ISSN:0975-9646

Use of Tobacco in India and the Influencing Factors: An Analysis on National Family and Health Survey Data (NFHS-III)

M.Mamatha [1],V.Nageswara Rao[2]

[1]*Research Scholar in Statistics, Kakatiya university, Warangal*
[2]*Department of Statistics, Kakatiya university, Warangal*

Abstract- *Objective*: **In the present study an attempt has been made to study the use of tobacco and the social, economic and the environmental factors that influence it.**
Method of the solution: **The data are cross tabulated and chi-square test and Multinomial logistic regression are used for the analysis of the data. Factor analysis is used to identify group of variables that share the variance to reduce the number of factors and multi-dimensional scaling is used to visualize high dimensional data in to considerably low dimensions.**
Principal findings: **In India smokeless tobacco consumption dominates the smoke tobacco products. Consumption of all types of the tobacco products (smoke and smokeless) is considerably large in rural than to the urban and in the age between 30-49.There exists association between highest education level and consumption of the tobacco products hence indicating the uneducated are more prone to this habit. Chewing of paan masala is almost equally seen in even educated and uneducated people. Hindus being largest population of India stays in the top in consumption of all tobacco products and Muslims being the second largest population has more number of the paan masala and the ghutka consumers than to the Christians. The most of poorest and the poorer are the users of all types of the tobacco and most of the middle wealth indexed people are paan masala chewers. Respondent's occupation is also associated with the consumption of tobacco where the most of the not-working and agricultural employees addicted to tobacco products. More number of people who are never married and currently married has the habit of smoking of all tobacco products. Regular newspaper /magazines readers and television viewers have lower likelihood of tobacco use whereas going to cinema once in a month has negative impact on smoking of cigarettes/bidis.**
Key words: ***use of smokeless and smoke tobacco, social factors, economic factors and the environmental factors, India.***

1 INTRODUCTION

India is the second largest consumer of tobacco products in the world in spite of the advances in public health campaigns complemented with tobacco control laws. Nearly 900, 000 people die every year in India due to diseases attributed to tobacco. Along with the smoking of cigarettes, bidis, pipes, cigars the smokeless tobacco products like pan masala, ghutka and the traditional forms like betel quid, tobacco with lime and tobacco tooth powder are commonly used and the use of new products is increasing, not only among men but also among children, teenagers, women of reproductive age and students in India. Tobacco use causes several types of cancers, heart diseases and lung diseases which effect on nearly every organ of the body. Direct medical costs of treating tobacco related diseases in India amounted to $907 million for smoked tobacco and $285 million for smokeless tobacco .Knowledge of the health consequences of tobacco use has led to much greater reductions in tobacco use in developed than in developing countries.

In India, tobacco consumption is responsible for half of all the cancers in men and a quarter of all cancers in women, in addition to being a risk factor for cardiovascular lung diseases. India also has one of the highest rates of oral cancer in the world, partly attributed to high prevalence of tobacco chewing. Forms of smoke tobacco include cigarette/bidis, pipes/ cigars and smokeless tobacco include chewing of paan masala, ghutka and the other chewing tobacco includes betel quid, tobacco with lime and tobacco tooth powder and others. The social factors include age in 5 –year group(between15-49), type of place of residence, religion and marital status, the economic factors include wealth index, highest education level, respondents occupation and environmental factor include frequency of reading newspaper, frequency of listening to radio, frequency of watching television, watching movies once in a month.

2 DATA SOURCE AND METHODS

Data was analyzed using SPSS software .The database for the present article is from the NFHS-III (2005-2006). The NFHS surveys were conducted by the Ministry of health And Family Welfare and International Institute for Population Sciences (IIPS), Mumbai as the nodal agency.
The data was analyzed by using the following tests.

1) Chi-square test: To find the association between the variables.

2) Multinomial logistic regression: Linear regression is not appropriate for situations in which there is no natural ordering to the values of the dependent variable. In such cases, multinomial logistic regression may be the best alternative.

