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Measuring the Level of Knowledge and Awareness of Tobacco Use in Bangladesh

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Measuring the Level of Knowledge and Awareness of Tobacco Use in Bangladesh

M.Phil. Thesis

Researcher

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A thesis submitted to the Department of Statistics, University of Rajshahi for partial fulfillment of the requirements for the degree of Master of Philosophy in Statistics

Department of Statistics

University of Rajshahi, Bangladesh

December, 2016

DEDICATED

TO

My Beloved Parents

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CERTIFICATE OF APPROVAL

I have the pleasure to certify that the thesis entitled "Measuring the level of knowledge and awareness of tobacco use in Bangladesh" is an original work done by Md. Tahidur Rahman. He has completed the research work under my direct supervision. As far as I know, the thesis has not been previously submitted to any university/institute for any kind of degree or diploma.

I also certify that I have perused the thesis and found it satisfactory for submission to the Department of Statistics, University of Rajshahi for the degree of Master of Philosophy in Statistics.

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DECLARATION

I do hereby that the thesis entitled "Measuring the Level of Knowledge and Awareness of Tobacco Use in Bangladesh" submitted to the Department of Statistics, University of Rajshahi for the degree of Master of Philosophy in statistics is an original research work carried out by me under the direct supervision and guidance of my learned supervisor Professor Dr. Dulal Chandra Roy and Co-Supervisor Professor Dr. Papia Sultana, Department of Statistics, University of Rajshahi. No proof of the thesis in any form has been submitted to any University/Institute for the award of any degree or diploma. The sources incorporated in the thesis have been duly acknowledged and cited for clarity.

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ABSTRACT

Tobacco is identified as leading modifiable global disease risk factor. Bangladesh is one of the largest tobacco consuming countries in the world. The use of tobacco is more prevalent among male population in Bangladesh. Also the use of tobacco is increasing. Therefore the objective of this study is to measure the level of knowledge and awareness of the health consequences of smoking among Bangladeshi adults and its associates.

We have used secondary data of size 9629 (Male=4468 and Female=5161) aged 15 years and above collected by the Global Adult Tobacco Survey (GATS), 2010. Binary logistic regression model has been used to identify significant correlates of knowledge and awareness of tobacco use in Bangladesh along with descriptive and bivariate analysis.

Knowledge of health consequences of tobacco smoking, smokeless tobacco user and exposure to secondhand smoke (SHS) has been analyzed. According to their knowledge, the most common health consequences of tobacco smoking are serious illness 96.61%, lung cancer 94.24%, strokes 85.88% and heart attacks 88.43%. On the other hand, among the smokeless tobacco user 91.05% belief that smokeless tobacco use causes serious illness, 81.68% belief that smokeless tobacco use causes lunch cancer, 97.60% belief it causes stroke, and 71.42% belief it causes heart attack. Among the secondhand smoker 97.60% belief that it causes serious illness. Non- smokeless tobacco user has an equal knowledge on health risks than smokeless tobacco user OR= 1.00 but higher knowledge

is found among secondhand smoker OR= 1.57. Current tobacco smoker is less knowledgeable than non-tobacco smoker OR= 0.57 which is statistically significant.

For all kind of tobacco use it has been found that educated respondents are more knowledgeable than less educated people. The odds ratios imply that respondent of low wealth index are more likely to be knowledgeable than the respondent of lowest wealth index.

Some of awareness policies have been analysed. We have found that tobacco users are more inspired by the marketing policy to use tobacco in the last 30 days than their counter parts. Rural respondents are more inspired to smoking tobacco than urban respondents. Female respondents are less inspired to smoking tobacco than male respondents and they are statistically significant. For tobacco smoking it has been found that educated respondents are more encouraged by the marketing policy to smoking tobacco than less educated people. We have also found that business man (small, large), farmer (land owner & farmer), agricultural /industrial worker/ daily laborer/other self-employed, homemaker /housework and student/other are more inspired by the marketing policy to smoking tobacco than those respondents are employers (Government, Non-Government). The odds ratios imply that respondents of low, middle and high wealth index are more inspired by the marketing policy to tobacco smoking than the respondents of lowest wealth index.

For secondhand smoke, we have found that smoking is more allowed at home and job place for respondents who affected by secondhand smoking than their counter part and

they are statistically significant. Smoking is more allowed at home and job place for rural respondents than urban respondents and they are statistically significant. Based on educational level it has been found that smoking is less allowed for higher educated respondents at home and job place than less educated respondents and they are statistically significant. We have also found that smoking are more allowed at home and job place for business man (small, large), farmer (land owner & farmer), agricultural /industrial worker/ daily laborer/other self- employed and retired and unemployed (able to work/unable to work) than employers (Government, Non-Government). It has been also found that smoking are less allowed for respondents of low, middle and higher wealth index at home and job place than respondents of lowest wealth index.

LIST OF TABLES

LIST OF FIGURES

Table of Contents

CHAPTER ONE

INTRODUCTION

1.1 Background of the study

Tobacco use is the leading cause of preventable death worldwide and is estimated to kill 6 million persons each year. According to the World Health Organization (WHO), if current trends continue, by 2030 tobacco use could cause 8 million deaths annually (*WHO,2009*). Among them more than 5 million are currently users and ex users and more than 600000 are nonsmokers exposed to second-hand smoke. Approximately one person dies every six seconds due to tobacco and this accounts for one in 10 adult deaths. Up to half of current users will eventually die of a tobacco-related disease. It is estimated that three quarters of these deaths will be in low and middle-income countries where the burden of tobacco-related illness and death is the heaviest [www.who.int/mediacenter/factsheets/fs339/en/index.html]. Consumption of tobacco products is increasing globally, though it is decreasing in some high-income and upper middle-income countries. Bangladesh is one of the largest tobacco consuming countries in the world. Over 58% of men and 29% of women use some form of tobacco, whether smoked (both cigarettes and bidis) or smokeless. In 2012, an estimated 46.3 million adults used some form of tobacco product, smoked or smokeless. Most smokers are male — 28.3% of adult men smoke manufactured cigarettes and 21.4% smoke bidis. In contrast,

smokeless tobacco use is substantial across both genders, with 26.4% of men and 27.9% of women using some form of smokeless tobacco. Most smokeless tobacco use is of betel quid with tobacco (zarda) though other forms of smokeless tobacco products, including gul, sada pata, and khoinee, are also commonly used (Barkat et al, 2012).

Knowledge and individual perceptions about adverse effects of all forms of tobacco, in addition to its social acceptance may influence the level of tobacco consumption in various socio-demographic groups (Van Zyl et al., 2013). Though there is significant awareness at population level about lung cancer being related to smoking and smokeless tobacco in most of the world, however, no comparisons have been drawn among different nations about the knowledge of general population about relationship of smoking and smokeless tobacco consumption to other life threatening illnesses, like heart attack and stroke. In addition, as compared to smoking, little is known about the level of awareness of general population about health impact of second hand smoke. Further, few studies have measured the knowledge, attitudes and perceptions of adult population (above 15 years) about impact of smoking, smokeless tobacco as well as second hand smoke on health, with particular reference to lung cancer, stroke and heart attack at a national level and no studies are available which have drawn any inter country comparisons on this issue (Goebel et al., 2000; Dey et al., 2012).

So, it is popularly believed that tobacco consumption is inversely linked to knowledge, attitudes and perception of population towards tobacco. Despite

high awareness about harmful effects of smoking, people continue to smoke developing a tolerant attitude towards it. The reasons for this phenomenon remain unclear and need to be studied in further depth. In addition, the awareness of adverse effects of tobacco smoking in most countries remains limited to lung cancer with relatively low awareness about adverse effects on cardiovascular system in form of heart attack and stroke. Also, there is surprisingly low awareness about adverse effects of smokeless tobacco in most countries. This needs to be rectified by governments and policy makers of respective countries through sustained media and educational campaigns to increase population awareness about the adverse effects of smokeless tobacco as well as preventing initiation into tobacco consumption.

Therefore, to study the level of knowledge and awareness is necessary.

1.2 Literature Review

Some research works already have been done in related area. Some of the previous empirical studies of Bangladesh as well as of other countries in this subject were conducted. Citable research works are summarized below:

Gupta B and Kumar N (2014) studied on knowledge and individual perceptions about adverse effects of all forms of tobacco exert direct influence on the level of tobacco consumption in various socio-demographic groups. The objective of that study was to determine the nature, extent and demographic correlates of knowledge, attitudes and perceptions of use of tobacco among

adults in low and middle income countries. The Global Adult Tobacco Survey, conducted in fourteen different countries from 2008-2010, was sourced for the data analyzed in that study. Descriptive statistical analyses were conducted to determine the prevalent knowledge and individual perceptions amongst adults about all forms of tobacco consumption. There was relatively high awareness about the harmful effects of smoking tobacco with main awareness being about its relationship with lung cancer (>90% in most countries). In contrast, there was relatively low awareness about harmful effects of smokeless tobacco (< 90% in all countries except India and Bangladesh), and observed correlation of smoking tobacco with heart attack (40.6% in China, 65.1% in India) and stroke (28.2% in China, 50.5% in India).

Sultana P, et al. (2015) studied on prevalence, socioeconomic and demographic correlates of tobacco smoking in Bangladesh. In that paper secondary data had been used of size 9629 (male=4468 and female=5161) aged 15 years and above collected by the Global Adult Tobacco Survey (GATS), 2010. Principle Component Analysis (PCA) had been used to get the wealth index. Binary logistic regression model had been used to assess the predictors of current tobacco smoking. Prevalence of current tobacco smokers in Bangladesh was 23.19 (48.28% male and 1.47% female) and the prevalence of current daily tobacco smokers were 21.16. Rural respondents were significantly more likely to smoke tobacco currently. Comparative to females, males were more likely to smoke currently (adjusted OR=37.55, 95% CI=25.91, 54.41).

Respondents of youngest age group (15-24 yrs) were less likely to smoke currently than all other age groups and respondents with no formal schooling were more likely to smoke than respondents with all other levels of education. Businessmen, farmers and workers/day labours were more likely to smoke, and employee, students and respondents with other jobs were less likely to smoke. It was also found that respondents with lowest wealth index were most likely to smoke and respondents with higher wealth index were least likely to smoke.

Kabir MA, et al. (2013) studied on tobacco consumption (TC) among youths poses significant public health problem in developing countries. That study utilized the data of Global Youth Tobacco Survey (GYTS), 2007 to examine and compare youth TC behavior in Bangladesh, Nepal and Sri Lanka. The GYTS covered a total of 2,242 Bangladeshi, 1,444 Nepalese and 1,377 Sri-Lankan youths aged 13–15 years. They represented response rates of 88.9%, 94.6%, and 85.0% for the three countries, respectively. Socioeconomic, environmental, motivating, and programmatic predictors of TC were examined using cross tabulations and logistic regressions. Prevalence of TC was 6.9% (9.1% in males, 5.1% in females) in Bangladesh, 9.4% (13.2% in males, 5.3% in females) in Nepal and 9.1% (12.4% in males, 5.8% in females) in Sri Lanka. The average tobacco initiation age was 9.6, 10.24 and 8.61 years, respectively. Cross tabulations showed that gender, smoking among parents and friends, exposure to smoking at home and public places, availability of free tobacco were significantly ($P < 0.001$) associated with TC in all three countries. The

multivariable analysis [odds ratio (95% confidence interval)] indicated that the common significant predictors for TC in the three countries were TC among friends [1.9 (1.30-2.89) for Bangladesh,4.10 (2.64-6.38) for Nepal and 2.34 (1.36-4.02) for Sri Lanka], exposure to smoking at home [1.7 (1.02-2.81) for Bangladesh, 1.81 (1.08-2.79) for Nepal and 3.96 (1.82-8.62) for Sri Lanka], exposure to smoking at other places [2.67(1.59-4.47) for Bangladesh, 5.22 (2.76-9.85) for Nepal and 1.76 (1.05-2.88) for Sri Lanka], and the teaching of smoking hazards in schools [0.56 (0.38-0.84) for Bangladesh, 0.60 (0.41-0.89) for Nepal and 0.58 (0.35-0.94) for Sri Lanka].

