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Correspondence Analysis to Patterning Correlates of Heavy Smokers in Bangladesh

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Abstract

This paper aimed at patterning correlates of heavy smokers in Bangladesh using correspondence analysis. In Bangladesh, smoking is less likely to have priority in research and so far no works have been found related to heavy smoking episodes. Therefore, this study will reveal pattern of correlates of heavy smokers in Bangladesh. For the current study, data from Global Adult Tobacco Survey, 2010 of size 9629 had been used. Among the respondents, 50.44% were from urban and 49.56% were from rural areas. It was also found that among the respondents, 46.40% were male and 53.60% were female. Multivariate Correspondent Analysis (MCA) showed that urban respondents mostly corresponded to non-smokers and rural respondents corresponded to light-smokers and non-smokers. Results also showed that male respondents were more likely to be associated with light-smokers and heavy-smokers. It had been found that respondents of age group 35-44 years and 45-54 years were mostly associated to heavy smokers. In conclusion, it can be said that government and policy makers may modify or implement new policies to encourage "quit heavy smoking", especially addressing rural people, people with no formal education and with lowest household wealth index.

Keywords: Heavy smoking, Correspondence analysis, correlates, GATS

AMS Classification: 62P25, 62h25.

1. Introduction

Smoking is extremely harmful for our body and is a global public health concern. About 1.4 billion people smoke worldwide, which is expected to rise to more than 1.6 billion by 2025 (Akhter S et al., 2015). Smoking is nothing but inhaling deadly poison. It kills the smokers not at a time but little by little. It causes huge premature deaths and possesses considerable economic burden among poor people, especially living in developing countries like Bangladesh. Smokers are at greater risk for cardiovascular diseases (ischaemic heart disease, hypertension), respiratory disorders (bronchitis, emphysema, chronic obstructive lung disease, asthma), cancer (lung, pancreas, breast, liver, bladder, oral, larynx, oesophagus, stomach and kidney), peptic ulcers and gastroesophageal reflux disease (GERD), male impotence and infertility, blindness, hearing loss, bone matrix loss, and hepatotoxicity (McBride PE, 1992; Abdel-Rahman, 2006; Bjartveit and Tverdal, 2005 and Sherman, 1991). Heavy smokers are at even in worse situation in terms of economic and health condition. A person who takes more than 25 cigarettes per day is identified as a heavy smoker (Wilson D et al., 1992). Heavy smokers are a subgroup who place themselves and others at risk for harmful health consequences and also are those least likely to achieve cessation. Those who smoke more than or equal to twenty cigarettes per day (≥20 CPD) are also identified as heavy smokers (John P. Pierce et al., 1965-2007).So every year many people worldwide including Bangladesh are dying before their expected lifetime due to heavy smoking. Some research works on heavy smoking are done in other countries (Kaleta et al., 2012; Bjartveit and Tverdal, 2005; Pierce et al., 2011; Lohse et al., 2016; Wilson et al., 1992; Shiffmanet al., 2002; Shiffman, et al., 2004). In Bangladesh, smoking is less likely to have priority in research and so far, no works have been found relating to heavy smoking. This paper aimed at patterning correlates of heavy smoking in Bangladesh.

2. Data and Methodology

2.1 Data Source

The data used for the study was taken from Global Adult Tobacco Survey (GATS) 2009-2010, Bangladesh
(https://nccd.cdc.gov/GTSSDataSurveyResources/Ancillary/DataReports.aspx?

CAID=2). Detailed methodology of data collection, sampling procedure, questionnaires and relevant information were reported in GATS: 2009-10, Bangladesh. Briefly, based on the sampling frame from Bangladesh Bureau of Statistics (BBS), the implementing agency of Bangladesh Population Census in 2001, the GATS was a three-stage stratified cluster sample of households. In the first stage, 400 primary sampling units (PSUs) (200 from rural and another 200 from urban areas) were selected with probability proportional to size. In the second stage, a random selection of one secondary sampling unit (SSU) per selected PSU was done. The SSUs were based upon the enumeration areas (EAs) from Bangladesh Agricultural Census, 2008. Each EA consisted of 200 households in rural areas and 300 households in urban areas. In the third stage, households were selected systematically within the listed households from a selected SSU (an average of 28 households to produce equal male and female households based on design specifications). One respondent was randomly selected for interview from each selected eligible household to participate in the survey. About 10751 (96.0%) households and 9629 (86.0%) individuals were involved for successful completion of the interview. The sample design for Bangladesh provides cross-sectional estimates for the country as a whole, as well as by urban, rural and gender-wise classifications.

