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MCA techniques on health awareness among the Bodo Women of Udalguri District, Assam

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Abstract---According to WHO report, “Health is a state of complete physical, mental and social well-being and not merely the absence of disease or infinity”, [1]. Consequently further developing health status of everything is a piece of population control program. Besides health status can improve or fall apart dependent on the attitudes and activities taken towards health. In demographic analysis, we come across some interesting problems which involve simultaneous consideration of several predictor variables to study their relationships with a dependent variable. Sometimes we are interested to know how well all the variables taken together explain variation in the dependent variable and also how each predictor variable is related to the dependent variable. In this paper, an endeavor has been made to examine the health status among the respondents of Bodo women of Udalguri District, Assam using "Multiple Classification Analysis, MCA". In fact, MCA is a technique for examining the inter-relationship between several predictor variables and dependent variables within the context of additive model. It may be easily explained as multiple regressions with dummy variables and ‘adjusted derivatives’ along with ‘unadjusted effects’. The effect of various foundation qualities, for example, – caste-residence compound status, educational status, family structure, economic condition and essential control of the families on health awareness has been concentrated in this paper.

Keywords---Demographic Analysis, Bodo Women, Health Awareness, MCA Techniques, Multiple Regressions etc.

Introduction

The two important demographic parameters: mortality and fertility depend on health. Therefore improving health status of all is a part of population control programme. Moreover health status can be improved or deteriorated based on the

attitude and activities taken towards health. Again health is such an asset which can be more acquired by awareness. The definitions of some of the related terms with the issue of health awareness these are – 1) Disease and injury 2) Impairment 3) Handicap 4) Health.

Rengaraju and Satyakumar (1994)[2] have developed MCA tables for trip production in India. They considered family size, vehicle proprietorship and family income as the variable affecting trip productions. The MCA considering two variables a time from family interview data with information is used as an option in contrast to the trip rate or regression analysis. This brought about benefits like direct applicability of family interview data with information that mirrors the impact of socio-economic characteristics of trip makers at the family level.

Rengaraju and Satyakumar (1995)[2,3] later extended out this method to a third dimension by adding a variable for travel attitude and trip length in addition to the socio-economic characteristics like family size, vehicle possession and family income, which were considered in the original category analysis. A framework of statistical modelling to predict the MCA table cells with meager or no information dependent on the leftover cells is introduced. A MCA, considering all the significant variables, would reflect the interrelationship between all the variables simultaneously. Bhowmik and Islam (2016)[4] portray that to rank the indicators, huge indicators with need file are need to distinguish. For the distinguishing proof of huge indicators Multiple Classification Analysis (MCA) is applied in this examination. The principle objective of the investigation is to discover the socio-demographic determinants of childhood mortality at neonatal, post-neonatal and post-newborn child period by fitting Linear Regression model just as to rank those through Multiple Classification Analysis. This investigation shows that MCA analysis can also be applied without Linear Regression Analysis to detect determinants with rank which help the approach producers taking drives on a need premise. Justin S. Chang et.al. (2014)[5] Studied the trip generation models by various strategies and analyze their outcomes. This paper plan to look at the performance of different trip generation models. Six unique models are talk about in this paper are Regression, Cross classification, ordered Logit, Multiple Classification Analysis and Tobit, Poisson. The locally established work trips from Seoul metropolitan region are utilized to develop trip generation models by every one of the six methods. The Multiple Classification Analysis shows a better result out of six methods.

Ravi Gadepalli et.al.(2013)[6] Developed an excursion creation model by Multiple Classification Analysis (MCA) and Regression Analysis. They have ordered families in two class dependent on income group namely slum (low income) and non-slum household. They have accepted 4226 household as a sample size in which 3,468 non-slum and 758 slum household are considered. They have used MCA table to develop Nomograms which can be used for the estimation of trip rate for different urban communities with comparative socioeconomic characteristics. Regression and MCA models are compared for the distinctive situation. R^2 (Coefficient of determination) worth of a model is considered for the proportion of rightness of the model. Difference of accuracy of prediction is under 5% in every one of the circumstances shows that for given information, the two procedures give comparable outcomes. Taking into account that the qualities from MCA are more

steady after some time than the coefficients of the regression analysis. MCA can be closed to be a more suitable technique for foreseeing trip creation rates in the Indian setting due their resemblance in trip rate prediction and usability for specialists. Henrik Lolte (2008)[7] present that Social researchers often analyse the effects of categorical variables on a dependent, interval scaled variable. Here he introduced that it is simple and conceivable to pick a lot fulfilling method for such circumstance, to be specific "Multiple Classification Analysis (MCA)" using ANOVA in SPSS. He has taken one model in which he used linear regression with dummy variable and multiple classification analysis method. Result got from the models shown that MCA has some extremely helpful qualities. The standardized effect measures for this variable are all the more naturally conceivable.