For a dependent variable with K categories, consider the existence of K unobserved continuous variables, Z_1, ... Z_K, each of which can be thought of as the "propensity toward" a category. In the case of a packaged goods company, Z_k represents a customer's propensity toward selecting the k^{th}

product, with larger values of Z_k corresponding to greater probabilities of choosing that product (assuming all other Z's remain the same).

Mathematically, the relationship between the Z's and the probability of a particular outcome is described in this formula.

$$\pi_{ik} = \frac{e^{z}_{ik}}{e^{z}_{i1}+e^{z}_{i2}.....e^{z}_{ik}}$$

Where

π_{ik} is the probability the i^{th} case falls in category k

z_{ik} is the value of the k^{th} unobserved continuous variable for the i^{th} case

Z_k is also assumed to be linearly related to the predictors.

$$z_{ik}=b_{k0}+b_{k1}x_{i1}+b_{k2}x_{i2}+...+b_{kJ}x_{iJ}$$

Where

x_{ij} is the j^{th} predictor for the i^{th} case

b_{kj} is the j^{th} coefficient for the k^{th} unobserved variable

j is the number of predictors

3) Factor analysis: Used for Data Reduction where the principal components method of extraction begins by finding a linear combination of variables (a component) that accounts for as much variation in the original variables as possible. It then finds another component that accounts for as much of the remaining variation as possible and is uncorrelated with the previous component, continuing in this way until there are as many components as original variables. Usually, a few components will account for most of the variation, and these components can be used to replace the original variables. This method is most often used to reduce the number of variables in the data file.

Kaiser-Meyer-Olkin: The Kaiser-Meyer-Olkin measure of sampling adequacy tests whether the partial correlations among variables are small. It should be >0.5 for the adequacy of the sample size for application of the test.

Bartlett's test of Sphericity: Bartlett's test of sphericity tests whether the correlation matrix is an identity matrix, which would indicate that the factor model is inappropriate.

4) Multi-dimensional scaling: The goal of multidimensional scaling is to find a representation of the objects in a low-dimensional space. This solution is found by using the proximities between the objects. The procedure minimizes the squared deviations between the original, possibly transformed, object proximities and their Euclidean distances in the low-dimensional space. is used to visualize high dimensional data in to considerable low dimensions.

Stress The degree of correspondence between the distances among points implied by MDS map and the matrix input by the user is measured (inversely) by a *stress* function. The general form of these functions is as follows:

$$\sqrt{\frac{\sum\sum (f(x_{ij})-d_{ij})^2}{scale}}$$

In the equation, d_{ij} refers to the Euclidean distance, across all dimensions, between points *i* and *j* on the map, $f(x_{ij})$ is some function of the input data, and *scale* refers to a constant scaling factor, used to keep stress values between 0 and 1. When the MDS map perfectly reproduces the input data, $f(x_{ij}) - d_{ij}$ is for all *i* and *j*, so stress is zero. Thus, the smaller the stress, the better the representation.

Here "Kruskal Stress", "Stress Formula 1" or just "Stress 1". The formula is:

$$\sqrt{\frac{\sum\sum (f(x_{ij})-d_{ij})^2}{\sum\sum d_{ij}^2}}$$

3 DATA SOURCE AND METHODS

Out of a sample of 256568 considered for the analysis it is found that 2.9% of the total population smoke cigarettes/bidis, 0.3% smoke pipe/cigar, 4.2% chew paan masala, 2.4% chew ghutka and 9.8% chew other tobacco .When the type of place of residence is considered the consumption of all types of the tobacco are considerably large in rural than to the urban. The age between15-49 is made in to seven equal groups which shows that the use of the all the tobacco products is more in the age between30-49. To know the association between the highest education and the use of tobacco the four groups of the education are considered and they are no educated, primary, secondary and higher which has shown that the uneducated people stay in the first position in smoking of the all types of tobacco than to the others. Chewing of paan masala is almost equally seen in even educated and uneducated people. The different religions are compared to know the tobacco consumption which shows that Hindus being more populated stays in the first in the use of all the types of tobacco. Muslims being the second largest population has more number of the paan masala and the ghutka consumers than to the Christians, whereas the smokers of cigarettes/bidis, pipe/cigar and other chewing tobacco are more in Christians than to Muslims. To know about the association between the wealth index and use of tobacco the wealth index has been divided in to the poorest, poorer, middle, richer, richest and it is observed that significantly more number of the poorest and the poorer are the users of all types of the tobacco and most of the middle wealth indexed people are paan masala chewers. When we consider the occupation, India has more than 50% of the population who are not working. People who are not working and the agricultural employees have considerably largest number of people who use all types of tobacco, It is also observed that the people in the occupation Prof., Tech., Manag. also has the users of all types of tobacco.