2.2 The tools of data collection

GATS in Bangladesh used two types of questionnaires: the household questionnaire and the individual questionnaire. The questionnaires were based on GATS core and optional questions. The Ministry of Health & Family Welfare of Bangladesh, in consultation with the local agencies, National Institute of Preventive and Social Medicine, National Institute of Population Research and Training, and Bangladesh Bureau of Statistics and international collaborators such as WHO South East Asia Regional Office and Centers for Disease Control and Prevention, conducted the survey. The survey used electronic system that facilitates the complex skip pattern used in the GATS questionnaire, as well as some in-built validity checks on questions during the data collection. A repeated quality control mechanism was used to test the quality of questionnaire programming. The main steps involved in quality control checks were: version checking for household and individual questionnaires, checking date and time,

skipping patterns and validation checks. The data were suitably weighted for well representation of tobacco use (smoking and smokeless) in Bangladesh.

2.3 Statistical Methods

Various statistical methodologies had been used to analyze the data. Descriptive analysis had been performed to know the characteristics of the study subjects. For that frequency with percentage has been reported. A comparison of socio-demographic and economic characteristics of study subjects to level of tobacco smoking had been performed. To analyze pattern of correlates of heavy smoking Correspondent Analysis (CA) had been used. Statistical software StataSE version 11 (StataCorp, USA) had been used to carry out statistical analyses. For advanced analysis missing data had been avoided.

3. Results and Discussions

3.1 Results

It had been observed that respondents from rural and urban area were equivalent (50.44% from urban and 49.56% from rural) [Table 1]. Female respondents were a bit more than that of males (46.40% male and 53.60% female). Most of the subjects were of no formal schooling (35.48%) and of homemaker/ household worker category (41.90%).

It had been found that heavy smokers were relatively more in rural area (6.31%) than in urban area (4.16%) [Table2]. Most of the heavy smokers were males (11.03%) than females (0.13%). Maximum number of respondents who were heavy smokers belonged to the age group 35-44 years (8.29%) and 45-54 years (8.65%). Heavy smoking was most prevalent among respondents with no formal schooling (8.11%) and least prevalent among respondents with College/University completed & higher (1.45%). It had been also found that heavy smoking was most prevalent among farmers (15.62%). Further, it had been found that heavy smoking was most prevalent among the respondents with lowest household wealth index (8.25%).

From multivariate correspondent analysis (MCA) it had been found than urban respondents mostly corresponded to non-smokers and rural respondents corresponded to light-smokers and non-smokers [Fig. 1]. It had been also found that male respondents were more likely to be associated with light-smokers and

heavy-smokers [Fig. 2]. It had been found that respondents of age group 35-44 years and 45-54 years were mostly associated with heavy smokers and respondents of age group 55 & above years were associated to light smokers [Fig. 3]. However, respondents with no formal education and with highest education were mostly associated with heavy-smokers [Fig. 4]. On the other hand, Business (small/large) man, Farmer (land owner & farmer), Agri. /industrial worker/Daily labourer/Other self-employed were mostly associated to heavy smoker [Fig. 5]. It had been also found that respondents with lowest wealth mostly corresponded to smokers [Fig. 6].

3.2 Discussions

This study was based on the nationally representative cross sectional study of Bangladesh and the information were self-reported. The study revealed that a significant percentage of adult people in Bangladesh were heavy smokers. From MCA, it had been found that rural residential area, male gender, illiteracy, lower paid or unsecured job, lower household wealth index etc. most lycor responded to heavy smoking. It had been found that rural respondents were more likely to correspond to heavy smokers. This might be due to their unconsciousness about adverse effect of heavy smoking or they might not be aware about their own health like many other health concerns.