Cristian Angelo Guevara et.al (2007)[8] describe that "Multiple Classification Analysis" strategy most widely utilized in transport designing with a scarcely conceivable supposition. They have used four MCA model-MCA_SM1 and MCA_SM2 which are describe by (Stopher and McDonald, 1983), MCA method for linear ordinary least square and MCA technique for basic normal by class. For the comparison of Various MCA moves toward genuine information from Santiago utilized in Monte Carlo simulation. Analysis also shows that the MCA technique most extensively used to appraise Other Home Based trips, it should be rejected on the grounds that it is upheld by a supposition with exceptionally low probability of exercise in real world. As far as exactness and hypothetical premise the MCA with direct standard least square and MCA with basic normal by class techniques are clearly better than the past ones. The choice of technique will rely upon the case examined, a choice that can be tried genuinely. MCA method which is more fiery to the design of the underlying model, is the simple calculation of trip rates as averages for each category. Peter r. Stopher and Kathie g. McDonald (1983) [9] used Multiple Classification Analysis (MCA) method first time in transportation planning. Paper described the MCA system and its benefits as far as statistical assessment, capacity to allow correlations among elective models and absence of vulnerability to little examples in individual cells-are discussed in detail. Study show that MCA overcomes the limitation of cross-classification model. This method permits statistical based variable determination for the cross classification model. Second, the technique gives a genuinely strong methodology to estimating cell means, which reduces the inborn inconstancy of rates registered from various size tests of families and is equipped for giving appraisals to certain cells where information might be deficient in the base informational collection. Third, there are good ness-of-fit statistics from these means in the process that license more explicit correlations with be made, acceptable theory testing methodology to be followed, and results to be surveyed as far as the measure of the changeability of the reliant variable that is caught in the model.

Omran (1971)[10], Olshansky et.al (1986)[11], Ian (1999)[12], Scot et.al. (2000)[13], Deodhar et.al (2001)[14] and Baruah P. (2007)[15] has been discuss the effect of different factors on health awareness. In this present paper, the main objective has been made to study the health awareness among the inhabitants of study area using Multiple Classification Analysis (MCA) techniques.

Data Collection and Methodology: Data Collection

To meet the objectives of the study, sample survey has been conducted. The data required for the study were primary in nature. Simple Random Sampling has been adopted for the collection of data. A schedule was prepared incorporating question regarding the information required from ST (Bodo Tribe), SC, MOBC, OBC and General caste. The information were collected 1594 (n=1594) sample from respondents of the study area (Udalguri District, Assam).

Methodology

The method of "Multiple Classification Analysis (MCA)" has been employed in this study. Additionally, perceptions have been made using basic tabulation of averages of proportion percentages of health expenditure per family with respect to different background characteristics. A concise conversation on the method for "Multiple Classification Analysis (MCA)" has been made in the accompanying passages. MCA is a method for examining the interrelationship between several predictor variables and dependent variables within the context of additive model. It could be effortlessly clarified as multiple regressions with dummy variables. If one looks more closely to MCA, it is an ordinary regression analysis using dummy variables. The form of the statistical model applied here is:

$$E_i = \beta_0 + \beta_{11}C_{1i} + \beta_{12}C_{2i} + \beta_{21}Q_{1i} + \beta_{22}Q_{2i} + \beta_{23}Q_{3i} + \beta_{24}Q_{4i} + \beta_3F_i + \beta_4O_i + \beta_5S_i + \epsilon_i,$$