Lalit J R, et al. (2011) found that the prevalence of smokeless tobacco use in India is the highest in the world, with 26% of adults reporting being users of smokeless tobacco only. The aim of that study was to use data from the ITC India Pilot Study conducted in 2006 to examine beliefs about the harms of smokeless tobacco use, knowledge of health effects, and intentions to quit among current smokeless tobacco users in two states, Maharashtra and Bihar. Data from the ITC India Pilot Study, a face-to-face cross sectional survey of 248 adults reporting exclusive current use of smokeless tobacco in Maharashtra and Bihar, were analyzed with respect to the knowledge of health effects, beliefs about harmfulness, and intentions to quit smokeless tobacco use. Around three quarters (36%) of smokeless tobacco users from Maharashtra and two thirds (62%) from Bihar had a ‘bad’ opinion about smokeless tobacco use. About 77% believed that smokeless tobacco use causes mouth cancer, followed

by gum disease (66%) and difficulty in opening the mouth (56%). Significant differences were found in health knowledge between urban and rural smokeless tobacco users in both states. Only 38% of smokeless tobacco users reported having intentions to quit, and only 11% had intentions to quit within the next 6 months. Smokeless tobacco users who reported higher knowledge of the specific health effects from smokeless tobacco use were more likely to have intentions to quit.

Das CM, et al. (2012) conducted a study to determine frequency, knowledge, and practice of tobacco smoking in pregnant women visiting outpatient department of Liaquat University Hospital Hyderabad. Study carried out at Liaquat University Hospital Hyderabad. All pregnant ladies visited the outpatient department of obstetrics and Gynecology for antenatal care with an age range 18-46 years were enrolled for study. Semi structured questionnaire consisting various items used to explore the range of knowledge and practice of pregnant women as far as tobacco smoking was concerned. A total of 350 pregnant women were included in that study. Frequency of tobacco smoking was 60.57% (212). 179(51.14%) women were also using smokeless tobacco along with smoking. Only 42 (12%) knew hazards of tobacco consumption. Knowledge was high in 27(7.71%) patients. Peer pressure was the reason for commencement of smoking in 234(66.85%) of women and depression in 60(17.14%).

Benhamou S, et al. (1994) studied on the effects of a tar content type of tobacco and use of a filter on lung cancer risk in male cigarette smokers. Data from a case-control study on lung cancer were used to evaluate the specific effects of the parameters. Cases of lung cancer and controls were interviewed in hospitals in France from 1976 to 1980. The past tar content of cigarettes distributed by the French Tobacco Monopoly was obtained. The results presented concern an exclusively male population of lifelong smokers of French cigarettes and lifelong smokers of light imported cigarettes. The population comprised 1114 cases of histological confirmed lung cancer and 1466 hospitalized controls. An increase in risk was found among smokers of both dark and light cigarettes (relative risk [RR] = 2.6, 95% confidence interval [CL]: 1.1–6.5) and among lifelong smokers of dark cigarettes (RR = 1.7, 95% CL: 0.9-3.2) compared to lifelong smokers of light cigarettes. Similarly, the risk of lung cancer was higher among smokers of both non-filter and filter cigarettes (RR = 1.6, 95% CL: 0.9-2.7) and among lifelong smokers of non-filter cigarettes (RR = 1.6, 95% CL: 0.9–2.8) than among lifelong smokers of filter cigarettes. A borderline significant increase in risk was observed for smokers of French cigarettes compared to smokers of light imported cigarettes (RR = 2.6, 95% CL: 0.9–7.7). No significant difference in the risk of lung cancer was observed among smokers of French cigarettes according to the proportion of years of smoking high tar cigarettes.

Caroline M, et al. (2000) conducted a tobacco control program to lower the rates of death from heart disease. Data on per capita cigarette consumption and age-adjusted rates of death from heart disease in California and the United States from 1980 to 1997 were fitted in multiple regression analyses. The regression analyses included the rates in the rest of the United States and variables that allowed for changes in the rates after 1988, when the tobacco-control program was approved, and after 1992, when the program was cut back. Between 1989 and 1992, the rates of decline in per capita cigarette consumption and mortality from heart disease in California, relative to the rest of the United States, were significantly greater than the pre-1989 rates, by 2.72 packs per year (P=0.001) and by 2.93 deaths per 100,000 population per year (P<0.001). Those rates of decline were reduced (by 2.05 packs per year [P=0.04], and by 1.71 deaths per 100,000 population per year [P=0.03]) when the program was cut back, beginning in 1992. Despite those problems, the program was associated with 33,300 fewer deaths from heart disease between 1989 and 1997 than the number that would had been expected if the earlier trend in mortality from heart disease in California relative to the rest of the United States had continued. The diminished effectiveness of the program after 1992 was associated with 8300 more deaths than would have been expected had its initial effectiveness been maintained and aggressive tobacco-control program was associated with a reduction in deaths from heart disease in the short run.

Cokkonides VE, et al. (2005) described the use of treatment for tobacco dependence in relation to insurance status and advice from a healthcare provider in a population-based national sample interviewed in 2000. Analyses were based on 3996 adult smokers who participated in the National Health Interview Survey in 2000, and who provided information on tobacco-cessation treatments used at their most recent quit attempt occurring in the last year. Age-adjusted and weighted categorical analysis was used to compute prevalence estimates of self-reported treatments (pharmacotherapy and behavioral counseling) for tobacco dependence. Multiple logistic regression analysis was used to examine factors associated with use of treatments. By that analysis they find that, overall, 22.4% of smokers who tried to quit in the previous year used one or more types of cessation aid compared to 15% in 1986. Treatment usually involved pharmacotherapy (21.7%) rather than behavioral counseling (1.3%). Smokers attempting to quit were more likely to use cessation aids if covered by private (25.4%) or military (25.0%) insurance than by Medicare (17.8%), Medicaid (15.5%), or no insurance (13.2%). In a multiple analysis of factors related to use of cessation aids, advice from a healthcare provider to quit smoking and the number of cigarettes smoked per day were significant predictors of treatment use, regardless of insurance status. Cessation aids were under-used across insurance categories. Advice by a healthcare provider to quit is associated with increased use of effective therapies for tobacco dependence.

Dongfeng G, et al. (2009) studied on the estimation of the number of deaths attributable to smoking in China. They conducted a large, prospective cohort study in a nationally representative sample of 169,871 Chinese adults who were 40 years of age or older. Investigators for the China National Hypertension Survey collected data on smoking and other risk factors at a baseline examination in 1991 using a standard protocol. Follow-up evaluation was conducted in 1999 and 2000, with a response rate of 93.4%. They used multivariable-adjusted relative risk, prevalence of smoking, mortality, and population size in each age group, stratified according to sex, to calculate the number of deaths attributable to smoking in 2005. There was a significant, dose–response association between pack-years smoked and death from any cause in both men and women after adjustment for multiple risk factors ($P<0.001$ for trend). They estimated that in 2005, a total of 673,000 deaths (95% confidence interval [CI], 564,700 to 781,400) were attributable to smoking in China: 538,200 (95% CI, 455,800 to 620,600) among men and 134,800 (95% CI, 108,900 to 160,800) among women. The leading causes of smoking-related deaths were as follows: cancer, 268,200 (95% CI, 214,500 to 321,900); cardiovascular disease, 146,200 (95% CI, 79,200 to 213,100); and respiratory disease, 66,800 (95% CI, 20,300 to 113,300). The study documented that smoking was a major risk factor for mortality in China. From the analysis author concluded that continued strengthening of national programs and initiatives for smoking prevention and cessation was needed to reduce smoking-related deaths in China.

Ezzadti M and Lopez AD (2003) studied on the estimation of the global and regional mortality in 2000 caused by smoking, including an analysis of uncertainty. Following the methods of Peto and colleagues used lung-cancer mortality as an indirect marker for accumulated smoking risk. Never-smoker lung-cancer mortality was estimated based on the household use of coal with poor ventilation. Relative risks were taken from the American Cancer Society Cancer Prevention Study, phase II, and the retrospective proportional mortality analysis of Liu and colleagues in China. Relative risks were corrected for confounding and extrapolation to other regions. They estimated that in 2000, 4·83 (uncertainty range 3·94–5·93) million premature deaths in the world were attributable to smoking; 2·41 (1·80–3·15) million in developing countries and 2·43 (2·13–2·78) million in industrialized countries. 3·84 million of these deaths were in men. The leading causes of death from smoking were cardiovascular diseases (1·69 million deaths), chronic obstructive pulmonary disease (0·97 million deaths), and lung cancer (0·85 million deaths).

Gajalakshmi V, et al. (2003) assessed age-specific mortality from smoking among men (since few women smoke) in urban and in rural India. They did a case-control study of the smoking habits of 27000 urban and 16000 rural men who had died in the state of Tamil Nadu, Southern India, from medical causes (i.e., any cause other than accident, homicide, or suicide), and of 20000 urban and 15000 rural male controls. In the urban study area, the death rates from medical causes of ever smokers were double to those of never smokers

(standardized risk ratio at ages 25–69 years 2·1 [95% CI 2·0–2·2]). The risks were substantial both for cigarette smoking (the main urban habit) and for bidi smoking. Of that excess mortality among smokers, a third involved respiratory disease, chiefly tuberculosis (4·5 [4·0–5·0], smoking-attributed fraction 61%), a third involved vascular disease (1·8 [1·7–1·9], smoking-attributed fraction 24%), 11% involved cancer (2·1 [1·9–2·4], smoking attributed fraction 32%), chiefly of the respiratory or upper digestive tracts, and 14% involved alcoholism or cirrhosis (3·3 [2·9-3·8], not attributed to smoking). Among ever smokers, the absolute excess mortality from tuberculosis was substantial throughout the age range 25–69 years. (A separate survey of 250000 men living in the urban study area found that ever smokers were three times as likely as never smokers to report a history of tuberculosis, corresponding to a higher rate of progression of chronic sub clinical infection to clinical disease.) The proportional excesses of respiratory, vascular, and neoplastic mortality at ages 25–69 years among ever smokers in the urban study area were replicated, each with similarly narrow CI for the risk ratio, in the rural study area (where bidi smoking predominated), and are taken to be largely or wholly causal. For urban and for rural death from medical causes at older ages (70 years), the standardized risk ratio was 1·3. Smoking, which increases the incidence of clinical tuberculosis, is a cause of half the male tuberculosis deaths in India, and of a quarter of all male deaths in middle age (plus smaller fractions of the deaths at other ages). At current death rates, about a quarter of cigarette or bidi smokers would be killed by tobacco at ages 25–69 years, those killed at these

ages losing about 20 years of life expectancy. Overall, smoking currently causes about 700000 deaths per year in India, chiefly from respiratory or vascular disease: about 550000 men aged 25–69 years, about 110000 older men, and much smaller numbers of women (since few women smoke).

