



# Frequencies of Consumption of Tobacco Products and Multinomial Logistic Regression : A Study of Metro City Ahmedabad

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ABSTRACT

**Research Objective:** To monitor and investigate frequencies of different types of tobacco consumption in adult population of metro city Ahmedabad .

**Design:** Self organized regional cross sectional population based survey.

**Data, sampling method and measures:** The multi stage sample includes 605 combusting tobacco product addicts and 882 non combusting tobacco product addicts sample subjects between 15 years to 64 years of age from population of Ahmedabad city. An un-weighted dataset is part of complex survey design and rates and ratios are calculated (estimated) with 95% confidence interval. For the evaluation of consumption frequencies of both combusting and non combusting tobacco products, different socio-demographic characteristics of respondents were selected as covariates. For the data collection a predefined and pretested questionnaire was prepared in two languages English and Gujarati.

**Statistical Analysis:** The whole statistical analysis of the collected data was carried out by means of SPSS 21.0 using multinomial logistic regression.

**Result:** Heavy frequencies of consumption of any type of tobacco products was found among respondents falling under the categories of male gender, illiterates and socially and economically backward classes .Young age , religion and occupational environments significantly affect frequencies of tobacco consumption.

**Conclusion:** Looking at present situations there is an urgency of effective tobacco control. According to present study results we can conclude that male, illiterates, poor and socially backward subgroups must be targeted for intervention trials as they have significantly higher addiction of tobacco with heavy frequency.

**KEYWORDS**

frequencies of tobacco use, Multinomial logistic regression , Odds ratio , proportions

**1. Introduction**

An effective tobacco control requires not only study of types and products of tobacco consumption because nicotine addiction varies with the frequency of tobacco consumption. Frequencies vary with type of consumption of tobacco products. To get the complete idea of hazardous effects of tobacco consumption it is essential to study how frequently tobacco addicts use tobacco products. India is a country with high tobacco consumption rates with different frequencies of use of tobacco products. Tobacco addiction is a major problem affecting public health which is of course preventable if studies properly and made known to general population. It can be considered as an evidence based interventions to decrease or remove the consumption of tobacco products because use of tobacco in any form or frequency is hazardous.

Among known studies on tobacco use, majority of the studies were done on prevalence and predictors of tobacco consumption. Very few studies from India excluding common studies of tobacco consumption in rural and urban area reported the frequencies of tobacco consumption using logistic regression as a predicting measure. Present study was conducted in Ahmedabad just to advance the level of tobacco research by identifying the frequencies of tobacco use in Ahmedabad as an application of Multinomial Logistic Regression model. Public health, biomedical, social sciences etc. are the fields in which data with categorical responses get analyzed with the use of special and advance statistical methods. Multinomial logistic regression is a widely used method in analysis of data with categorical responses. Present study aims, to determine the frequencies of use of tobacco products in adult residents of Ahmedabad as a real life application of multinomial logistic regression.

**2. Material, Methods and Data collection**

**Design of study:** It was a self organized regional cross sectional population based survey which included 605 consumers of combusting tobacco products and 882 consumers of non combusting tobacco products of age between 15 to 64

years from Ahmedabad city.

**Selection of subjects:** To select the subjects or respondents from general population of Ahmedabad city a sampling with multistage procedure is done. In First stage 6 socio-demographic characteristics were included which later divided into subgroups according to their levels and representative nature in second stage and at the end of the procedure respondents were selected randomly by balancing the gender selection and subgroup probability proportional to population size.

**Data collection:** The face to face survey was conducted to collect required data using a pretested questionnaire (prepared in English and local language Gujarati). It was given to selected subjects of age between 15 to 64 years who are residents of Ahmedabad city. An unbiased assistance was provided to those respondents who were unable to fill questionnaire at their own (e.g. illiterates, physically handicapped, blind etc.). Non responses were excluded from the sample .

**3. Statistical Analysis**

The whole statistical analysis of the collected data was carried out by means of SPSS 21.0 using multinomial logistic regression.

**3.1 Multinomial logistic regression with multiple independent variables**

3.1.1 The "logit" model for dichotomus outcomes:

For m explanatory variables

$$\text{logit}(p(Y)) = \alpha + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_m X_m ,$$

Where  $\text{logit} (p) = \ln \left( \frac{p}{1-p} \right) = \alpha + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_m X_m$

and the odds =  $\left( \frac{p}{1-p} \right)$

Or as a direct specification alternate

$$p \text{ or } \pi(x) = \frac{\exp(\alpha + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_m X_m)}{1 + \exp(\alpha + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_m X_m)}$$

( = P(Y/X= x) )

Here parameter  $\beta_i$  = effect of  $x_i$  on the log odds that Y assumes 1, controlling other  $x_i$ , for instance,  $\exp(\beta_i)$  is the multiplicative effect on the odds of a unit increase in  $x_i$ , at fixed levels of other  $x_j$ .