where β 's are the regression coefficients and ϵ_i is the error term with usual consideration. For the analysis purpose, health awareness has been measured by average health expenditure per family because health is such an asset which can be more acquired by awareness and expenditure on health definitely gives an idea regarding health awareness, health expenditure is an important issue for planning population policy. Similarly, the educational attainment of the family has been measured by highest education of the married women in the family and so on. The table-2.1 explains the variables along with their types, indicators and codes used in the model. The unadjusted effects of different predictors on the response variable are derived by regression of response variable on predictors separately. For example, if we take the first predictor caste-residence compound status, the regression equation is:

$$E_i = \beta_0 + \beta_{11}C_{1i} + \beta_{12}C_{2i} + \epsilon_i$$

From the above equation one can easily find the expressions for different categories of predictors by setting (C_{1i}, C_{2i}) alternatively to (0,0), (1,0), (0,1) in the equation. Hence the mean health expenditure among the three caste-residence compound status categories is:

Table-2.1
Variables, Types, Indicator and Codes

Background Characteristics	Variables	Type	Indicator	Codes
	SC and M.O.B.C. (C _{1i})	Independent (binary variable)	If caste-residence compound status of the family is SC and MOBC	1
			Otherwise	0
	General and O.B.C. (C _{2i})	Independent (binary variable)	If caste-residence compound status of the family is general and OBC	1
			Otherwise	0
Occupation	Primary occupation of the family (O _i)	Independent (binary variable)	Non farming	1
			Farming	0
Family structure	Family structure (F _i)	Independent (binary variable)	Nucleus	1
			Joint	0
Education attainment	LP (Q _{1i})	Independent (binary variable)	If highest education of the female of the family is LP	1
			Otherwise	0
	ME (Q _{2i})	Independent (binary variable)	If highest education of the female of the family is ME	1
			Otherwise	0
	HSLC (Q _{3i})	Independent (binary variable)	If highest education of the female of the family is HSLC	1
			Otherwise	0
	Above HSLC (Q _{4i})	Independent (binary variable)	If highest education of the female of the family is above HSLC	1
			Otherwise	0

Table-2.2
Variables, Types, Indicators and Codes

Background Characteristics	Variables	Type	Indicator	Codes
Economic status of the family	Economic status of the family (S _i)	Independent (binary variable)	If economic status of the family is above poverty line (APL)	1
			Otherwise	0

Health Awareness	Monthly Health expenditure (E_i)	Independent (binary variable)	Monthly health expenditure of the family (in Rs.)	1
			Otherwise	0

Inhabitants of Bodo areas : β_0
 SC and MOBC : $\beta_0 + \beta_{11}$
 General caste and OBC : $\beta_0 + \beta_{11} + \beta_{12}$

On the other hand, in order to calculate the adjusted values of health expenditure for different categories of predictor variables, formula is derived from all the predictor variables. In the present case, the formulae for adjusted values of health expenditure for categories of caste-residence compound status are obtained by setting (C_{1i} , C_{2i}) alternatively to (0, 0), (1,0), (0,1) in the equation (as in the unadjusted case).

$$E_i = \beta_0 + \beta_{11}C_{1i} + \beta_{12}C_{2i} + \beta_{21}\overline{Q_1} + \beta_{22}\overline{Q_2} + \beta_{23}\overline{Q_3} + \beta_{24}\overline{Q_4} + \beta_3\overline{F_3} + \beta_4\overline{O_4} + \beta_5\overline{S_5} + \epsilon_i$$

$\overline{Q_4}$, $\overline{S_5}$ etc. are constants taken as their mean values in the entire sample. On the other hand, average of proportion percentage of health expenditure per family has been computed as- $(\sum P_i)/k$, where k is numbers of family, P_i is the proportion percentage of health expenditure to total expenditure of the i^{th} family i.e. P_i is (health expenditure of the i^{th} family/total expenditure of the i^{th} family) $\times 100$.