Gellert C, et al. (2012) performed a systematic review and meta-analysis of the empirical evidence on the association of smoking with all-cause mortality in people 60 years and older. A systematic literature search was conducted in multiple databases including MEDLINE, EMBASE, and ISI Web of Knowledge and complemented by cross-referencing to identify cohort studies published before July 2011. Core items of identified studies were independently extracted by 2 reviewers, and results were summarized by standard methods of meta-analysis. They identified 17 studies from 7 countries. Current smoking was associated with increased all-cause mortality in all studies. Relative mortality (RM) compared with never smokers ranged from 1.2 to 3.4 across studies and was 1.83 (95% CI, 1.65-2.03) in the meta-analysis. A decrease of RM of current smokers with increasing age was observed, but mortality remained increased up to the highest ages. Furthermore, a dose-response relationship of the amount of smoked cigarettes and premature death was observed. Former smokers likewise had an increased mortality (meta-analysis: RM, 1.34; 95% CI, 1.28-1.40), but excess mortality compared with never smokers clearly decreased with duration of cessation. Benefits of smoking cessation were evident in all age groups, including subjects 80 years

and older. Smoking remains a strong risk factor for premature mortality also at older age. It was found that smoking cessation was beneficial at any age.

Gupta P C and Mehta H C (2000) carried out a cohort study in the city of Mumbai, India, to estimate the relative risks for all-cause mortality among various kinds of tobacco users. A baseline survey of all individuals aged 35 years using voters' lists as a selection frame was conducted using a house-to-house approach and face-to-face interviews. Active follow-up of 52,568 individuals in the cohort was undertaken 5–6 years after the baseline study, and 97.6% were traced. A total of 4358 deaths were recorded among these individuals. The annual age-adjusted mortality rates were 18.4 per 1000 for men and 12.4 per 1000 for women. For men the mortality rates for smokers were higher than those of non-users of tobacco across all age groups, with the difference being greater for lower age groups (35–54 years). Mortality rates were calculated using the person-years method. The relative risk was 1. 39 for cigarette smokers and 1.78 for bidi smokers with an apparent dose–response relationship for frequency of smoking. Women were basically smokeless tobacco users, with the relative risk among such users being 1.35 and a suggestion of a dose–response relationship. These findings established that bidi smoking as no less hazardous than cigarette smoking and indicated that smokeless tobacco use may also cause higher mortality.

Gupta PC, et al. (2005) studied on absolute and relative risks of mortality among various kinds of ever tobacco users vs never-users in the city of Mumbai, India. Using the Mumbai voters' list as the selection frame, 99 570 individuals aged ≥35 years were interviewed at their homes during 1992–94. At active follow-up (during 1997–99) after 5.5 years, 97 244 (97.7%) were traced. Among those, 7531 deaths (4119 men, 3412 women) were recorded, of which 89% died within study area. It was possible to abstract cause of death information from the records of the municipal corporation for 5470 deaths. These were coded using ICD 10. The adjusted relative risk was 1.37 (95% CI 1.23–1.53) for (men) cigarette smokers and 1.64 (95% CI 1.47–1.81) for bidi smokers, with a significant dose–response relationship for number of bidis or cigarettes smoked. Women were essentially smokeless tobacco users; the adjusted relative risk was 1.25 (95% CI 1.15–1.35). The risk of deaths from respiratory diseases (RR 2.12, 95% CI 1.57–2.87), tuberculosis (RR 2.30, 95% CI 1.68–3.15), and neoplasm's (RR 2.60, 95% CI 1.78–3.80) were significantly high in male smokers than never tobacco users. They study indicated that Bidi was no less hazardous than cigarette smoking, and smokeless tobacco use may also result in significantly increased mortality.

Helyer AJ, et al. (1995) estimated the disease burden of cigarette smoking for department of defense (DOD) health care in terms of smoking attributable morbidity, mortality, excess medical care, and excess disability. Prevalence based analysis of smoking attributable mortality and cost of illness based on

DOD health care costs, characteristics of the total DOD population, and specific disease characteristics. The method, developed by CDC, was used by states to assist policymakers in strengthening tobacco control efforts. In the research cost and death estimates were based on a total DOD (active duty, dependent, retiree) population of approximately 8.3 million persons in 1995 and for smokers age 35 years and older. Although younger smokers suffered health problems, the health and cost effects were largely experience after age 35. Smoking was attributable disease accounted for 1 in 6 deaths, about 16 percent of the deaths in the total DOD population in 1995: Cardiovascular deaths(45%), Neoplasm(35%), Respiratory Diseases(19%), and Neonatal(1%). A significant portion of DOD health care resources were spent caring for smoking-attributable disease, which is preventable. Vigorous efforts were needed to prevent the initiation of smoking, encourage smoking cessation, and strengthen control measures.

Holman CD and Shean RE (1986) determined proportions of total deaths and premature adult mortality in 1979-1983, and of short-stay hospital admissions and bed-days in 1983, that were attributable to the smoking of tobacco were estimated in Western Australia by the use of etiological fractions that had been derived from the published literature. Premature adult mortality was measured by the person-years of life that were lost from ages 15 to 69 years (PYLL 15-69). In men it was estimated that 25% of all deaths and 14% of PYLL 15-69 were attributable to smoking. In women the corresponding proportions were

15% of deaths and 8% of PYLL 15-69. The proportions of short-stay hospital bed-days that were attributable to smoking were estimated at 7% in men and 3% in women; for hospital admissions the estimates were 4% and 1% in men and women, respectively. In all, tobacco-related disease and injury accounted for around 1700 deaths and 7500 short-stay hospitalizations each year in a population of 1.4 million persons.

Jemal A, et al. (2008) studied on lung cancer incidence and death rates, tobacco use, and tobacco control by state of residence. Information on invasive cancers was obtained from the NCI, CDC, and NAACCR and information on mortality from the CDC's National Center for Health Statistics. Annual percentage changes in the age-standardized incidence and death rates (2000 US population standard) for all cancers combined and for the top 15 cancers were estimated by join point analysis of long-term (1975–2005) trends and by least squares linear regression of short-term (1996–2005) trends. All statistical tests were two-sided. Both incidence and death rates from all cancers combined decreased statistically significantly ($P < .05$) in men and women overall and in most racial and ethnic populations. These decreases were driven largely by declines in both incidence and death rates for the three most common cancers in men (lung, colorectal, and prostate) and for two of the three leading cancers in women (breast and colorectal), combined with a leveling off of lung cancer death rates in women. Although the national trend in female lung cancer death rates had stabilized since 2003, after increasing for several decades, there was

prominent state and regional variation. Lung cancer incidence and/or death rates among women increased in 18 states, 16 of them in the South or Midwest, where, on average, the prevalence of smoking was higher and the annual percentage decrease in current smoking among adult women was lower than in the West and Northeast. California was the only state with decreasing lung cancer incidence and death rates in women. The study indicated although the decrease in overall cancer incidence and death rates was encouraging, large state and regional differences in lung cancer trends among women underscore the need to maintain and strengthen many state tobacco control programs.

Jiang J, et al. (2010) provided a more accurate estimate of early smoking-attributable mortality and potential years of life lost using data from a representative study of 103 study areas in China. Two datasets were employed as follows. Firstly, retrospective national mortality survey data, which included a population of 67 million in 103 study areas and about 1 million adults who died in 1986–1988; secondly, nationally representative case-control comparative data which was extracted from the survey data to measure the effect of smoking on age trends in smoking-attributable mortality. Potential years of life lost, and sex differences in life expectancy in smokers and non-smokers in the total population aged 35 and over were also estimated. Tobacco caused 11.2% (16.0% of men and 3.7% of women) of total deaths in 1987, and more than two-thirds of those excess deaths occurred between the ages of 50 and 74 years, but only less than 5% excess deaths occurred at ages under 50.

Although life expectancies varied with region or sex differences, the years of life lost attributable to smoking was almost the same. Smokers at age 35 lost about 3 years of life expectancy in comparison with never smokers. The study also confirmed that more than 50% of the sex difference in life expectancy was accounted for by smoking. Fully understanding the consequences of smoking in relation to mortality can clarify its effects on the health and longevity of the entire population.

Khan MH, et al. (2009) used secondary data which was collected by the 2006 Urban Health Survey on Bangladesh. The data were representative for the urban areas in Bangladesh. Both slums and non-slums located in the six City Corporations were considered. Slums in the cities were identified by two steps, first by using the satellite images and secondly by ground truthing. At the next stage, several clusters of households were selected by using proportional sampling. Then from each of the selected clusters, about 25 households were randomly selected. Information of a total of 12,155 adult men, aged 15–59 years, was analyzed by stratifying them into slum (= 6,488) and non-slum (= 5,667) groups. Simple frequency, bivariable and multiple logistic regression analyses were performed using SPSS. In the study the author found that overall smoking prevalence for the total sample was 53.6% with significantly higher prevalence among men in slums (59.8%) than non-slums (46.4%). Respondents living in slums reported a significantly ($P<0.001$) higher prevalence of smoking cigarettes (53.3%) as compared to those living in non-slums (44.6%). A similar

pattern was found for bidi (slums=11.4% and non-slums=3.2%, P<0.001). Multiple logistic regression revealed significantly higher odds ratio (OR) of smoking cigarettes (OR = 1.12, 95% CI = 1.03–1.22), bidis (OR = 1.90, 95% CI = 1.58–2.29) and any of the two (OR = 1.23, 95% CI = 1.13–1.34) among men living in slums as compared to those living in non-slums when controlled for age, division, education, marital status, religion, birth place and types of work. Division, education and types of work were the common significant correlates for both cigarette and bidi smoking in slums and non-slums by multivariable logistic regressions. Other significant correlates of smoking cigarettes were marital status (both areas), birth place (slums), and religion (non-slums). Similarly significant factors for smoking bidis were age (both areas), marital status (slums), religion (non-slums), and birth place (both areas).

Liu B-Q, et al. (1998) assessed the hazards at an early phase of the growing epidemic of deaths from tobacco in China. Design by Smoking habits before 1980 (obtained from family or other informants) of 0.7 million adults who had died of neoplastic, respiratory, or vascular causes were compared with those of a reference group of 0.2 million who had died of other causes. Analysis was based on 24 urban and 74 rural areas of China. One million people who had died during 1986-8 and whose families could be interviewed were their subject. Tobacco attributable mortality in middle or old age from neoplastic, respiratory, or vascular disease measured as main outcome. Among male smokers aged 35-69 there was a 51% excess of neoplastic deaths, a 31% excess

of respiratory deaths, and a 15% excess of vascular deaths. All three excesses were significant ($P < 0.0001$). Among male smokers aged >70 there was a 39% excess of neoplastic deaths, a 54% excess of respiratory deaths, and a 6% excess of vascular deaths. Fewer women smoked, but those who did had tobacco attributable risks of lung cancer and respiratory disease about the same as men. For both sexes, the lung cancer rates at ages 35-69 were about three times as great in smokers as in non-smokers, but because the rates among non-smokers in different parts of China varied widely the absolute excesses of lung cancer in smokers also varied. Of all deaths attributed to tobacco, 45% were due to chronic obstructive pulmonary disease and 15% to lung cancer; esophageal cancer, stomach cancer, liver cancer, tuberculosis, stroke, and ischemic heart disease each caused 5-8%.

Lopez AD, et al. (1994) conducted a study and it was found from the study that tobacco consumption continued and was increasing in many countries, especially in Asia and in Southern and Eastern Europe. A major factor affecting public awareness of the substantial health hazard of tobacco use in three to four decade lag between the peak in smoking prevalence the subsequent peak in smoking-related mortality. Based on nearly 100 years of observations in countries with longest history of widespread cigarette use, a four stage model of cigarette consumption and subsequent mortality among men and women was proposed. From the model it was clear that, during certain period of evaluation of the epidemic it was to be expected that smoking

attributable mortality to be rise at the same time that smoking prevalence might be decreased. Broad geographic classifications of regions were given, according to the stage of the epidemic that they were experienced. Tobacco control policy implications for countries each of the four stages of the cigarette epidemic were also discussed.