**3.1.2 Multinomial logistic regression model for categorical responses with more than 2 categories:**

If a sample of n independent observations are bifurcated into p explanatory variables with m categories of qualitative responses, in a multinomial case all the logits are constructed relative to a predefined single reference category( any of the category of the response variable can be considered as base level / reference category).

The multinomial logistic regression model is

$$\log\left(\frac{\pi_j(x)}{\pi_m(x)}\right) = \alpha_j + \beta_{1j} x_{1i} + \beta_{2j} x_{2i} + \dots + \beta_{mj} x_{mi}$$

where  $j=1,2,3,\dots,(m-1)$ ,  $i=1,2,3,\dots,n$

which reduces to  $\log(\pi_j(x_i)) = \frac{\exp(\alpha_{0j} + \beta_{1j} X_{1i} + \beta_{2j} X_{2i} + \dots + \beta_{mj} X_{mi})}{1 + \sum_{k=1}^{m-1} \exp(\alpha_{0k} + \beta_{1k} X_{1i} + \beta_{2k} X_{2i} + \dots + \beta_{mk} X_{mi})}$

**3.1.3 Selection of the variables**

**3.1.3.1 Response variable:** The present study focuses on the phenomenon of tobacco consumption frequency therefore it was considered as response variable with three categories coded 1,2 and 3 respectively as follows

1. Low frequency of Tobacco consumption (light chewing with 2 or less units a day)	2. Moderate frequency of Tobacco consumption (Moderate chewing with 3-10 units a day)	3. High frequency of Tobacco consumption (Heavy chewing with more than 10 units a day)
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**3.1.3.2 Reference category of the response variable:** The category high frequency with code 3 is chosen as the baseline category or reference category because it has highest frequency and due to the liberality to choose any of the category as reference category. In short the comparison will be against high tobacco consumption frequencies.

**3.1.3.3 Explanatory Variables:** The following is a detailed review of explanatory variables which we believe have an effect on responses.

Variable name	Categories	code	Variable name	Categories	code
Gender	Female	1	Occupation	Professionals	1
	Male	2		Employers	2
Age	55-64	1	Self employed workers / street vendors	Employees	3
	45-54	2		Students	4
	35-44	3		Unemployed / Unpaid workers/ Housewives	5
	25-34	4		Labourers	6
Religion	15-24	5	Level of Education	16 or more years of education	1
	Other	1		13-15 years of education	2
	Christian	2		8-12 years of education	3
	Sikh	3			

	Muslim	4		1-7 years of education	4
	Hindu	5		No education	5
Cast	Other backward Class	1	Annual Income:	10 lakhs or more	1
	Schedule tribe	2		5-9.99 lakhs	2
	Schedule cast	3		2.5-4.99 lakhs	3
	General	4		0-2.49 lakhs	4

**3.1.3.4 Verifications of assumptions and checking of explanatory variables:**

There is no violation of any assumption of MLR (Multinomial logistic regression).Our dependent variable is measured at the nominal level with multiple categories and all observations are mutually exclusive and exhaustive. There is no multi-co-linearity between independent variables. There are no outliers, high leverage values or highly influential points. The procedure of different phases of recalculated model fitting includes checking of standard errors, statistical significance of parameter estimates and goodness of fit. Explanatory variables with unusual results are excluded as per the requirement of validation.