Males were more prevalent as heavy smokers than females which was obvious and expected. In Bangladesh, smoking among females is not acceptable and social structure of Bangladesh does not allow that. However, the small percentage of heavy smoking among female was still a matter of concern.

It had been found that middle aged (35-54 years) people were more prevalent as heavy smokers. Results from CA also confirmed that. People at this age in Bangladesh struggle with their family satisfaction, job satisfaction, financially settling down etc. which might enforce them to be heavy smokers. However, more research is needed to confirm this. It had been also found that poorest people were most prevalent to be heavy smokers. In developed countries economic condition was not associated with heavy smoking [Wilson 1992; Baumert et al., 2010; Wilson, Taylor and Roberts 1995; Kaleta et al., 2012]. In Bangladesh this might be due to their mental stress for insecurity of food, cloth, shelter, treatment etc.

4. Strength and limitation

The study was based on the nationally representative survey for adults covering urban and rural areas with adult male and female populations. The survey was self-reported; hence the parameters might be under or over estimated. Also the study could not check the pattern over time as the GATS was a cross sectional study. However, the data is a bit old.

5. Conclusion

In conclusion it may be said that to make the campaign 'quittobacco' successful, tobacco smoking should be characterized properly according to the level of smoking as different strategies may be needed for different levels. The current study reflects the real scenario of heavy smokers. Therefore, government and policy makers may get idea as to whether existing policies are needed to be modified or new policies need to be implemented for heavy smokers to quit successfully, especially for rural people, people with no formal education and those with lowest household wealth index.

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Table 1: Socio-demographic and economic characteristics of the study subjects	
Socio-demographic characteristics	**n (%), Sample size=9629**
Residence	
Urban	4857(50.44)
Rural	4772(49.56)
Gender	
Male	4468(46.40)
Female	5161(53.60)
Age(years)	
15-24	2073(21.53)
25-34	2665(27.68)
35-44	2232(23.18)
45-54	1329(13.80)
55& above	13.30(13.81)
Educational level	
No formal schooling	3416(35.48)
Less than primary school	1487(15.44)
Primary school completed	1115(11.58)
Less than secondary school	1937(20.12)
Secondary school completed	663(6.89)
High school completed	463(4.81)
College/University completed & higher	273(2.84)
Post graduate degree completed	2.11(2.19)
Missing	64(0.66)
Occupation	
Government employee	221(2.30)
Non-Government employee	740(7.69)
Business –small	865(8.98)
Business- large	128(1.33)
Farming (land owner & farmer)	826 (8.58)
Agricultural worker	374 (3.88)
Industrial worker	214 (2.22)
Daily laborer	631 (6.55)
Other self-employed	318 (3.30)
Student	463 (4.81)
Homemaker/Household worker	4030 (41.85)
Retired	113 (1.1)
Unemployed, able to work	153 (1.59)
Unemployed, unable to work	165 (1.71)

Other (specify)	388 (4.03)
Wealth index	
1(lowest)	1866 (19.38)
2	2068 (21.48)
3	1732 (17.99)
4	2040 (21.19)
5(highest)	1923 (19.97)

Note: Wealth index was calculated using principal component analysis. Asset information covered household ownership of a number of items, such as electricity, flush toilet, fixed telephone, cell telephone, television, radio, refrigerator, car, moped/scooter/motorcycle, washing machine, bicycle, sewing machine, almirah/ wardrobe, table, bed or cot, chair or bench, watch or clock, as well as the type of main material used for the roof of the main house (cement, tin and katcha such as bamboo/thatched/straw)

Table 2: Comparing characteristics to smoking level

Socio Demographic Factors	**Smoking Level (%)**		
	non smoker	**light smoker**	**heavy smoker**
Residence			
Urban	80.15	15.69	4.16
Rural	77.49	16.2	6.31
Gender			
Male	55.86	33.1	11.03
Female	98.72	1.09	0.19
Age in years			
15-24	90.5	8.25	1.25
25-34	80.6	15.38	4.02
35-44	73.12	18.59	8.29
45-54	70.81	20.54	8.65
55 and above	74.74	20	5.26
Educational level			
No formal schooling	71.96	19.94	8.11
Less than primary school	74.98	18.36	6.66
Primary school completed	83.5	13.09	3.41