Michael C and Flore MD (2000) provided recommendations for brief clinical interventions, intensive clinical interventions, and system changes to promote the treatment of tobacco dependence. An independent panel of 18 scientists, clinicians, consumers and methodologists selected by the US Agency for Healthcare Research and Quality. A consortium of 7 governmental and nonprofit organizations sponsored the update. One panel meeting and numerous conference calls and staff meetings were held to evaluate meta-analytic and other results, to synthesize the results, and to develop recommendations. The updated guideline was then externally reviewed by more than 70 experts and revised. That evidence-based, updated guideline provides specific recommendations regarding brief and intensive tobacco cessation interventions as well as system-level changes designed to promote the assessment and treatment of tobacco use. Brief clinical approaches for patients willing and unwilling to quit were described. Major conclusions and recommendations included: (1) Tobacco dependence was a chronic condition that warrants repeated treatment until long-term or permanent abstinence was achieved. (2) Effective treatments for tobacco dependence exist and all tobacco

users should be offered those treatments. (3) Clinicians and health care delivery systems must institutionalize the consistent identification, documentation, and treatment of every tobacco user at every visit. (4) Brief tobacco dependence treatment was effective, and every tobacco user should be offered at least brief treatment. (5) There was a strong dose-response relationship between the intensity of tobacco dependence counseling and its effectiveness. (6) Three types of counseling were found to be especially effective—practical counseling, social support as part of treatment, and social support arranged outside of treatment. (7) Five first-line pharmacotherapies for tobacco dependence—sustained-release bupropion hydrochloride, nicotine gum, nicotine inhaler, nicotine nasal spray, and nicotine patch—were effective, and at least 1 of these medications should be prescribed in the absence of contraindications. (8) Tobacco dependence treatments were cost-effective relative to other medical and disease prevention interventions; as such, all health insurance plans should include as a reimbursed benefit the counseling and pharmacotherapeutic treatments identified as effective in the updated guideline.

Mokdad AH, et al. (2004) identified and quantified the leading causes of mortality in the United States. Comprehensive MEDLINE search of English-language articles that identified epidemiological, clinical, and laboratory studies linking risk behaviors and mortality was considered as design. The search was initially restricted to articles published during or after 1990, but

they later included relevant articles published in 1980 to December 31, 2002. Prevalence and relative risk were identified during the literature search. They used 2000 mortality data reported to the Centers for Disease Control and Prevention to identify the causes and number of deaths. The estimates of cause of death were computed by multiplying estimates of the cause-attributable fraction of preventable deaths with the total mortality data. Actual causes of death were measures as main outcome. The leading causes of death in 2000 were tobacco (435 000 deaths; 18.1% of total US deaths), poor diet and physical inactivity (400 000 deaths; 16.6%), and alcohol consumption (85 000 deaths; 3.5%). Other actual causes of death were microbial agents (75 000), toxic agents (55 000), motor vehicle crashes (43 000), incidents involving firearms (29 000), sexual behaviors (20 000), and illicit use of drugs (17 000). These analyses showed that smoking remains the leading cause of mortality.

Palipudi KM, et al. (2012) examined the role of social determinants on current tobacco use in thirteen low-and-middle income countries. They used nationally representative data from the Global Adult Tobacco Survey (GATS) conducted during 2008–2010 in 13 low-and-middle income countries: Bangladesh, China, Egypt, India, Mexico, Philippines, Poland, Russian Federation, Thailand, Turkey, Ukraine, Uruguay, and Viet Nam. These surveys provided information on 209,027 respondent's aged 15 years and above and the country datasets were analyzed individually for estimating current tobacco use across various socio-demographic factors (gender, age, place of residence,

education, wealth index, and knowledge on harmful effects of smoking). Multiple logistic regression analysis was used to predict the impact of those determinants on current tobacco use status. Current tobacco use was defined as current smoking or use of smokeless tobacco, either daily or occasionally. Former smokers were excluded from the analysis. Adjusted odds ratios for current tobacco use after controlling other cofactors, was significantly higher for males across all countries and for urban areas in eight of the 13 countries. For educational level, the trend was significant in Bangladesh, Egypt, India, Philippines and Thailand demonstrating decreasing prevalence of tobacco use with increasing levels of education. For wealth index, the trend of decreasing prevalence of tobacco use with increasing wealth was significant for Bangladesh, India, Philippines, Thailand, Turkey, Ukraine, Uruguay and Viet Nam. The trend of decreasing prevalence with increasing levels of knowledge on harmful effects of smoking was significant in China, India, Philippines, Poland, Russian Federation, Thailand, Ukraine and Viet Nam.

Pedenekar MS, et al. (2008) conducted a prospective cohort study of 148,173 men and women aged ≥35 years in Mumbai, India. Subjects were recruited during 1991–1997 and then followed for approximately 5–6 years (1997–2003). During 774,129 person-years of follow-up, 13,261 deaths were observed. Tobacco use increased the risk of death across different categories of body mass, with particularly high risks being observed in extreme body mass categories. Among men, obese smokers and obese never users of tobacco were

at 56% and 34% increased risks of death, respectively, compared with overweight never users of tobacco. Similarly, at highest risk were extremely thin males who smoked bidis (relative risk = 3.45) or cigarettes (relative risk = 3.32). Body mass and all forms of tobacco use had independent as well as multiplicative joint effects on mortality risk. Tobacco use and under nutrition were serious problems in India. The study indicated that obesity may emerge as a serious public health problem with which tobacco use may interact.

Peterson AV, et al. (2000) determined the long-term impact of a theory-based, social influences, grade 3–12 intervention on smoking prevalence among youth. Forty Washington school districts were randomly assigned to the intervention or to the control condition. Study participants were children enrolled in two consecutive 3rd grades in the 40 districts (n = 8388); they were followed to 2 years after high school. The trial achieved high implementation fidelity and 94% follow-up. Data were analyzed with the use of group-permutation methods, and all statistical tests were two-sided. No significant difference in prevalence of daily smoking was found between students in the control and experimental districts, either at grade 12 (difference [Δ] = 0.2%, 95% confidence interval [CI] = −4.6% to 4.4%, and P = .91 for girls; Δ = 0.3%, 95% CI = −5.0% to 5.5%, and P = .89 for boys) or at 2 years after high school (Δ = −1.4%, 95% CI = −5.0% to 1.6%, and P = .38 for girls; Δ = 2.6%, 95% CI = −2.5% to 7.7%, and P = .30 for boys). Moreover, no intervention impact was observed for other smoking outcomes, such as extent of current smoking or

cumulative amount smoked, or in subgroups that differ in a priori specified variables, such as family risk for smoking. The rigor of the HSPP trial suggests high credence for the intervention impact results. Consistent with previous trials, there was no evidence from the study that a school-based social-influences approach was effective in the long-term deterrence of smoking among youth.

Peto R, et al. (1996) estimated the numbers and proportions of death attributable to smoking in 44 developed countries in 1990. In developed countries as a whole, tobacco was responsible for 24% of all male deaths and 7% of all female deaths, rising to over 40% in men in some former socialist economies and 17% in women in the USA. The average loss of life for all cigarette smokers was about 8 years and for those whose deaths were attributable to tobacco about 16 years. Trends in mortality attributable to tobacco differed by half in men since 1965; in others it was continuing to increase. In women, the proportion was mostly increasing, almost universally in old age. Mortality not attributable to smoking decreased since 1955 in all OECD (Organization for European Collaboration and Development) countries, by up to 60% in men and more in women. No precise estimate can be made of the number of deaths attributable to smoking in undeveloped countries, but the prevalence of smoking suggests that it will be large. In the world as a whole, some 3 million deaths a year are estimated to be attributable to smoking, rising to 10 million a year in 30–40 years' time.

Rahman M, et al. (2003) undertook a meta-analysis of epidemiological studies investigating the relationship between bidi smoking and oral cancer. Primary studies were identified through a computerized literature search of Medline. Articles abstracted were all epidemiological studies published as original articles in English during 1966–2002 that included quantitative information on bidi smoking and oral cancer. Odds ratios (OR) were calculated based on random effects model. A total of 12 case-control studies used for this meta-analysis provided the summary estimates of OR of bidi smoking for oral cancer compared to that of nonsmokers. An increased risk of oral cancer was found for bidi smokers compared to never smokers (OR =3.1, 95% confidence interval [CI] 2.0 –5.0) whereas no significant pattern of risk was found for cigarette smokers (OR=1.1, 95% CI=0.7–1.8). There was substantial heterogeneity in the pooled OR estimate. The results clearly indicated that bidi smokers were at increased risk of oral cancer. It was found that the information be incorporated into smoking prevention which was important and cessation efforts, particularly among the urban poor and rural mass in South Asian countries where bidi smoking was widely prevalent.

Rani M, et al. (2003) estimated the prevalence and the socioeconomic and demographic correlates of tobacco. The data for the study came from the household questionnaire fielded under NFHS-2—a nationally representative, cross sectional, household sample survey conducted in 1998–99 covering 99% of India's population living in 26 states. A sample of 91196 households yielded

334553 individuals—160 871 men and 154 726 women—15 years and older, which constituted the study population for estimating the prevalence of tobacco consumption. Family Health Survey-2 (1998–99). Data on tobacco consumption were elicited from household informants. Prevalence of current smoking and current chewing of tobacco were used as outcome measures. Simple and two ways cross tabulations and multivariate logistic regression analysis were the main analytical methods. Thirty per cent of the population 15 years or older—47% men and 14% of women—either smoked or chewed tobacco, which translates to almost 195 million people—154 million men and 41million women in India. However, the prevalence may be underestimated by almost 11% and 1.5% for chewing tobacco among men and women, respectively, and by 5% and 0.5% for smoking among men and women, respectively, because of use of household informants. Tobacco consumption was significantly higher in poor, less educated, scheduled castes and scheduled tribe populations. The prevalence of tobacco consumption increased up to the age of 50 years and then leveled or declined. The prevalence of smoking and chewing also varied widely between different states and had a strong association with individual's socio-cultural characteristics. The findings of the study highlight that an agenda to improve health outcomes among the poor in India must include effective interventions to control tobacco use. Failure to do so would most likely result in doubling the burden of diseases—both communicable and non-communicable—among India's teeming poor. There was a need for periodical surveys using more consistent definitions of tobacco

use and eliciting information on different types of tobacco consumed. The study also suggested a need to adjust the prevalence estimates based on household informants.

Rehm J, et al. (2006) found burden of disease from alcohol, illicit drugs and tobacco. The use of alcohol, tobacco and illicit drugs entails considerable burden of disease: in 2000, about 4% of the global burden as measured in disability adjusted life years was attributable to each alcohol and tobacco, and 0.8% to illicit drugs. The burden of alcohol in the above statistic was calculated as net burden, i.e. incorporating the protective health effects. Tobacco use was found to be the most important of 25 risk factors for developed countries in the comparative risk assessment underlying the data. It had the highest mortality risk of all the substance use categories, especially for the elderly. Alcohol use was also important in developed countries, but constituted the most important of all risk factors in emerging economies. Alcohol use affected younger people than tobacco, both in terms of disability and mortality. The burden of disease attributable to the use of legal substances clearly outweighed the use of illegal drugs. A large part of the substance-attributable burden would be avoidable if known effective interventions were implemented.