**Table 1 Frequencies of daily consumption of combusting tobacco products in Ahmedabad**

Demographic variables	Variable name	Categories	Low frequency of Tobacco consumption (light smoking with 2 or less units a day)		Moderate frequency of Tobacco consumption (Moderate smoking with 3-10 units a day)		High frequency of Tobacco consumption (Heavy smoking with more than 10 units a day)	
			#	%	#	%	#	%
Gender	Female		21	23.1	56	61.5	14	15.4
		Male	83	16.1	170	33.1	261	50.8
Age	55-64		42	29	61	42.1	42	29
	45-54		18	14.1	43	33.6	67	52.3
	35-44		19	19.4	39	39.8	40	40.8
	25-34		13	14.4	31	34.4	46	51.1
	15-24		12	8.3	52	36.1	80	55.6
Religion	Other		0	-	10	76.9	3	23.1
	Christian		13	28.9	9	20	23	51.1
	Sikh		6	31.6	7	36.8	6	31.6
	Muslim		18	13.8	40	30.8	72	55.4
	Hindu		67	16.8	160	40.2	171	43
Cast	Other backward Class		24	18.6	39	30.2	66	51.2
	Schedule tribe		6	12.8	13	27.7	28	59.6
	Schedule cast		21	12.4	72	42.4	77	45.3
	General		53	20.5	102	39.4	104	40.2
Occupation	Professionals		21	23.6	33	37.1	35	39.3
	Employers		11	25.6	11	25.6	21	48.8
	Employees		23	17.7	45	34.6	62	47.7
	Self employed workers /street vendors		5	15.2	12	36.4	16	48.5
	Students		36	30.8	56	47.9	25	21.4
	Unemployed / Unpaid workers/ Housewives		8	11.3	38	53.5	25	35.2
	Labourers		0	-	31	25.4	91	74.6

Level of Education	16 or more years of education	30	25.2	50	42	39	32.8
	13-15 years of education	23	21.1	34	31.2	52	47.7
	8-12 years of education	34	25	54	39.7	48	35.3
	1-7 years of education	16	11.8	51	37.5	69	50.7
	No education	1	1	37	35.2	67	63.8
Annual Income:	10 lakhs or more	23	25.3	32	35.2	36	39.6
	5-9.99 lakhs	43	26.7	63	39.1	55	34.2
	2.5-4.99 lakhs	27	20.9	49	38	53	41.1
	0-2.49 lakhs	11	4.9	82	36.6	131	58.5

**Table 2 Frequencies of daily consumption of non combusting tobacco products in Ahmedabad**

Demographic variables		Low frequency of Tobacco consumption (light chewing with 2 or less units a day)		Moderate frequency of Tobacco consumption (Moderate chewing with 3-10 units a day)		High frequency of Tobacco consumption (Heavy chewing with more than 10 units a day)	
Variable name	Categories	#	%	#	%	#	%
Gender	Female	30	12.9	101	43.5	101	43.5
	Male	103	15.9	248	38.2	298	45.9
Age	55-64	54	32	68	40.2	47	27.8
	45-54	22	12.6	66	37.9	86	49.4
	35-44	19	9.9	74	38.5	99	51.6
	25-34	22	14.1	53	34	81	51.9
Religion	15-24	16	8.4	88	46.3	86	45.3
	Other	7	50	7	50	0	-
	Christian	3	12.5	11	45.8	10	41.7
	Sikh	1	16.7	2	33.3	3	50
	Muslim	20	9.1	88	40.2	111	50.7
Cast	Hindu	102	16.5	241	39	275	44.5
	Other backward Class	35	16.1	77	35.5	105	48.4
	Schedule tribe	18	25.4	25	35.2	28	39.4
	Schedule cast	34	11	131	42.4	144	36.1
Occupation	General	46	16.2	116	40.8	122	30.6
	Professionals	15	22.7	35	53	16	24.2
	Employers	4	7.7	19	36.5	29	55.8
	Employees	25	18	52	37.4	62	44.6
	Self employed workers /street vendors	17	19.8	42	48.8	27	31.4
Level of Education	Students	39	32	52	42.6	31	25.4
	Unemployed / Unpaid workers/ Housewives	8	6.7	43	36.1	68	57.1
	Labourers	25	8.4	106	35.7	166	55.9
Level of Education	16 or more years of education	22	27.5	39	48.8	19	8
	13-15 years of education	19	20.2	31	33	44	46.8
	8-12 years of education	30	21.1	56	39.4	56	39.4

	1-7 years of education	41	14.3	117	40.8	129	44.9
	No education	21	7.6	106	38.1	151	54.3
Annual Income:	10 lakhs or more	8	10	38	47.5	34	42.5
	5-9.99 lakhs	21	23.1	34	37.4	36	39.6
	2.5-4.99 lakhs	46	27.1	67	39.4	57	33.5
	0-2.49 lakhs	58	10.7	210	38.9	272	50.4

**Table 3 Analysis of association between covariates and daily frequency of consumption of combusting tobacco products of tobacco consumers of Ahmedabad (estimates of parameters according to the selected model)**

Low frequency of Tobacco consumption (light smoking with 2 or less units a day)