Less than secondary school	83.74	13.01	3.25
Secondary school completed	86.73	11.16	2.11
High school completed	88.98	9.94	1.08
College/University completed & higher	85.54	13.02	1.45
Missing	0.66	-	-
Occupation			
Employment (government/non-government)	76.59	21.12	2.29
Business (small/large)	55.69	33.33	10.98
Farming (land owner & farmer)	50.24	34.14	15.62
Agri/industrial worker/Daily labour/Other self-employed	54.33	33.38	12.3
Homemaker/ Housework	98.96	0.94	0.1
Retired and unemployed (able/unable to work)	80.74	15.31	3.94
Student/ Others	84.14	11.99	3.88
Wealth Index			
1(Lowest)	73.63	18.11	8.25
2	75.05	18.57	6.38
3	78.35	15.88	5.77
4	80.78	15.49	3.73
5(Highest)	86.32	11.54	2.13

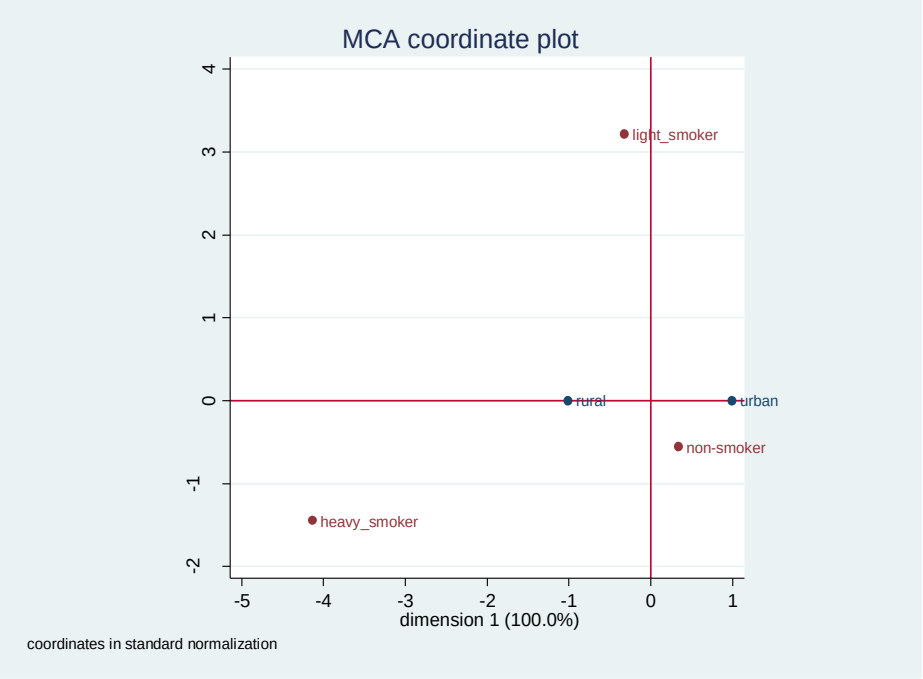

Fig 1: MCA plot for showing the relationship between residence and smoking level

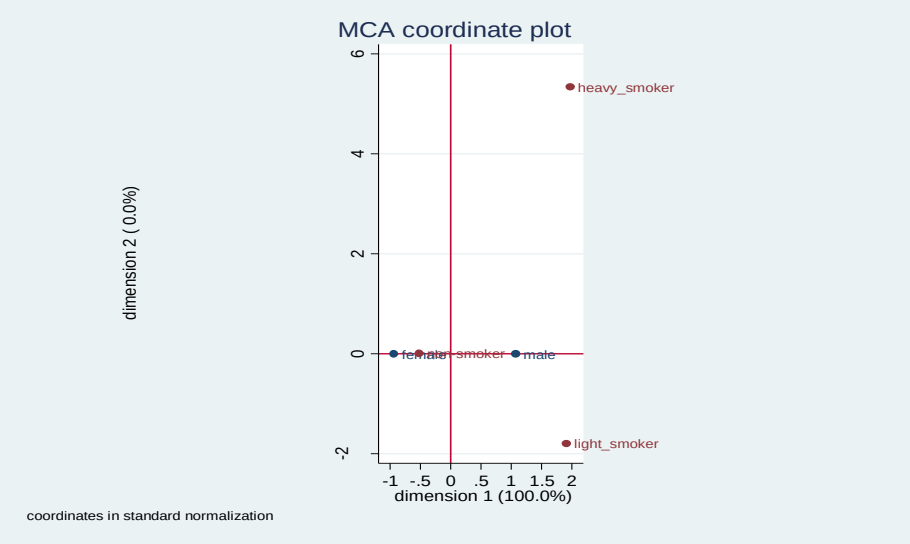

Fig 2: MCA plot for showing the relationship between gender and smoking level

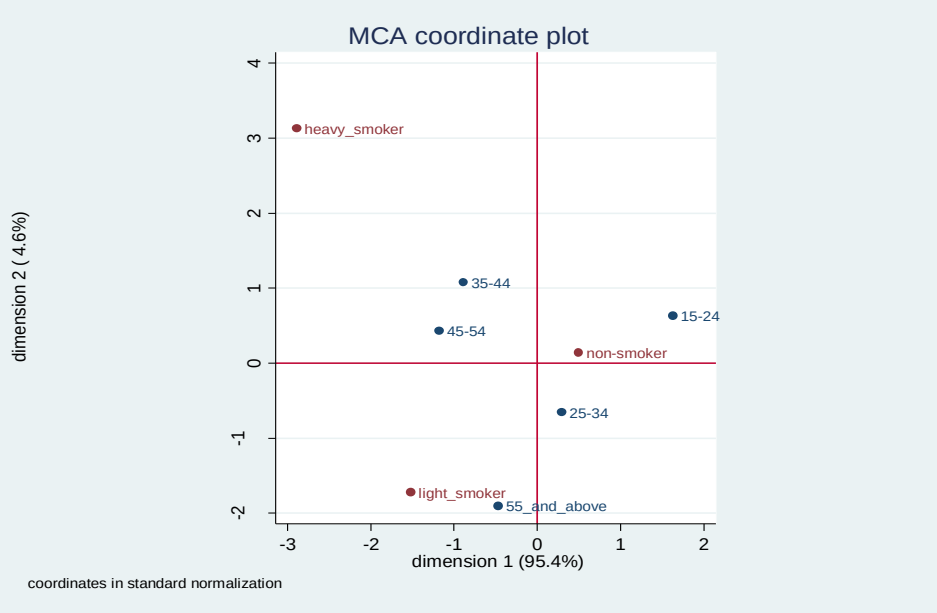

Fig 3: MCA plot for showing the relationship between age group and smoking level

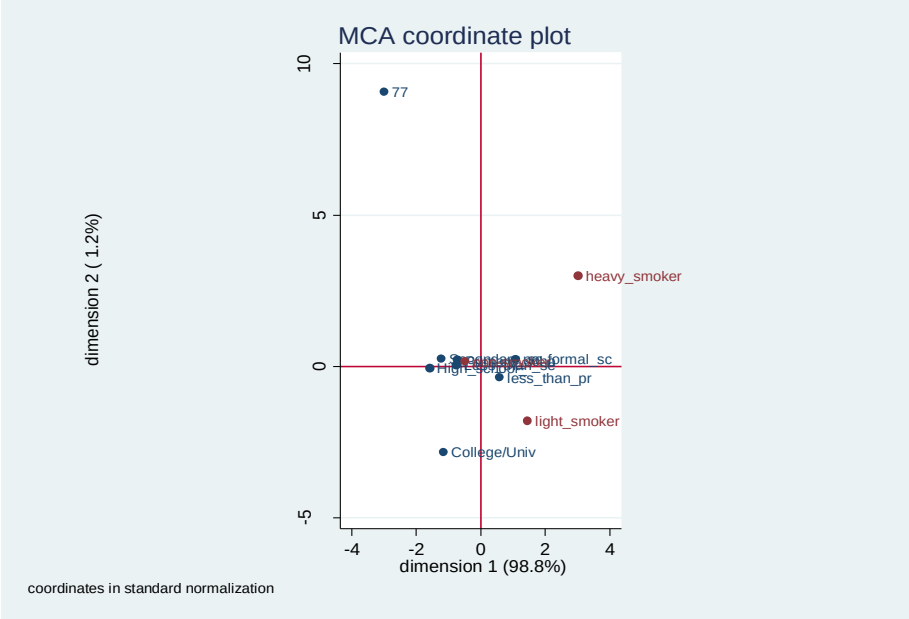

Fig 4: MCA plot for showing the relationship between educational level and smoking level