Richter KP, et al. (2001) examined tobacco use prevalence, types of tobacco used, interest in quitting, and prior quit attempts among persons in methadone maintenance treatment. Counselors collected surveys from 84% (550 of 655) of all clients in a 4-county metropolitan area. Most clients (77%) smoked

cigarettes. Of the 59 former tobacco users, only 6 reported using a cessation pharmacotherapy to quit. Three quarters of the current smokers had attempted to quit at least once, with an average of 5 attempts. Most smokers (80%) were "somewhat" or "very" interested in quitting. The quit ratio among methadone maintenance treatment clients was 12%, compared with 50% nationwide. To reduce morbidity and mortality, cessation interventions must be developed and disseminated. Descriptive statistics were calculated with SAS.17 Frequencies and percentages were calculated for all categorical variables. Means, medians, SDs, and ranges were computed for continuous variables. Age was grouped into 5 categories. We used 5 racial/ethnic categories but in analyses combined these into 2 groups—White and people of color—to maximize power to examine differences in smoking behaviors between racial/ethnic minority and White persons. Confidence intervals and hypothesis tests were constructed with Minitab (Minitab, Inc, State College, Pa) to examine sex and racial/ethnic inferences in tobacco use. Inferential statistics included χ^2 analyses and t tests.

Rivara PF, et al. (2004) determined the number of smoking-attributable deaths and years of potential life lost (YPLL) in adults that might be saved through interventions to reduce smoking prevalence among children and adolescents. Calculation of the smoking-attributable mortality and years of potential life lost by age 85 among the cohort of people aged 18 in 2000. By age 85, there would be 127,670 smoking-attributable deaths among women and 284,502 deaths among men, for a total 412,172 smoking-attributable deaths in the United States among the cohort of 3,964,704 people aged 18 years alive in 2000.

Through large-scale multimedia campaigns and a $1 increase in the price per pack of cigarettes, smoking prevalence could be reduced by 26% and would result in an annual savings of 108,466 lives and 1.6 million YPLL. The study indicated that interventions to decrease smoking prevalence among children and adolescents can have large effects on adult mortality.

Shopland DR (1995) provided an overview of the relationship between tobacco use and early cancer mortality. It presented a retrospective examination of trends in smoking behavior and how these trends affected the national lung cancer mortality pattern during this century. Information on smoking prevalence was presented for black and white men and women for each 5-year birth cohort between 1885 and 1969. The author argued that the lung cancer mortality pattern observed in the United States since 1950 was entirely compatible with changes in smoking behavior among the various birth cohorts examined. The paper also reviewed our current scientific knowledge about the etiological relationship between cigarette smoking and site-specific cancer mortality, with particular emphasis on lung cancer. Data on other forms of tobacco use and cancer mortality risks were included as are data on environmental tobacco smoke exposures and nonsmokers' lung cancer risk. Data were presented to demonstrate that cigarette use alone will be responsible for nearly one-third of the U.S. cancer deaths expected in the United States in 1995, or 168,000 premature cancer deaths. The paper showed risk for women who had never smoked relative to that for current smokers who had smoked for

one to 19 years was 0.3 and risk for men who had never smoked relative to that for current smokers who had smoked for 1 to 19 years was 0.6. Among males, 38% of all cancer deaths were cigarette related, while among women 23% of all cancer deaths were due to cigarettes. These totals, however, include neither the cancer deaths that could reasonably be attributed to pipe, cigar, and smokeless tobacco use among males nor the estimated 3000 to 6000 environmental tobacco smoke-related lung cancer deaths that occur annually in nonsmokers. It was concluded that tobacco use, particularly the practice of cigarette smoking, is the single greatest cause of excess cancer mortality in U.S. populations.

Sorensen G, et al. (2005) assessed social disparities in the prevalence of overall tobacco use, smoking, and smokeless tobacco use in Mumbai, India, by examining occupation-, education-, and gender-specific patterns. Data were derived from a cross-sectional survey conducted between 1992 and 1994 as the baseline for the Mumbai Cohort Study (n=81837). Odds ratios (ORs) for overall tobacco use according to education level (after adjustment for age and occupation) showed a strong gradient; risks were higher among illiterate participants (male OR = 7.38, female OR = 20.95) than among college educated participants. After age and education had been controlled, odds of tobacco use were also significant according to occupation; unskilled male workers (OR = 1.66), male service workers (OR = 1.32), and unemployed individuals (male OR = 1.84, female OR = 1.95) were more at risk than

professionals. The steepest education- and occupation-specific gradients were observed among male bidi smokers and female smokeless tobacco users. The results of the study indicated that education and occupation have important simultaneous and independent relationships with tobacco use that require attention from policymakers and researchers alike.

Teo KK, et al. (2006) assessed the risks associated with tobacco use (both smoking and non-smoking) and second hand tobacco smoke (SHS) worldwide. They did a standardized case-control study of acute myocardial infarction (AMI) with 27 089 participants in 52 countries (12 461 cases, 14 637 controls). They assessed relation between risk of AMI and current or former smoking, type of tobacco, amount smoked, effect of smokeless tobacco, and exposure to SHS. They controlled for confounders such as differences in lifestyles between smokers and non-smokers. Current smoking was associated with a greater risk of non-fatal AMI (odds ratio [OR] 2·95, 95% CI 2·77–3·14, p<0·0001) compared with never smoking; risk increased by 5·6% for every additional cigarette smoked. The OR associated with former smoking fell to 1·87 (95% CI 1·55–2·24) within 3 years of quitting. A residual excess risk remained 20 or more years after quitting (1·22, 1·09–1·37). Exclusion of individuals exposed to SHS in the never smoker reference group raised the risk in former smokers by about 10%. Smoking biddies alone (indigenous to South Asia) was associated with increased risk (2·89, 2·11–3·96) similar to that associated with cigarette smoking. Chewing tobacco alone was associated with OR 2·23 (1·41–

3·52), and smokers who also chewed tobacco had the highest increase in risk (4·09, 2·98–5·61). SHS was associated with a graded increase in risk related to exposure; OR was 1·24 (1·17–1·32) in individuals who were least exposed (1–7 h per week) and 1·62 (1·45–1·81) in people who were most exposed (>21 h per week). Young male current smokers had the highest population attributable risk (58·3%; 95% CI 55·0–61·6) and older women the lowest (6·2%, 4·1–9·2). Population attributable risk for exposure to SHS for more than 1 h per week in never smokers was 15·4% (12·1–19·3).

Thun MJ, et al. (2000) determined age and the exposure response relationships between cigarette smoking and premature death. Subject in the analysis were drawn from CPS-II (Garfinkel, 1985; Garfinkel and stellman, 1988), a nationwide prospective mortality study of 185106 men and women, begun by the ACS in 1982. They find death rates from all combined causes were substantially higher in men and women who smoked cigarettes than in lifelong non-smokers. Because the death Current Smokers rates increased more steeply with age in smokers than in nonsmokers, the absolute difference in death rates (RD) increased with the age of the smoker. The RD associated with any current cigarette smoking peaked among smokers at 4,981.3 deaths per 100,000 person-years in men and 1,805 in women at the oldest ages. When the death rate in smokers was expressed relative to that in nonsmokers, the effect of smoking as reflected by the RR decreased rather than increased beyond age 65. Among men, all-cause death rates between ages 35 and 59 were about three

times higher in smokers than nonsmokers, whereas rates were 1.9 times higher at age 80 and older. Among women, the all-cause RR peaked at 2.3 times higher for smokers vs. nonsmokers at ages 60 to 69 and decreased to 1.6 times higher in the oldest age group The decline in the all-cause RR with age indicates that, even though the death rate of smokers increases faster with age than that of nonsmokers, it does not keep pace on a multiplicative scale with the rising background risk in nonsmokers beyond age 59 in men and age 69 in women. Programs that prevent young people from starting smoking and enable those who already smoke to quit by middle age would have the greatest short- and long-term impact on the tobacco epidemic.

Welte R, et al. (1999) investigated the years of potential life lost, the direct medical costs and the indirect costs of cigarette smoking in Germany. Using the concept of attributable risks and the prevalence-based approach smoking-attributable mortality and morbidity were calculated for 1993. Neoplasms, cardiovascular diseases, respiratory diseases, perinatal diseases and burn deaths were considered. Attributable risks stem from the literature and were processed in an epidemiological model. Costs were estimated from a societal perspective. Direct costs were mainly calculated based on routine utilization and expenditure statistics and indirect costs were calculated according to the human capital approach. Twenty-two percent of all male and 5% of all female deaths as well as 1.5 million years of potential life lost were attributable to smoking. The study provided a conservative estimate of the costs of smoking in

Germany. The magnitude was considered sufficient reason to call for stronger support of cost-effective, smoke-cessation measures and of anti-smoking policy.

Zorrilla-Torras B (2005) evaluated the impact of smoking in public health smoking attributable mortality was estimated for 1998 and for changes since 1992. The number of smoking attributable deaths and years of potential life lost attributable to cigarette smoking for 1992 and 1998 by gender and age group were estimated, based on the population attributable fraction. The relative risks of the Cancer Prevention Study II were used. To compare the two periods of study, a Poisson regression analysis adjusted by age was applied. In 1998, 15.9% of total mortality in the population older than 34 years was attributable to smoking. Lung cancer and chronic obstructive pulmonary disease are the main causes of death in both genders. In the period studied, 1992–1998, the adjusted rates diminished in men in both age groups, while in women they increased in the age group 35 to 64 years. The mortality from lung cancer remained stable in men, increasing in women by 12%. The years of potential life lost decreased by 14% in men and increased by 42% in women. Conclusions: One in four deaths in men and one in 36 deaths in women were attributed to cigarette smoking. The study indicated that smoking attributable mortality in males had been tended to stabilize, while in women premature mortality was been increased.

1.3 Aims and objectives of the study

In previous literatures maximum of them considered only prevalence of tobacco use and their correlates. Very few studies considered knowledge and awareness [Gupta B and Kumar N, 2014; MMWR, 2010]. However, those studies considered data from other countries. None of those studies have used nationally representative data of Bangladesh.

The main object of this research is

- To determine the level of knowledge and the level of awareness towards the adverse health effect of tobacco use (Smoking, smokeless and secondhand smoke)
- To identify the socio-demographic and economic determinants of knowledge and awareness towards tobacco use.

1.4 Organization of the study

The study has been carried out the following seven chapters maintaining the proper sequence.

Chapter I: Introduction with background, review of earlier studies, motivation, aims and objectives have been discussed in this chapter.

Chapter II: Chapter two presents the data source including study design. Methodology of the study has also been discussed in this chapter.

Chapter III: In this chapter characteristics of the study subject has been represented and some of their corresponding graphs have been presented. Descriptive analysis has been performed to know the characteristics of the study subjects. For that frequencies with percentages, mean with standard deviation and median with inter-quartile range have been reported.

Chapter IV: In chapter four determine the level of knowledge and to understand their awareness towards smoking and to determine how socio demographic background, smoking status and knowledge on the health risks of smoking contribute toward the development of such attitude. A comparison of socio-demographic and economic characteristics of study subjects to gender and residence for current tobacco smokers, smokeless and secondhand smoke group have been performed. To compare variables chi-square test (Pearson Chi-square or Likelihood Ratio Chi-square) has been used to categorical variable and prevalence with 95% confidence interval has been reported for individual variable. Mean with 95% confidence interval has been reported for continuous variable. These tests have been performed at 5% level of significance.

Chapter V: This chapter aims to compare various socio-demographic and economic factors to knowledge and awareness towards tobacco use in Bangladesh.

Chapter VI: In this chapter determinants of knowledge and awareness towards tobacco use have been identified. For that logistic regression has been used. We have used binary logistic regression model to identify the significant variables using 'Forward Stepwise (Likelihood Ratio)' method. ORs with 95% CI have been reported. We have constructed the ROC curve to check the prediction accuracy of the model.

Chapter VII: This chapter summarizes various findings of the study and concludes about the findings stating the necessary policy implications to increase the knowledge and awareness towards tobacco use in Bangladesh.

CHAPTER TWO

DATA AND METHODOLOGY

2.1 Introduction

In chapter one the background and objectives of the study have been discussed. It also reviews some important and relevant literatures. In any study it is essential to mention the data source, to discuss and narrate the methodology of the study. In this chapter the data source, the study design and a general description of questionnaires (information on tobacco use, cessation, second-hand smoke, economics, media, knowledge, attitudes and perceptions) have been discussed.