Demographic variables		Proportion		Odds ratio		
Variable name	Categories	#	%	O.R.	95% C.I.	
					L.B.	U.B.
Gender	Female	21	23.1	10.120*	4.322	23.699
	Male	83	16.1	1	-	-
Age	55-64	42	29	5.602*	2.488	12.612
	45-54	18	14.1	1.400	.592	3.307
	35-44	19	19.4	2.553*	1.043	6.247
	25-34	13	14.4	1.671	.648	4.306
Cast	15-24	12	8.3	1	-	-
	Other backward Class	24	18.6	.735	.382	1.413
	Schedule tribe	6	12.8	.554	.193	1.594
Level of Education	Schedule cast	21	12.4	.510*	.263	.991
	General	53	20.5	1	-	-
	16 or more years of education	30	25.2	16.989*	1.836	157.192
Annual Income:	13-15 years of education	23	21.1	8.310	.906	76.222
	8-12 years of education	34	25	14.280*	1.573	129.664
	1-7 years of education	16	11.8	7.793	.932	65.150
	No education	1	1	1	-	-
Annual Income:	10 lakhs or more	23	25.3	3.728*	1.351	10.281
	5-9.99 lakhs	43	26.7	3.863*	1.479	10.088
	2.5-4.99 lakhs	27	20.9	2.305	.859	6.181
	0-2.49 lakhs	11	4.9	1	-	-

Moderate frequency of Tobacco consumption (Moderate chewing with 3-10 units a day)

Demographic variables		Proportion		Odds ratio		
Variable name	Categories	#	%	O.R.	95% C.I.	
					L.B.	U.B.
Gender	Female	56	61.5	9.323*	4.714	18.438
	Male	170	33.1	1	-	-
Age	55-64	61	42.1	2.765*	1.516	5.044
	45-54	43	33.6	1.037	.585	1.835
	35-44	39	39.8	1.849*	.984	3.477

	25-34	31	34.4	1.137	.601	2.154
	15-24	52	36.1	1	-	-
Cast	Other backward Class	39	30.2	.504*	.295	.861
	Schedule tribe	13	27.7	.395*	.178	.876
	Schedule cast	72	42.4	.669	.409	1.093
	General	102	39.4	1	-	-
Level of Education	16 or more years of education	50	42	2.289*	.962	5.447
	13-15 years of education	34	31.2	1.015	.438	2.356
	8-12 years of education	54	39.7	1.869	.825	4.234
	1-7 years of education	51	37.5	1.173	.620	2.221
	No education	37	35.2	1	-	-
Annual Income:	10 lakhs or more	32	35.2	1.129	.532	2.395
	5-9.99 lakhs	63	39.1	1.343	.673	2.681
	2.5-4.99 lakhs	49	38	.961	.479	1.929
	0-2.49 lakhs	82	36.6	1	-	-
High frequency of Tobacco consumption (Heavy smoking with more than 10 units a day) is selected as reference category						
Note : *O.R. ,p< 0.05 and O.R.=Odds ratio, U.B. =Upper bound, L.B.=lower bound, C.I. = Confidence interval						

**Table 4 Analysis of association between covariates and daily frequency of consumption of non combusting tobacco products of tobacco consumers of Ahmedabad (estimates of parameters according to the selected model)**

Low frequency of Tobacco consumption (light smoking with 2 or less units a day)

Demographic variables		Proportion		Odds ratio		
Variable name	Categories	#	%	O.R.	95% C.I.	
					L.B.	U.B.
Gender	Female	30	12.9	2.664*	1.384	5.128
	Male	103	15.8	1	-	-
Age	55-64	54	32	3.543*	1.300	9.654
	45-54	22	12.6	1.250	.568	2.753
	35-44	19	9.9	.887	.393	1.998
	25-34	22	14.1	1.121	.509	2.469
	15-24	16	8.4	1	-	-
Cast	Other backward Class	35	16.1	.996	.560	1.773
	Schedule tribe	18	25.4	1.713	.784	3.741
	Schedule cast	34	11	.699	.387	1.261
	General	46	16.2	1	-	-
Occupation	Professionals	15	22.7	2.892	.742	11.268
	Employers	4	7.7	.904	.199	4.109
	Employees	25	17.9	1.130	.404	3.159
	Self employed workers /street vendors	17	19.8	3.870*	1.682	8.904
	Students	39	32	1.958	.647	5.931
	Unemployed / Unpaid workers/ Housewives	8	6.7	.666	.249	1.784

