbidity (i.e. time

taken by otherwise economically active individuals to treat their condition), and disability associated with disease, treatment and its complications.

Area of the Study

Although studies have been conducted to assess Alcoholics and its risk factor burden in many regions of India, the data was not compiled together. Understanding this problem the researcher planned to conduct her survey in Coimbatore city. This city has a multi-cultural society, most of cosmopolitan nature. Its inhabitants are largely conservative and traditional, retaining their roots in their native villages. It is a Municipal Corporation as well as the District Headquarters. The city has numerous hospitals. Apart from the Government hospital, several multi-facility hospitals function in the city. The district health department is amongst the best in terms of implementing government-initiated health schemes. Also, several rare surgical procedures have taken place here. The city also has numerous homeopathic clinics run by Non-Governmental Organizations. Fast pace of industrialization, spiraling population and the increase in the health awareness have led to the growth of the healthcare industry in Coimbatore. The city stands second to Chennai in the Tamilnadu State for highly affordable and quality healthcare deliveries of international standards. Coimbatore is also the preferred health care destination for the floating population from nearby towns, districts and also nearby districts of Kerala. The growth of the hospitals in the city can be attributed to the vision of the industrialists here to bridge the gap between growing health needs and the existing services. Many of the private hospitals in the city are promoted by industrialists as an extension of their business portfolio and their service to society.

Multiple Regression Technique

Multiple regression technique is the most commonly used technique to assess the net effects of a number of explanatory variables on a dependent variable measured on a ratio scale (Walpole, 1974).

The basic model in the linear form (Multiple Linear Regression) is $\mathbf{Y=\beta_0+\sum \beta_i X_i +e}$ where, 'Y' is the dependent variable, 'Xi' are the explanatory variables, 'β_0' is the constant term , 'β_i' are the regression coefficients, and 'e' is the error term . It is assumed that the error terms are uncorrelated and homoscedastic. The R2 value, that is, square of the multiple regression coefficients, indicates the proportion of variation in Y collectively explained by the explanatory variables. The regression coefficient β_i measures the effect of variable xi on Y controlled for the effects of other variables. An increase of one unit in variable xi is expected to bring about an increase of β_i units in Y. Thus, the predicted values of Y can be computed. Tests for the regression coefficients can be easily performed: the commonly used measures t-test is based on the assumption of normality.

Table 1 Resultse of Multiple Linear Regression Analysis on Total Cost Incurred for Treatment of Alcohol Related Health Problems

Explanatory Variables	Standardized Coefficient (ß)	t-value	p-value
Age (in Years)	-0.010	-0.224	0.823
Educational Status (7 Categories)	0.106	2.154	**0.05**
Monthly Income (in Rs.)	0.171	3.568	**0.001**
Total Value of Income from All Sources (in Rs.)	0.104	2.290	**0.05**
Alcohol Related Health Problems (Actual Nos.)	0.151	3.462	**0.001**
Nativity (Ref. Rural) Urban	-0.101	-2.257	**0.05**
Migration Status (Ref: *Migrated*) Not-migrated	0.117	2.697	**0.01**
Debt Position (Ref: *No Debts*) Have Debts	0.146	3.186	**0.01**
R^2 (in %)	**14.2**		
Total Sample	**486**		

Determinants of Total Cost Incurred for Treatment of Alcohol Related Health Problems

In view of the discussion stated above, an attempt is made here to analyze the principal determinants of total cost incurred for the treatment of alcoholic ill-health (problems) with the help of a multivariate technique. The dependent variable, total cost incurred for treatment of alcoholic related health problems, treated here as a continuous variable in nature (i.e., actual amount spent in Indian Rupees) and hence, multiple linear regression analysis is felt to be the most appropriate. The independent (explanatory) variables considered for analysis are based on the theoretical importance as well as their levels of significance with the dependent variable (except the age and educational status). Out of the 8 variable included in the model, 5 are continuous in nature and the other 3 are dummy variable type (2 categories only – for details see Table 1). More details about the multiple regression analysis are provided in the chapter on Methodology. Results based on multivariable analysis are provided in Table 1.

Data provided in Table 1 highlights that, among the total sample respondents, all the eight variables included in the model together have explained about 14.2 percent variation in total cost incurred for the treatment alcoholic related health problems. Controlling for all the variables included in the model, the total const incurred for treatment related alcoholic health problems of the respondents tend to increase significantly with an increase in their monthly income as well as with the total number of health problems from which they suffered ($p<0.001$ and $p<0.001$, respectively). Thus, the results indicate that, on the one side, the tendency to spend more and more money for the treatment of health problems is higher as their monthly income increasing ($\beta=0.171$), mainly due to accessibility and affordability of monetary resources. Likewise, it is pertinent to note that respondents are tend to incur large sum

amount of money for the treatment of alcoholic health problems with an increase in the number of health problems from which they suffered (β=0.151). Such finding is obvious because of the need and human tendency to take treatment at the earliest for one or the other diseases, even with more amounts of money either from their personal income and/or money raised from different sources and/or borrowed from others.

Another striking finding noticed here is that the total cost for the treatment related to alcoholic health problems is observed to be fairly increasing with an increase in the their educational status, but the results are turned out as moderately significant (β=0.106; p<0.05). This is finding is also on the expected lines in the sense that as the level of education increases, respondents will have better knowledge to take sophisticated treatment even by paying large sums of money and further, those who have higher education are likely to be placed in better positioned jobs and thereby, earning higher amounts of money so as to have the affordability to take treatment. Yet another major finding of this analysis is the positive net effect of total value of money raised from all sources for treatment on their cost of treatment. This finding is moderately significant (β=0.104; p<0.05) and thus, suggesting that respondents are able to spend comparatively higher amounts of money for treatment of alcoholic related health problems by pooling money from different sources.

Among the role of categorized variables on the cost incurred for treatment, it is conspicuous to note that the net positive effect of non-migrant status on the total cost spent for the treatment of alcoholic ill-health is significantly high (ß= 0.117; p<0.01) and thus, specify that respondents who are residing in the city of Coimbatore are spending lot of money for treatment for alcoholic ill-health as compared those who migrated to the Coimbatore and its surroundings. Another noticeable fact here is that those who have debt showed a higher tendency to spend higher amount for the treatment of alcoholic related health problems as compared to those who didn't have such debt, and this finding is also turned out as statistically highly significant (ß=0.146; p<0.01). Yet another interesting finding noticed here is that the sum of money spent for the treatment of alcoholic ill-health is reasonably much lower among those who born and brought up in urban areas than those whose nativity is rural areas and this finding also emerged as moderately significant (ß=-0.101; p<0.05). Finally, the amount of money spent for the alcoholic ill-health appears to be decreasing with an increase in their current age (ß=-0.010), but the t-test results didn't turned out significant.

Conclusion

In sum, the multiple regression analysis results on the total cost incurred for treatment of health problems among alcoholic respondents revealed that such cost has increased significantly (at different levels) with an increase in the sample respondents' educational status, monthly income, total value of income from all

sources and number of health problems from which they suffered. Likewise, it is also conspicuous to note that the total cost incurred for the treatment of alcoholic ill-health (significant at different levels) is higher among those who have not migrated to Coimbatore city and who have debts than their respective counterparts. Conversely, such cost is lower among those respondents who born and brought up in urban areas as against to those whose nativity is rural areas. Current age percent has exhibited somewhat positive net effect on the total cost for treatment, but the t-test results turned out as insignificant.

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