2.2 Data Source

This study is based on the data from Global Adult Tobacco Survey (i.e., GATS: Version 2.0. Atlanta, GA: Centers for Disease Control and Prevention, 2010). The survey was conducted in Bangladesh, Brazil, China, Egypt, India, Mexico, Philippines, Poland, Russia, Thailand, Turkey, Ukraine, Uruguay and Vietnam from 2008 to 2010. We have used only the data of Bangladesh which have information on 9629 respondents aged 15 years and above. The Global Adult Tobacco Survey (GATS) is a nationally representative household survey of men and women aged 15 years and above. It is designed to produce internationally comparable data on tobacco use and tobacco control measures

using a standardized questionnaire, sample design, data collection, aggregation and analysis procedures. In Bangladesh, the survey was implemented by the National Institute of Preventive and Social Medicine (NIPSOM) with the collaboration of National Institute of Population Research and Training (NIPORT) and the Bangladesh Bureau of Statistics (BBS). The Centers for Disease Control and Prevention (CDC), United States, and the World Health Organization have provided technical assistance. [Global Adult Tobacco Survey, 2010]

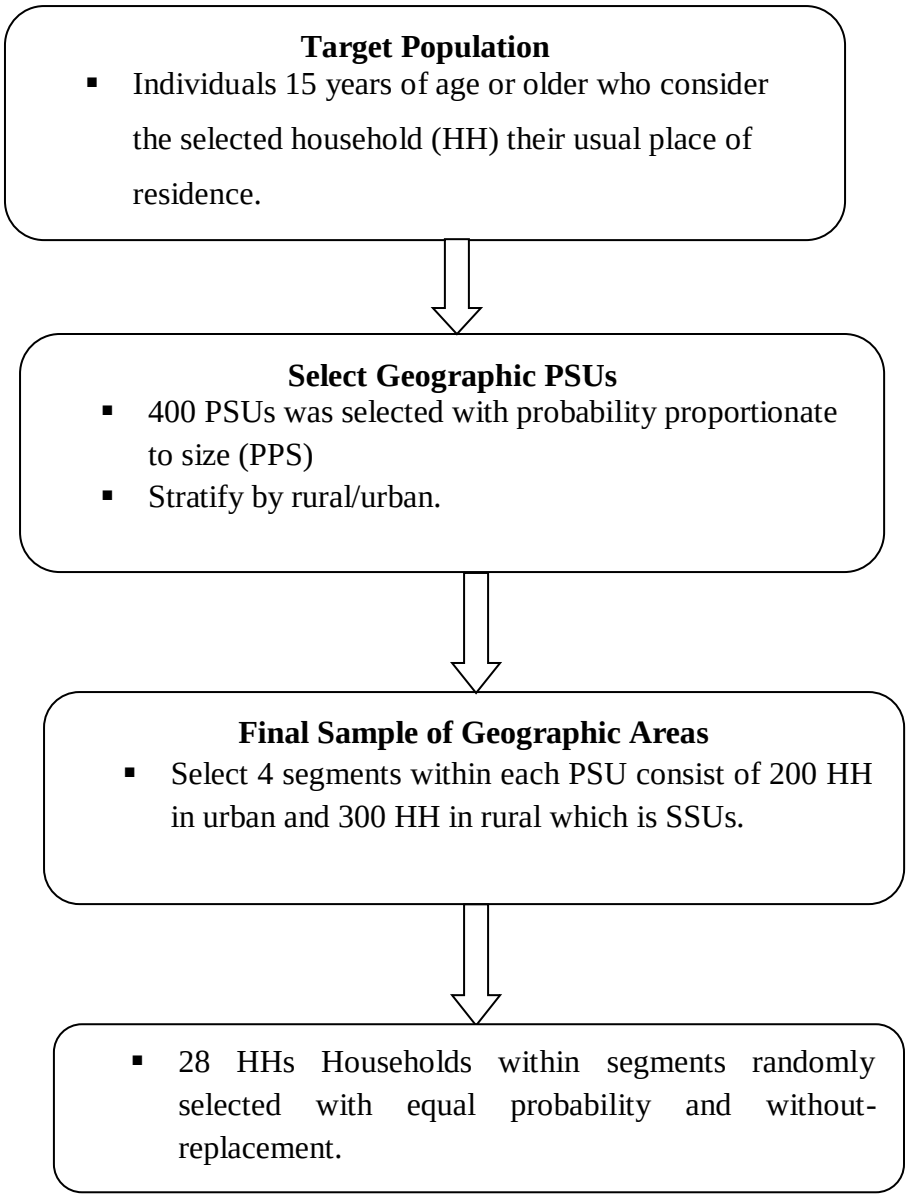
2.3 Study Design

The sampling frame used for GATS Bangladesh was the sampling frame used by population census of the People's Republic of Bangladesh conducted by Bangladesh Bureau of Statistic (BBS). The survey was based on a three-stage stratified cluster sample of households. At the first stage 400 Primary Sampling Units (PSUs) (Mauza in rural and Mohalla in urban areas) were selected with probability proportional to size (PPS) sampling, followed by a random selection of one Secondary Sampling Unit (SSU) per selected PSU. At the third stage households were selected systematically within the listed households from a selected SSU. SSUs were based upon Enumeration Areas (EA) from the Bangladesh Agricultural Census. These selected EAs were updated with mapping and listing. Typically these EAs consisted of 200 household units in Mauzas and 300 household units in each Mohalla. The explicit stratification used at the first stage of selection based upon urban (Mahalla) and rural (Mauza) designation of BBS. Each list of rural and urban geopolitical units was

implicitly stratified by division, and within division by the percent literacy of women in each Mahalla and Mauza. Data were collected from 200 urban and 200 rural primary sampling units (mauza in rural and mohalla in urban areas). Therefore, sample design for Bangladesh consists of 400 PSUs, 200 in urban areas and 200 in rural areas. After accounting for possible non-response and eligibility rates, it was determined to have an average of 28 households per selected SSU resulting in a total sample size of 11200 non-institutionalized households from all 6 administrative divisions covering 95.5% of the total population. As per design, one respondent was randomly selected for the interview from each selected eligible household to participate in the survey. The Bangladesh sample design provides cross-sectional estimates for the country as a whole as well as by urban, rural and gender.

Details about the study design can be found in Global Adult Tobacco Survey Collaborative Group. 2010a. *Global Adult Tobacco Surveys (GATS): Sample Design Manual.* [www.cdc.gov/tobacco/global].

Overview of GATS Sample Design with flowchart



2.4 Questionnaires

GATS Bangladesh collected information on a variety of indicators that will assist monitoring tobacco use prevalence and aid policy-makers and program managers to track and formulate tobacco control strategies. GATS in Bangladesh used two types of questionnaire: the household questionnaire and the individual questionnaire for all the adults age 15 and older. The household

and individual questionnaires (see appendix E for details) were based on GATS core questionnaire and optional questions which was designed for use in countries implementing GATS. In consultation with the NIPSOM, NIPORT, BBS, WHO Bangladesh and the technical committee under Ministry of Health and Family Welfare (MOHFW), these questionnaires were adapted and modified to reflect the relevant issues applicable for the country situation. The adaptations took place during a technical mission in consultation with Centers for Disease Control and Prevention (CDC), Atlanta and WHO South East Asia Regional Office (WHO- SEARO) in December 2007 in Dhaka, Bangladesh. The adapted questionnaire was approved by an in country technical committee and questionnaire review committee. The questionnaire was developed in English and later translated into Bangla. The questionnaire was also back translated to check the quality of translations. The questionnaire was finalized in January 2009 after incorporating the changes suggested from the pretest experience. Informed consent was used for both household and individual questionnaires (separately).

Household questionnaire: The household questionnaire collected information on all usual residents in the sampled household to identify eligible persons from the household (either male or female based on sampling strategy) and collect their basic information to select a random eligible respondent for the individual questionnaire. For all listed household members, basic information on age and sex were collected. The questionnaire also collected information on

current use of smoked and smokeless tobacco. The information on age was used to identify an eligible random respondent for the individual questionnaire.

Individual questionnaire: Individual questionnaire collected information from eligible selected male or female aged 15 years and older. The individual questionnaire consists of the eight sections:

a. Background characteristics*:* Questions on sex, age, education, Occupations, and possession of household items and material used for roof of the house which is refers as wealth index. Here the wealth index was constructed by the GATS Collaborator Team 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). Each asset was assigned a weight (factor score) generated through principal components analysis, and the resulting asset scores were standardized in relation to a normal distribution with a mean of zero and standard deviation of one. Each household was then assigned a score for each asset, and the scores were summed for each household; individuals were ranked according to the total score of the household in which they resided. The sample was then divided into quintiles from one (lowest) to five (highest). A single asset index was developed for the

whole sample; indices were not prepared for urban and rural populations separately [24].

b. Tobacco smoking: Questions cover patterns of use (daily consumption, less than daily consumption, not at all), former/past tobacco consumption, age of initiation of daily smoking, consumption of different tobacco products (cigarettes, bidi, hukkah, pipes, cigars and other smoked tobacco), nicotine dependence and frequency of attempts to quit. The term 'current tobacco smoking' includes 'daily' and/or 'occasional (less than daily)' tobacco smoking. Ex-smoking have not been included in the analysis of this thesis.

c. Smokeless tobacco: Questions cover patterns of use (daily consumption, less than daily consumption, not at all), former/past use of smokeless tobacco, age of initiation of daily use of smokeless tobacco, consumption of different smokeless tobacco products *(*zarda, sada pata, gul, nosshi, khoinee and other smokeless chewing tobacco products etc.), nicotine dependence, frequency of attempts to quit.

d. Cessation: Questions related to advice to quit smoking by health-care providers, methods used to try stop smoking. Similar information was solicited for cessation on smokeless tobacco as well.

e. Secondhand smoke: Questions were on smoking allowed in the home, exposure to secondhand smoke at home, indoor smoking policy at the work place, exposure in the last 30 days in the work place, government buildings/offices, health-care facilities, restaurants, and public transportation. There were some additional optional items on exposure that included universities, private workplaces, etc. as well as knowledge about serious illness in non-smokers due to secondhand smoke.

f. Economics: Questions cover type of tobacco product and quantity bought, cost of tobacco product(s), brand, type and source of last tobacco products purchased.

g. Media: Questions on exposure to advertising: television, radio, billboards, posters, newspapers/magazines, cinema, internet, public transportation, public walls, others; exposure to sporting events related to tobacco; exposure to music, theatre, art or fashion events connected with tobacco; exposure to tobacco promotion activities; reaction to health warning labels on cigarette packages; exposure to anti-tobacco advertising and information. Similar questions were included for smokeless tobacco as well. The reference period for the questions in this section was previous 30 days.

h. Knowledge, attitudes and perceptions: Questions regarding knowledge about health effects of both smoking and smokeless tobacco. Details about the

questionnaires can be found in Global Adult Tobacco Survey Collaboration Group, 2010. Global Adult Tobacco Survey (GATS). Core Questionnaire with Optional Questions, version 2.0, Atlanta, GA: Centers for Diseases Control and Prevention. http://www.cdc.gov/tobacco/global.

2.5 Methodology

Various statistical methodologies have been used to analyze the data in this study. First, descriptive analysis has been performed to know the characteristics of the study subjects. For that frequency with percentage, mean with standard deviation and median with inter-quartile range have been reported. Frequencies indicate the number of cases (respondents), which falls into each of the available categories. Frequencies can be displayed in terms of counts or percentages. Frequencies are usually displayed by means of frequency tables, but can also be displayed graphically in graphs and charts. Suitable graphs to display frequencies for categorical data are bar charts or pie charts.