	Labourers	25	8.4	1	-	-
Level of Education	16 or more years of education	22	27.5	5.434*	1.629	18.127
	13-15 years of education	19	20	1.274	.458	3.542
	8-12 years of education	30	21.1	1.605	.631	4.081
	1-7 years of education	41	14.3	1.553	.756	3.191
	No education	21	7.6	1	-	-
Annual Income:	10 lakhs or more	8	10	.871	.257	2.952
	5-9.99 lakhs	21	23.1	2.223	.819	6.034
	2.5-4.99 lakhs	46	27.1	3.547*	1.579	7.967
	0-2.49 lakhs	58	10.7	1	-	-
Moderate frequency of Tobacco consumption (Moderate chewing with 3-10 units a day)						
Demographic variables		Proportion		Odds ratio		
Variable name	Categories	#	%	O.R.	95% C.I.	
					L.B.	U.B.
Gender	Female	101	43.5	1.975*	1.287	3.029
	Male	249	38.3	1	-	-
Age	55-64	68	40.2	.802	.362	1.774
	45-54	67	38.3	.735	.451	1.200
	35-44	74	38.5	.710	.442	1.141
	25-34	53	34	.520*	.318	.850
	15-24	88	46.3	1	-	-
Cast	Other backward Class	77	35.5	.868	.570	1.321
	Schedule tribe	25	35.2	1.021	.535	1.951
	Schedule cast	144	42.6	1.008	.671	1.515
	General	122	40.8	1	-	-
Occupation	Professionals	35	53	3.533*	1.317	9.480
	Employers	19	36.5	1.528	.580	4.021
	Employees	53	37.9	1.347	.679	2.670
	Self employed workers /street vendors	42	48.8	3.038*	1.681	5.490
	Students	52	42.6	2.863*	1.147	7.145
	Unemployed / Unpaid workers/ Housewives	43	36.1	.760	.453	1.273
	Labourers	106	35.7	1	-	-
Level of Education	16 or more years of education	39	48.8	2.000	.825	4.847
	13-15 years of education	32	33.7	.688	.334	1.419
	8-12 years of education	56	39.4	.904	.474	1.726
	1-7 years of education	117	40.8	1.024	.666	1.575
	No education	106	38.1	1	-	-
Annual Income:	10 lakhs or more	38	47.5	1.121	.468	2.683
	5-9.99 lakhs	34	37.4	1.046	.483	2.266
	2.5-4.99 lakhs	67	39.4	1.604	.880	2.923
	0-2.49 lakhs	211	39	1	-	-
High frequency of Tobacco consumption (Heavy smoking with more than 10 units a day) is selected as reference category						
Note : *O.R. ,p < 0.05 and O.R.=Odds ratio, U.B. =Upper bound, L.B.=lower bound, C.I. = confidence interval						

#### 4. Discussion

Present study is a statistical multi-community study of frequencies of tobacco consumption of respondents as effects of different socio-demographic predictors. According to the visible proportions of tobacco consumption frequencies of subjects of Ahmedabad, heavy frequency of smoking is more frequent in male subjects than female. Female subjects have general tendency of moderate or low smoking frequency. Young and middle aged smokers are heavy smokers and else are having moderate smoking frequency. Consumers of combusting tobacco products with less education and backward socially and economically are heavy smokers. Smokeless tobacco products have more frequent use in female respondents. Frequencies of use of smokeless tobacco products by lower cast and less educated people are comparatively high. Moderate and low frequencies of consumption of smokeless tobacco products have seen in subjects who are economically sound and highly educated. Professionals and consumers with remarkable employments are less frequent in using tobacco products of both types combusting and non combusting than street vendors, self employed workers and laborers. But these study results may not clear the picture of combined effects of set of predictors as they are individual proportions. To overcome this problem an advance statistical analysis is needed.

Like all other regressions, multinomial regression is also a predictive analysis. Multinomial logistic regression is nothing but a logistic regression to predict membership of multiple (more than 2) categories of response variable. It can be considered as a zoomed profile of simple proportionate values of frequencies of tobacco use according to their socio-demographic characteristics. Table 3 and 4 presents estimated odds ratios for frequencies of use of combusting and noncombusting tobacco products respectively using MLR model. As there are three categories of responses we have two sets of odds ratios in both tables 3 and 4 one as "Low frequency" row and another as "Moderate frequency" row. Both represent the comparison with reference category "Heavy frequency". It can be seen that some of the categories of predictors are not statistically significant (without \*). Odds ratios or  $\exp(b)$  of the dependent variables are predicted changes in odds for the unit increase in respective dependent variable. The values greater than 1, less than 1 and equal to 1 of odds ratio represent corresponding increase, decrease and no effect on response variable respectively.