If the use of tobacco in the different states of the India is considered, Utter Pradesh stays in the first with 18% and Mizoram stays in the second with 16.3% and Bihar stays in the third with 11.7% of the total percentage of the cigarette/bidi smokers. Out of the sample Karnataka, Kerala and Himachal Pradesh are free from cigarette /bidi smokers. The smokers of pipe/cigars are considerably low in all the states of the country. When the chewing of paan masala is considered Nagaland, Manipur and Tripura stay

in first three positions and Tamilnadu, Punjab, Himachal Pradesh are free from paan masala users. Because of the ban on ghutka many states found free from ghutka eaters, whereas Orissa, Utter Pradesh, Manipur are in top of ghutka consumption. Users of other chewing tobacco are more in the Mizoram and Manipur. To check the relation between the use of tobacco and marital status we found that 24.3% of the never married, 73.4% of the currently married, 1.1% of the widowed, 0.3% of divorced, 0.5%of the separated people have the habit of smoking the cigarettes/ bidis. If smoking of the pipe/cigars is considered 27.9% of the never married, 69.2% of the currently married, 0.9% of widowed, 1.4% of the divorced, 0.3% of separated people have this habit. When chewing of the paan masala is considered 33.9% of the never married, 64.4% of the currently married, 0.6% of widowed, 0.4% of the divorced, 0.4% of separated people has this habit. If ghutka eaters are considered 39.5% of the never married, 58.2% of the currently married, 0.8% of widowed, 0.2% of the divorced, 0.4% of separated people has this habit. If uses of other chewable tobacco products are considered 23.8% of the never married, 73.6% of the currently married, 1.2% of widowed, 0.3% of the divorced, 0.5% of separated people has this habit. The highest percentages of the currently married smoke cigarettes/bidis, never married eat ghutka, widowed use other chewable tobacco products, divorced smoke pipe/cigars, separated smoke cigarettes/bidis and other chewable tobacco products. On the whole we can make the conclusion that more number of people who are never married and currently married has the habit of smoking of all tobacco products.

Mass media marketing of tobacco products through direct advertising, as well as through product placement in cultural and entertainment events, has been linked to increased tobacco use and at the same time Anti-tobacco mass media campaigns have also been shown to be effective at reducing smoking rates and increasing the perceived harm from smoking hence to know the impact of mass media on the use of tobacco on this data, first smoking of cigarette/bidis is considered which had shown that 4.3% of the people who smoke cigarette /bidis neither watch television, nor listen to radio or read newspaper at all. Majority of the People who do not read newspaper are found to be smokers of cigarettes/bidis, by which we can make a conclusion that majority of the illiterates are bound to be the smokers of cigarette/bidis. People who watch television and listen to radio regularly found very less number of the smokers of cigarettes/bidis hence indicating the positive impact of television and radio which made the people aware of the ill effects of the smoking of cigarettes/bidis. Only 1.2% of the total population who go to cinema hall once in a month have the habit of smoking the cigarette/bidis. People who go to cinema once in a month have more number of the cigarettes/bidis smokers than to the people who do not go to the cinema once in the month. Hence going to cinema once in a month has negative impact on smoking of cigarettes/bidis.

The percentage of smokers of the pipes/ cigars is very less than to all other tobacco users. Smoking of the pipes/cigars in Regular television viewers is found to be considerably less indicating positive response in creating the awareness among the people about the ill effects due to smoking of the pipes/cigars than non-television viewers. Radio and newspapers have shown no impact about the smoking of the pipes/cigars. Going to cinema hall once in a month have almost no impact on the smoking of pipe/cigar.