Results and Discussion

The average proportion percentages of health expenditure per family with respect to different background characteristics, caste-religion compound status, occupation, family structure, economic status and educational attainment (indicated by highest education of the females in the family) have been depicted through table-3.1

Table-3.1
 Average Proportion Percentage of Health Expenditures per Family as for Different Background Characteristics

Background Characteristics		Average proportion percentage
Caste-religion compound status	General caste and OBC	3.34
	SC and MOBC	2.86
	Inhabitants of Bodo areas	2.89
Occupation of family	Non farming	4.61
	Farming	3.43
Economic status	APL	1.42
	BPL	1.55
Education attainment	Above HSLC	7.95
	HSLC	8.65
	ME	4.81
	LP	4.12
	Illiterate	2.01

The average proportion percentage of health expenditure per family for inhabitants of Bodo areas has been observed lowest in comparison to General caste and OBC. But the average proportion percentage of health expenditure per family for inhabitants of Bodo areas has been observed highest in comparison to SC and MOBC. This average proportion percentage of health expenditure per family has been noticed highest for General caste and OBC. Hence inhabitants of Bodo areas of Udalguri District might be considered as average health aware. As mentioned above, health awareness plays role on fertility and the inhabitants of Bodo areas of Udalguri District have been seen average health aware, it is nothing wrong for them to exercise average fertility. The average proportion percentage of health expenditure per family for non-farming primary occupation families has been observed more than that for farming primary occupation families i.e. the non-farming primary occupation families may be considered as more health aware than farming primary occupation families. Regarding family structure and average proportion percentage of health expenditure per family it can be said that joint families have been less health aware than nucleus families, since average proportion percentage of health expenditure per families are product of modernization. The average proportion percentage of health expenditure for Above Poverty Line (APL) has been observed more than that for Below Poverty Line (BPL) families, which is not unusual, because people would think about their health only when they are not hungry, otherwise they would think about the meal. But literacy status has been found to be more dominant than educational attainment since average proportion percentage of health expenditure has been lower for families where all the families have been illiterate than families where at least one of the female has been literate. Now let us consider the findings based on MCA technique, which have been presented in table-3.2

Table: 3.2
Average Monthly Health Expenditure (in Rs.)

Background characteristics	Background characteristics	Total case	Unadjusted	Adjusted
Caste-residence compound status	Inhabitants of Bodo area	1067	60.05	79.41
	SC/MOBC	315	52.47	78.22
	General caste/OBC	212	98.67	80.12
Educational attainments	Illiterate	560	44.49	73.52
	LP	280	115.25	65.22
	ME	250	99.65	57.77
	HSLC	294	127.15	62.35
	Above HSLC	210	125.33	54.44
Economic status	BPL	520	22.24	21.18
	APL	774	121.17	123.43
Family structure	Joint	915	47.89	71.23
	Nucleus	682	64.56	53.43
Occupation	Farming	987	55.24	57.55
	Non farming	607	89.12	69.42

$R^2 = 0.93222$

From the table-3.2, it has been observed that in unadjusted case i.e. when impact of other variables is eliminated than inhabitants of Bodo areas of Udalguri District have been observed average aware of health (being the average expenditure on health average for them) followed by SC and MOBC, followed by General and OBC. A similar interpretation can be made for adjusted case i.e. when the impact of other variables on health awareness is eliminated then also inhabitants of Bodo areas have been average aware followed by SC and MOBC, followed by General caste and OBC. Thus as the inhabitants of Bodo areas have been seen average health aware, so it is nothing wrong for them to exercise medium fertility. Regarding the role of educational attainment, in unadjusted case the findings have supported the universal phenomenon- "education brings all round development" sine these findings have revealed that higher is the educational attainment higher is the health expenditure. But interestingly for adjusted case the findings have contradicted the universal phenomenon the reason of this unexpected findings has been best accounted in the interpretation of findings.

Now let us consider economic status of the family. Improving economic condition people can be made more health aware and as such the economic condition of most of the inhabitants of Bodo areas of Udalguri District average, so they are average health aware and so they might practice medium fertility. Family structure is another important factor regarding different demographic characteristics, so let us now consider impact of family structure on health awareness and from the findings it can be said that health awareness has been more among the families of nucleus structure than those of joint structure, which is also not unexpected since nucleus families are product of modernization and so they are advanced.

Conclusion

The impact of different background characteristics such as caste-residence compound status, educational attainment, family structure, economic condition and primary occupation of the families on health awareness has been studied in this paper. The health awareness has been measured by health expenditure of the families. The inhabitants of Bodo areas of Udalguri District have been noticed average health aware in comparison to SC and MOBC or General caste and OBC, so it is nothing wrong for the inhabitants of Bodo people to exercise medium fertility resulting in their average growth. The medium fertility might be the reason of their average population growth. Therefore by making them more health conscious for their average growth can be checked, which is the urgent need of the people.

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