#### 5. Results

Table 1 summarizes the frequencies of consumption of combusting tobacco products only in three categories of low, moderate and heavy with respect to different socio-demographic characteristics in sample of respondents of Ahmedabad city (area under Ahmedabad Municipal Corporation only). Majority of male consumers are consuming combusting tobacco products with heavy frequency whereas female consumers consume combusting tobacco products with low or moderate frequency. Respondents of young age and middle age use combusting tobacco products with heavy frequency. Frequencies of tobacco consumption get decreased with age. Almost half of the Muslims and Christians are heavily addicted of combusting tobacco products. Frequency of using combusting tobacco products decreases with increase in social or economical status and education.

Table 2 summarizes the frequencies of consumption of only non combusting tobacco products in three categories of low, moderate and heavy with respect to different socio-demographic characteristics in sample of respondents of Ahmedabad city (area under Ahmedabad Municipal Corporation only). The pattern of frequencies of consuming non combusting tobacco products by male and female consumers are almost same. Matured adults between the age of 25 to 44 years use non combusting tobacco products with heavy frequency. Muslims are heavily addicted of non combusting tobacco products. Visible changes are found in frequency of using non combusting tobacco products in social or economical status, education and occupational environment.

Table 3 summarizes the output of procedure of multinomial logistic regression of frequencies of use of combusting tobacco products among respondents of Ahmedabad by different socio-demographic characteristics. Female smokers are more likely to get addicted with low and moderate smoking as compared to male smokers with respect to heavy smoking. Elderly consumers are more likely to get addicted with low or moderate frequency smoking than young consumers with the comparison of heavy frequency of smoking. Educated smokers had a higher likelihood of low or moderate frequency smoking as compared to uneducated smokers with respect to heavy frequency smoking. People with higher income are more likely to adopt lower frequency of smoking than people with lower income according to the comparison with heavy frequency of smoking. People of schedule cast are less likely to adopt low frequency smoking and people of schedule tribe and other backward class are less likely to adopt moderate frequency smoking as compared to the people of general category with respect to heavy smoking.

Table 4 summarizes the output of procedure of multinomial logistic regression of frequencies of use of non combusting tobacco products among respondents of Ahmedabad by different socio-demographic characteristics. Female consumers are more likely to get addicted with low and moderate tobacco chewing as compared to male chewers with respect to heavy consumption of non combusting tobacco products. Elderly consumers are more likely to get addicted with low frequency tobacco chewing than young consumers with the comparison of heavy use of chewing tobacco and matured consumers between the age of 25 to 34 years are less likely to get addicted with moderate tobacco chewing than young chewers between the age of 15 to 24 years. Educated chewers had a higher likelihood of low or moderate frequency smoking as compared to uneducated tobacco chewers with respect to heavy frequency of use of non combusting tobacco. Self employed workers and street vendors are more likely to get addicted with low frequency chewing than labour workers. People with higher education are more likely to adopt lower frequency of chewing tobacco than people with no education according to the comparison with heavy frequency. Middle class families with income between 2.5 to 5 lakhs are more likely to adopt low frequency tobacco chewing than people with income lower than 2.5 lakhs. Students, professionals, street vendors and self employed workers are more likely to adopt addiction of tobacco chewing with moderate frequency as compared to labour workers with respect to addiction of heavy consumption of tobacco chewing.

#### 6. Conclusion

Tobacco consumption and its prevalence are not the only criteria of study which can be useful in successful intervention. The health effects of tobacco consumption may vary with frequencies of consumption. Present study aims at with what frequency people are getting addicted of smoking or tobacco chewing in Ahmedabad. From the results we can conclude that people among combusting and non combusting tobacco product users of Ahmedabad which fall in categories of male gender, young age between 15 to 24 years, lower social and economical status and illiterates are more likely to get addicted with heavy frequency tobacco addiction. These are the groups which need focus and importance in effective tobacco control in Ahmedabad. At least it may help in decreasing number of tobacco users or their frequencies by organising different programs which let them aware of health hazards of heavy frequencies of tobacco use.

This study recommends further research looking at the links with medical researches of health hazards and economical researches of economical effects of tobacco consumption with different frequencies.

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