Chewing of the paan masala had been more in the people who do not read newspaper at all or read it less than once in a week than to who read regularly hence most of the illiterates are addicted to the paan masala because of the lack of awareness regarding the ill effects. The largest percentage of the regular listeners of radio is found to have more number of paan masala eaters indicating the influence of the radio on chewing of paan masala. The people who watch television at least once in a week and less than once in a week had more number of paan masala eaters. Only 4.0% of total of the population who watch movies once in a month have the habit of eating paan masala. People who go to cinema once in a month have less number of the paan masala eaters than to the people who do not go to the cinema once in the month. Hence going to cinema has no impact on chewing of paan masala.

When chewing of ghutka considered the highest percentage of people i.e. 2.8% of total of the population who don't read news paper /magazine at all are found to have more number of ghutka eaters indicating the most of the illiterates are ghutka eaters. The lowest percentages i.e. 2.2% and 1.8 % of the total population who do not listen to radio at all and who watch television regularly are found to have less number of the ghutka eaters which indicates television has the positive and the radio has the negative impact on the habit of ghutka eating. People who go to cinema once in a month have less number of the ghutka eaters than to the people who do not go to the cinema. Hence going to cinema has no impact on chewing of ghutka.

When the smokers of other chewable tobacco products are considered the highest percentage of people i.e10.8% of the total population who don't read newspaper /magazines at all are found to be more, hence illiterates are more addicted to this habit. The lowest percentages i.e. 9.1% and 6.4% of the total population who listen to radio almost every day and watch television everyday are found to have less number of the other chewable tobacco products eaters which indicate that radio and television are successful in creating the awareness among the people regarding the diseases caused by chewing of the other tobacco. People who go to cinema once in a month have less number of the users of other chewable tobacco than to the people who do not go to the cinema. Hence going to cinema has no impact on smokers of smoking of the chewable tobacco products.

Factor analysis is applied to reduce the total number of 11 factors affected by smoking of the cigarettes/bidis , which had shown that Kaiser-Meyer-Olkin measure of sampling adequacy is 0.712 and Bartlett's test of Sphericity is 0.00, and the test extracted 4 components which explain the 55.884% of the total variation indicating that type of place of residence, highest education level ,frequency of reading newspaper/magazines frequency of watching television and wealth index are strongly loaded on to factor 1,age 5 year

groups, highest education level, frequency of reading newspaper/magazines loaded on to factor 2,Religion and frequency of listening to radio loaded on to factor 3 and Respondents occupation and marital status loaded on to factor 4.

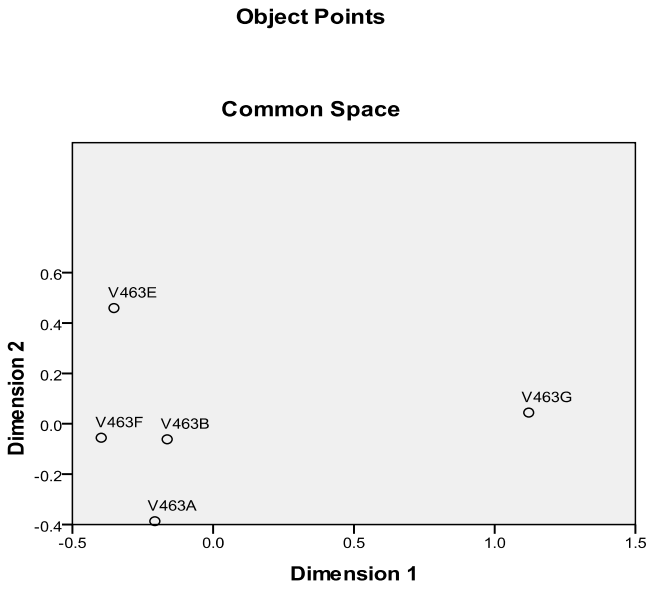
Factor analysis is applied to reduce the total number of 11 factors affected by chewing of the pipe/cigars , which had shown that Kaiser-Meyer-Olkin measure of sampling adequacy is 0.802 and Bartlett's test of Sphericity is 0.00 , and the test extracted 4 components which explain the 63.264% of the total variation indicating that type of place of residence, highest education level ,frequency of reading newspaper/magazines, frequency of listening to Radio and frequency of watching television, wealth index are strongly loaded on to factor 1,Age 5year groups and Religion loaded on to factor 2,Respondents occupation and attend cinema hall once in a month loaded on to factor 3 and type of place of residence and marital status loaded on to factor 4.