A measure of central tendency is a single value that attempts to describe a set of data by identifying the central position within that set of data. As such, measures of central tendency are sometimes called measures of central location. They are also classed as summary statistics. The mean (often called the average) is most likely the measure of central tendency but there are others, such as, the median and the mode. The mean, median and mode are all valid measures of central tendency but under different conditions, some measures of central tendency become more appropriate to use than others. The mean (or

average) is the most popular and well known measure of central tendency. It can be used with both discrete and continuous data, although its use is most often with continuous data. The mean is equal to the sum of all the values in the data set divided by the number of values in the data set. So, if we have n values in a data set and they have values x_1, x_2, ..., x_n, then the sample mean, usually denoted by $\bar{x}$ (pronounced x bar), is:

$$\bar{x} = \frac{x_1 + x_2 + ... + x_n}{n} \Rightarrow \bar{x} = \frac{\sum_{i=1}^{n} x_i}{n}$$

However, one of its important properties is that it minimizes error in the prediction of any one value in the data set. That is, it is the value that produces the lowest amount of error from all other values in the data set. Another important property of the mean is that it includes every value in the data set as part of the calculation. In addition, the mean is the only measure of central tendency where the sum of the deviations of each value from the mean is always zero. The mean is valid only for interval data or ratio data. Since it uses the values of all of the data points in the population or sample, the mean is influenced by outliers that may be at the extremes of the data set. The median is determined by sorting the data set from lowest to highest values and taking the data point in the middle of the sequence. There is an equal number of points above and below the median. The median is usually preferred to other measures of central tendency when the data set is skewed (i.e. forms a skewed distribution) or dealing with ordinal data. However, the mode can also be appropriate in these situations but is not as commonly used as the median.

Unlike the mean, the median is not influenced by outliers at the extremes of the data set. For this reason, the median often is used when there are a few extreme values that could greatly influence the mean and distort what might be considered typical.

The standard deviation is a measure of the spread of scores within a set of data. The standard deviation is used in conjunction with the mean, to summaries continuous data not categorical data. In addition, the standard deviation, like the mean, is normally only appropriate when the continuous data is not significantly skewed or has outliers.

To eliminate the possible distortion caused by outliers, a common practice when measuring the spread of a data set is to use the inter-quartile range. The inter-quartile range is the range of the middle 50% of a distribution. Because any outliers in our distribution must be on the ends of the distribution, the range as a measure of dispersion can be strongly influenced by outliers. One solution to this problem is to eliminate the ends of the distribution and measure the range of scores in the middle. Thus, with the inter-quartile range we will eliminate the bottom 25% and top 25% of the distribution, and then measure the distance between the extremes of the middle 50% of the distribution that remains. The IQR is used to build box plots, simple graphical representation of a probability distribution. Invented in 1977 by statistician John Tukey, a box plot (also known as a box-and whisker plot) is a picture of the five-number summary of a data set. The box plot consists of a rectangular box that sits

above a scale and extends from the first quartile to the third quartile on that scale.

Later we have compared the characteristics of the study subject to residence and gender. For comparison, Chi-square test, independent-sample t-test and Mann-Whitney U test is performed and p-value is computed. P-value tells us whether the results are statistically significant or not. If the p-value is smaller than 0.05, we know the results are statistically significant by 0.05.

Test of independence

If there are *r* rows and *c* columns in the table, the chi square test can be thought of as a test of independence. In a test of independence the null and alternative hypotheses are:

H_0: The two categorical variables are independent.

H_1: The two categorical variables are related.

In this case, an "observation" consists of the values of two outcomes and the null hypothesis is that the occurrence of these outcomes is statistically independent. Each observation is allocated to one cell of a two-dimensional array of cells (called a table) according to the values of the two outcomes.

The "theoretical frequency" for a cell, given the hypothesis of independence, is

$$E_{i,j} = \frac{\left(\sum_{n_c=1}^{c} O_{i,n_c}\right).\left(\sum_{n_r=1}^{r} O_{n_r,j}\right)}{N}$$

where *N* is the total sample size (the sum of all cell frequencies in the $r \times c$ table).

The value of the test-statistic is

$$\chi^2 = \sum_{i=1}^{r} \sum_{j=1}^{c} \frac{\left(O_{i,j} - E_{i,j}\right)^2}{E_{i,j}}$$

where,

χ^2 =Pearson's cumulative test statistic, which asymptotically approaches a χ^2 distribution.

$O_{i,j}$ = an observed frequency;

$E_{i,j}$ = an expected (theoretical) frequency, asserted by the null hypothesis;

n = the number of cells in the table.

Fitting the model of "independence" reduces the number of degrees of freedom by $p = r + c - 1$. The number of degrees of freedom is equal to the number of cells rc, minus the reduction in degrees of freedom, p, which reduces to $(r - 1)(c - 1)$. Here r is the number of levels for one categorical variable and c is the number of levels for the other categorical variable.

The approximation to the chi-squared distribution breaks down if expected frequencies are too low. It will normally be acceptable so long as no more than 20% of the events have expected frequencies below 5. Where there is only 1 degree of freedom, the approximation is not reliable if expected frequencies are below 10. In this case, a better approximation can be obtained by reducing the absolute value of each difference between observed and expected frequencies by 0.5 before squaring; this is called Yates's correction for continuity. In cases where the expected value, E, is found to be small (indicating either a small underlying population probability, or a small number of observations), the normal approximation of the multinomial distribution can fail, and in such

cases it is found to be more appropriate to use the G-test, a likelihood ratio-based test statistic. Where the total sample size is small, it is necessary to use an appropriate exact test, typically either the binomial test or (for contingency tables) Fisher's exact test; but note that this test assumes fixed and known marginal totals.

In statistics, **G-tests** are likelihood-ratio or maximum likelihood statistical significance tests that are increasingly being used in situations where chi-squared tests were previously recommended.

The general formula for G is

$$G = 2\sum_{i=1}^{n} O_i \cdot \ln\left(O_i / E_i\right)$$

where O_i is the observed frequency in a cell, E_i is the expected frequency on the null hypothesis, and the sum is taken over all cells, and where $\ln$ denotes the natural logarithm(log to the base) and the sum is taken over all non-empty cells.

Chi Square Test

A chi-squared test, also referred to as chi-square test or χ^2 test, is any statistical hypothesis test in which the sampling distribution of the test statistic is a chi-squared distribution when the null hypothesis is true, or any in which this is asymptotically true, meaning that the sampling distribution (if the null hypothesis is true) can be made to approximate a chi-squared distribution as closely as desired by making the sample size large enough.

Some examples of chi-squared tests where the chi-squared distribution is only approximately valid:

- **Pearson's chi-squared test**, also known as the chi-squared goodness-of-fit test or chi-squared test for independence. A test of independence assesses whether paired observations on two variables, expressed in a contingency table, are independent of each other (e.g. polling responses from people of different nationalities to see if one's nationality affects the response).
- **Likelihood-ratio tests**, is a weighted average of the ratio of the observed and expected counts.

Fisher's exact test is a statistical significance test used in the analysis of contingency tables. Although in practice it is employed when sample sizes are small, it is valid for all sample sizes. It is named after its inventor, R. A. Fisher, and is one of a class of exact tests, so called because the significance of the deviation from a null hypothesis can be calculated exactly, rather than relying on an approximation that becomes exact in the limit as the sample size grows to infinity, as with many statistical tests.

Independent-sample t-test

The independent-samples t-test is used when we want to compare the means of two independent groups. The test can be used with an interval or ratio level

dependent variable and dichotomous nominal level independent variable. The assumption of the test are that the scores on the dependent variable y (a) are normally distributed in each of the two populations, (b) have equal population variances, and (c) are independent. Different t-test formulas are used depending on whether the variances of the two groups are significantly different.

If the sample variances are equal, the test statistic is,

$$t = \frac{\bar{y}_1 - \bar{y}_2}{s_{\bar{y}_1 - \bar{y}_2}} \sim t_{n_1+n_2-2}, \quad \text{df} = n_1 + n_2 - 2$$

where $\bar{y}_1$ and $\bar{y}_2$ are the means for sample 1 and sample 2, respectively, and $s_{\bar{y}_1 - \bar{y}_2}$ is the standard error of the difference between two means. This standard error is the standard deviation of the sampling distribution of the difference between two means and is computed as

$$s_{\bar{y}_1 - \bar{y}_2} = s_p \sqrt{\frac{1}{n_1} + \frac{1}{n_2}}$$

where s_p is the pooled standard deviation computed as

$$s_p = \sqrt{\frac{(n_1 - 1)s_1^2 + (n_2 - 1)s_2^2}{n_1 + n_2 - 2}}$$

where s_1^2 and s_2^2 are the sample variances for groups 1 and 2, respectively; n_1 and n_2 are the sample sizes for groups 1 and 2, respectively. Conceptually, the standard error $s_{\bar{y}_1 - \bar{y}_2}$ is the pooled standard deviation weighed by the two sample sizes; more especially, the two sample variances are weighted by their respective sample sizes and then pooled.

If the sample variances are not equal, the test statistic is,

$$t = \frac{\bar{y}_1 - \bar{y}_2}{\sqrt{\frac{s_{y_1}^2}{n_1 - 1} + \frac{s_{y_2}^2}{n_2 - 1}}}, \text{ df}=(n_1 - 1) + (n_2 - 1)$$

The test statistic *t* is then compared to a critical value from the t distribution. For two-tailed, if the test statistic falls into either critical region, then we reject H_0; otherwise, we fail to reject H_0.

Mann-Whitney U test

One of the most commonly used nonparametric statistics is the Mann-Whitney *U* test. It provides an assumption-free alternative to the t-test when our dependent variable is at the ordinal level. It also can be used with interval- or ratio level data when those data are not distributed normally. Mann-Whitney *U* test is used for testing median i.e. two population distributions are identical. This test was developed by H. B. Mann and D. R. Whitney in 1947. In order to perform the Mann-Whitney *U* test, the sample values are combined into one group and then these values are arranged in ascending order. These pooled values are ranked from 1 to n, the smallest value being assigned the rank 1 and the highest value being assigned the highest rank. The sum of ranks of values from sample 1is denoted by R_1 and the sum of ranks of values from sample 2 is denoted by R_2. While pooling values, each value has a group identifier. The Mann-Whitney *U* test is conducted differently for small samples and large samples.

The null and alternative hypotheses for a two-tailed test can be stated as follows:

H_0: The two populations are identical.

H_1: The two populations are not identical.

When n_1 (number of items in sample 1) and n_2 (number of items in sample 2) are both less than or equal to 10, samples are considered to be small. The *U* statistic for *R*1 and *R*2 can be defined as

$$U_1 = n_1 n_2 + \frac{n_1(n_1+1)}{2} - R_1 \text{ and}$$

$$U_2 = n_1 n_2 + \frac{n_2(n_2+1)}{2} - R_2$$

The test statistic *U* is the smallest of these two *U* values. We do not need to calculate both U_1 and U_2. If either U_1 or U_2 is calculated, the other can be computed by using the equation:

$$U_1 = n_1 n_2 - U_2$$

When n_1 (number of items in sample 1) and n_2 (number of items in sample 2) are both greater than or equal to 10, the samples are considered to be large samples. In case of large samples, sampling distribution of the *U* statistic can be approximated by the normal distribution. The *z* statistic can be computed by using the following formula

$$z = \frac{U - \mu_u}{\sigma_u}$$

Where, mean, $\mu_u = \frac{n_1 n_2}{2}$ and standard deviation, $\sigma_u = \sqrt{\frac{n_1 n_2 (n_1 + n_2 + 1)}{12}}$.