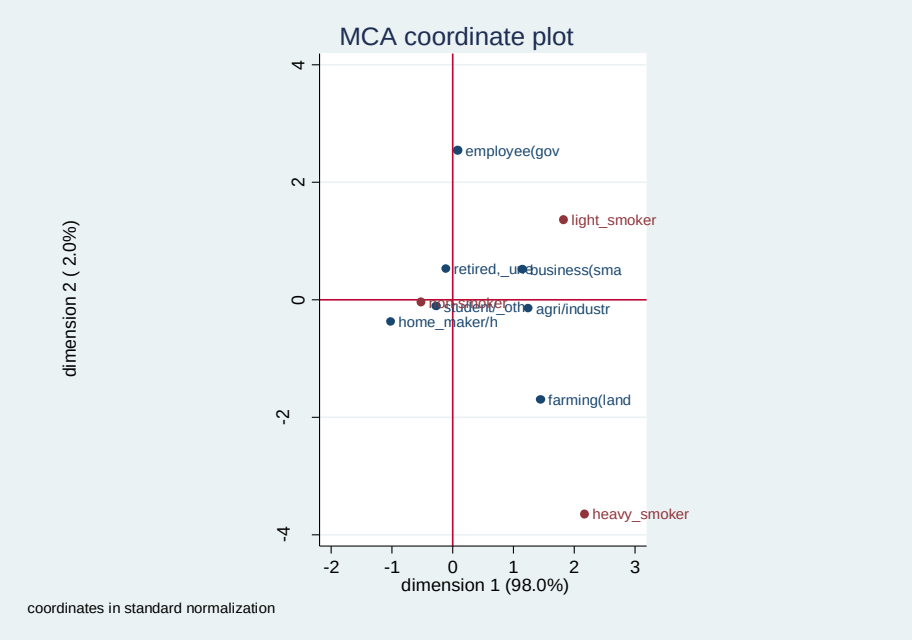

Fig 5: MCA plot for showing the relationship between occupation and smoking level

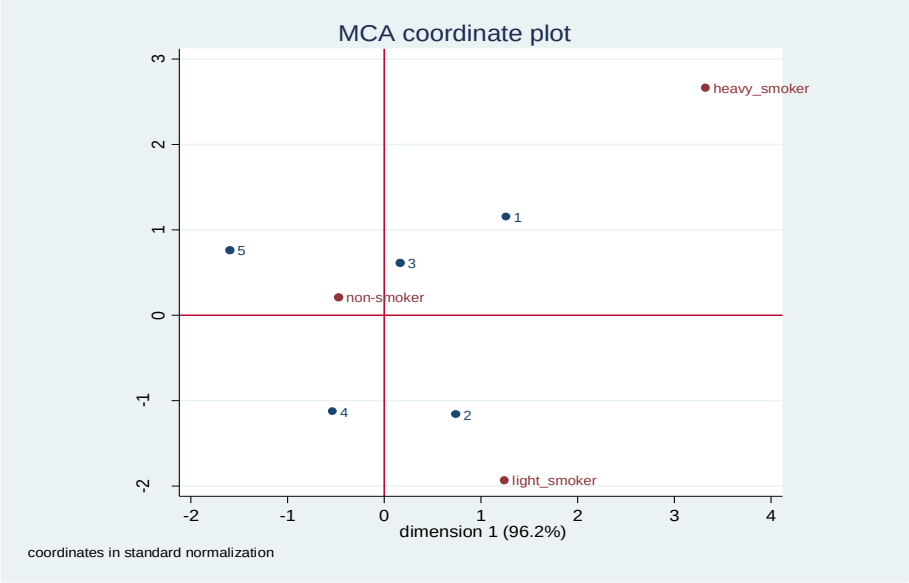

Fig 6: MCA plot for showing the relationship between wealth index and smoking level