Factor analysis is applied to reduce the total number of 11 factors affected by smoking of the paan masala , which had shown that Kaiser-Meyer-Olkin measure of sampling adequacy is 0.732 and Bartlett's test of Sphericity is 0.00 , and the test extracted 4 components which explain the 56.466% of the total variation indicating that type of place of residence, highest education level ,frequency of reading newspaper/magazines, frequency of watching television, wealth index are strongly loaded on to factor 1, frequency of listening to Radio loaded on to factor 2 ,Age 5year groups, marital status loaded on to factor 3 and attend cinema hall once in a month and marital status loaded on to factor 4.

Factor analysis is applied to reduce the total number of 11 factors affected by chewing of the ghutka , which had shown that Kaiser-Meyer-Olkin measure of sampling adequacy is 0.716 and Bartlett's test of Sphericity is 0.00 , and the test extracted 4 components which explain the 57.532% of the total variation indicating that type of place of residence, highest education level , frequency of watching television, wealth index are strongly loaded on to factor 1, highest education level , Religion , frequency of reading newspaper/magazines ,frequency listening to Radio loaded on to factor 2,Marital status loaded on to factor 3 and attend cinema hall once in a month loaded on to factor 4.

Factor analysis is applied to reduce the total number of 11 factors affected by the other chewable tobacco products , which had shown that Kaiser-Meyer-Olkin measure of sampling adequacy is 0.757 and Bartlett's test of Sphericity is 0.00 , and the test extracted 4 components which explain the 57.666% of the total variation indicating that type of place of residence, highest education level , frequency of reading newspaper/magazines ,frequency of watching television, wealth index are strongly loaded on to factor 1, frequency listening to Radio, attend cinema hall once in a month loaded on to factor 2, Age 5year groups and religion loaded on to factor 3 and Respondents occupation and Marital status loaded on to factor 4.

Using multi-dimensional scaling to find the visual representation of the use of the Tobacco products the plot shown in two dimensions has stress-1 of 0.10426 and Tucker's Coefficient of Congruence of 0.99455. Where V463A (smoking of cigarettes/bidis), V463B (smoking of pipes/cigars), V463E (chewing of paan masala), V463F chewing of ghutka), V463G (chewing of other tobacco products) shows that the number of other chewing tobacco people are more and number of ghutka chewers are less on dimension-1 and paan masala chewers are more and number of cigarettes/bidi smokers are less on dimension-2. The number of other chewing tobacco people and paan masala chewers are scattered far away from the origin indicating highest percentage of the addicted to these habits and the others are clustered at one place indicating less addicted.



4 CONCLUSIONS

This study identified associations of visual, audio, and print mass media use with tobacco chewing and smoking. Even though legislation against the use of tobacco products has been intensified in India according to the present study, chewing of tobacco continues to be predominant among majority of rural population. Considering the high priority given to tackle the tobacco menace government has plan for developing certain approaches so as to achieve complete root out of this problem.

REFERENCES

[1] Jayakrishnan(2011)Community Based Smoking Cessation Intervention Trial for Rural Kerala, India Asian Pacific J Cancer Prev, 12, 3191-3195*, Vol 12, 2011*

[2] Citation: Viswanath K, Ackerson LK, Sorensen G, Gupta PC (2010) Movies and TV Influence Tobacco Use in India: Findings from a National Survey. PLoS ONE 5(6):e11365. doi:10.1371/journal.pone.0011365

[3] Gupta PC, Ray CS (2003) Smokeless tobacco and health in India and South Asia. Respirology 8: 419–431

[4] John RM, Sung HY, Max W (2009) Economic cost of tobacco use in India, 2004. Tob Control 18: 138–143.

[5] Reddy KS, Gupta PC (2004) Report on tobacco control in India Ministry of Health and Family Welfare, Government of India.