At 95% ($\alpha = 0.05$) confidence level, if the p-value is less than 0.05, accept the alternative hypothesis and reject the null hypothesis.

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Logistic Regression

Logistic regression is useful for situations in which we want to be able to predict the presence or absence of a characteristic or outcome based on values of a set of predictor variables. It is similar to a linear regression model but is suited to models where the dependent variable is dichotomous. Logistic regression coefficients can be used to estimate odds ratios for each of the independent variables in the model. Logistic regression is applicable to a broader range of research situations than discriminate analysis. Logistic regression is more applicable because of its distribution free assumption of the categorical independent variable. Interpretation of logistic regression can be done in terms of odd ratio, which may be the fundamental reason why logistic regression has proven such a powerful tool for epidemiologic research.

In the analysis of dichotomous outcome or response variable many distribution functions have been proposed for use. Discussing some of these, Cox (1970) suggested the logistic distribution. The logistic distribution preferred for two primary reasons:

1. From a mathematical point of view, it is an extremely flexible and easily used function.
2. It lands itself to a biologically meaningful interpretation.

Logistic regression model considers a categorical variable (dichotomous variable) as dependent variable.

Let Y is a dichotomous dependent variable, which take the values 0 and 1. Thus

y_i = { 1, if the i-th individual develops a certain disease during the study
0, otherwise

where, i = 1, 2,..., n.

Also consider a collection of k independent variables which will be denoted by the vector

$X' = (X_1, X_2, \ldots, X_k)$ and β be a (k+1)×1 vector of unknown parameters.

For simplification, we will use the quantity $P(Y = 1|X = x) = \pi(x)$ the probability that the event occurs conditional on the value of X. We can write

$$P(Y = 1|X_i = x_i) = \pi(x_i) = \frac{e^{g(x_i)}}{1 + e^{g(x_i)}} \qquad \ldots\ldots\ldots\ldots (2.1)$$

and

$$P(Y = 0|X_i = x_i) = 1 - \pi(x_i) = 1 - \frac{e^{g(x_i)}}{1 + e^{g(x_i)}} = \frac{1}{1 + e^{g(x_i)}} \qquad \ldots\ldots\ldots\ldots (2.2)$$

where $g(x_i) = \beta_0 + \beta_1 x_{i1} + \ldots\ldots\ldots\ldots\ldots\ldots\ldots + \beta_k x_{ik}$, $i = 1, 2, ..., n.$

The central part of logistic regression is a transformation of $\pi(x)$ which is known as logit transformation and defined as follows:

$$g(x_i) = \text{logit}[\pi(x_i)] = \log\left[\frac{\pi(x_i)}{1 - \pi(x_i)}\right] = \beta_0 + \beta_1 x_{i1} + \ldots + \beta_k x_{ik} \quad \ldots\ldots\ldots\ldots (2.3)$$

Equation (2.3) is the logit of the multiple logistic regression model. The logit, $g(x)$ is linear in its parameters and has many of the desirable properties of

linear regression model. The logit, $g(x)$ may be continuous and depending on the range of X it may range from $-\infty$ to ∞ (Hosmer and Lemeshow, 1989).

For testing the significance of the parameters of logistic regression model following test procedures are usually used

1. Likelihood ratio test
2. Score test
3. Wald test

Likelihood ratio test is a general test procedure introduced by Neyman and Pearson in 1928 is known as the likelihood ratio test. This test is based on maximum likelihood estimates. The likelihood ratio test can be used for testing a sample or composite hypothesis against a simple or composite hypothesis.

In logistic regression, the likelihood ratio test is used for testing the overall significance of coefficient for all the parameters. Our hypotheses are as follows

$$H_0 : \beta_1 = \beta_2 = \ldots = \beta_k = 0$$

against H_1 : At least one of them is not equal to zero

The likelihood ratio test is based on the ratio of two likelihood functions.

The comparison of observed values to predicted values using the likelihood function is based on the following expression:

$$D = -\sum \ln\left(\frac{L_0}{L_1}\right)$$

where, L_0 = likelihood function for the current model and

L_1 = likelihood function for the standard model.

A standard model is one that contains as many parameters as there are in the data set. The quantity inside the brackets in the above expression is called the likelihood ratios and a test based on it is called likelihood ratio test. The statistic D is equation of (β) is called the deviance by McCullagh and Nelder (1985) and plays a central rate in some approaches to assessment of goodness of fit. For assessing the significance of an independent variable we compare the value of D with and without the independent variable in the equation. The effect of including the independent variable in the model can be obtained by G as follows

G = D(for the model without the variable)-D(for the model with the variable)

i.e. G measure the change in D due to inclusion of the independent variable in the model, G can be expressed as

$$G = -\sum \log\left[\frac{(Liklihood\ \ without\ \ the\ \text{var}iable\ )}{Liklihood\ \ with\ the\ \text{var}iable\ )}\right]$$

Under the null hypothesis that $\beta_i's$ (i=1,2,.....,p) are equal to zero, the statistics G follows chi-square distribution with p degrees of freedom. If the null hypothesis is rejected we may conclude that all the coefficient is not equal to zero i.e. at least on of the coefficient (β_i) has significant effect.

Robert F. Engle showed that the **Wald test**, the likelihood-ratio test and the Lagrange multiplier test (also known as the score test) are asymptotically

equivalent. We have used Wald test for testing the significance of individual parameters of logistic regression model. The Wald test procedure was introduced by Wald in 1943 and named according to his name. A Wald test can be used in a great variety of different models including models for dichotomous variables and models for continuous variables. In logistic regression analysis due to the nature of maximum likelihood estimation Wald test has a definite advantage over the likelihood ratio test. But it has the same assumption as those of likelihood ratio test, when the overall null hypothesis $H_0 : \beta_1 = \beta_2 = \ldots = \beta_k = 0$ is rejected then to identify the significant coefficient Wald test is used.

The Wald test is obtained by comparing the maximum likelihood estimate of any parameter to the estimate of its standard error. For testing

$$H_0 : \beta_i = 0$$

against, $H_1 : \beta_i \neq 0$ for $i = 0, 1, 2, ..., k$

the univariate Wald statistic is defined as

$$W_i = \frac{\hat{\beta}_i}{S \cdot E\left(\hat{\beta}_i\right)} \qquad \ldots\ldots\ldots\ldots\ldots (2.4)$$

where $\hat{\beta}_i$ is maximum likelihood estimate of β_i and $S.E\left(\hat{\beta}_i\right)$ denotes the standard error of $\hat{\beta}_i$. Under the null hypothesis W_i follows a standard normal distribution.

The multivariate of the Wald test can be expressed as

$$W = \hat{\beta}' \left[\text{var}\left(\hat{\beta}\right)\right]^{-1} \hat{\beta} \qquad \ldots\ldots\ldots\ldots\ldots (2.5)$$

where, $\widehat{\beta}$ is the maximum likelihood estimate of vector of parameter β and $\text{var}(\widehat{\beta})$ is the estimated variance-covariance matrix, which is the inverse of the information matrix.

Under the null hypothesis

$$H_0 : \beta_1 = \beta_2 = \ldots\ldots\ldots = \beta_k = 0$$

W follows Chi-square distribution with k degrees of freedom.

Wald test has the limitation that it behaved in an aberrant manner and often failing to reject the null hypothesis when the coefficient is significant, which was examined by Hauck and Donner (1987), and Jennings (1986).

For testing whether the overall effect is significant or not, the **score test** is used. We assumed that the asymptotic distribution of score vector is known and Cox and Hinkly (1974) showed that under the following regularity condition score vector $\text{U}(\beta)$ is asymptotically normally distributed with mean 0 and variance-covariance matrix $\text{I}(\beta)$.

The regularity conditions are;

1. The order of integration and differentiation are interchangeable.
2. The dimension of the parameter space Ω is finite and the value of the parameter is interior to Ω.
3. The probability distributions for different values of β are distinct.
4. The first two derivatives of log-likelihood with respect to β exist in the neighborhood of the true parameter value.

Under above regularity conditions the central limit theorem can be applied to the above score vector $U(\beta)$. As a result $U(\beta)$ follows asymptotically normally distributed with mean vector 0 and variance-covariance matrix $[I(\beta)]$.

For β be the (p+1) vector of parameters the hypothesis can be written as

$$H_0 : \beta = \beta_0$$

Against, $H_1 : \beta \neq \beta_0$

Under the null hypothesis the score statistic $U(\beta_0)$ is asymptotically normally distributed with mean vector 0 and variance-covariance $I(\beta_0)$.

Then we can define the test statistic for score test as,

$$\chi_{sc}^{\ 2} = [U(\beta_0)][I(\beta_0)]^{-1}[U(\beta_0)] \quad \text{..... (2.4)}$$

where, χ_{sc}^2 follows an asymptotic chi-square distribution with k degrees of freedom.

From the chi-square distribution table with p.d.f. we can get the value of $\chi_{k,\alpha y}^2$ at α% level of significance. If $\chi_{sc}^2 > \chi_{k,\alpha y}^2$ then we may reject the null hypothesis at α% level of significance. We may conclude that the β may not be equal to β_0.

As in linear regression model interpretation of parameters in logistic regression model is not so straightforward. Interpretation of parameters in logistic regression model can be done in terms of following two ways:

1. Interpretation in terms of logit.

2. Interpretation in terms of odds ratio.

(1) The logit transformation of logistic regression model is called the logit. The logit is defined as

$$\pi(x) = \frac{e^{\sum_{i=1}^{k}\beta_i x_i}}{1+e^{\sum_{i=1}^{k}\beta_i x_i}} \qquad \ldots\ldots\ldots\ldots(2.6)$$

$$\log it[\pi(x)] = g(x) = \log\left[\frac{\pi(x)}{1-\pi(x)}\right]$$

$$= \beta_o + \beta_1 x_1 + \ldots\ldots\ldots + \beta_k x_k \qquad \ldots\ldots\ldots\ldots(2.7)$$

which is linear in parameters.

According to linear regression model, we can interpret the $\beta_j; (j = 1,2,\ldots\ldots,k)$ represents the rate of change in $\log it[\pi(x)]$ for one unit changes in x_j given other variables remaining constant.

(2) from logistic regression model we have,

$$\pi(x) = \frac{\exp(\beta_0 + \beta_1 x_1 + \ldots\ldots + \beta_i x_i + \ldots\ldots + \beta_k x_k)}{1+\exp(\beta_0 + \beta_1 x_1 + \ldots\ldots + \beta_i x_i + \ldots\ldots + \beta_k x_k)}$$

where, $\pi(x)$ is the proportion of individuals with outcome being present for given x. And proportion of individuals with outcome being absent for given x is as follows,

$$1-\pi(x) = \frac{1}{1+\exp(\beta_0 + \beta_1 x_1 + \ldots\ldots + \beta_i x_i + \ldots\ldots + \beta_k x_k)}$$

Now, the odds of outcome being present for given x is defined as,

$$\frac{\pi(x)}{1-\pi(x)} = \exp(\beta_0 + \beta_1 x_1 + \ldots\ldots + \beta_i x_i + \ldots\ldots + \beta_k x_k)$$

Now we consider the situation where the independent variable is dichotomous. It is the simplest case and will provide the conceptual foundation for all the other situations. We assume that x_i takes value 0 and 1, and then the odds ratio denoted by OR is defined as the ratio of the odds for x_i =1 to the odds for x_i =0 and is given by,

$$OR = \frac{\pi(1)/[1-\pi(1)]}{\pi(0)/[1-\pi(0)]}$$

$$= \frac{\exp(\beta_0 + \beta_1 x_1 + \ldots\ldots + \beta_i \times 1 + \ldots\ldots + \beta_k x_k)}{\exp(\beta_0 + \beta_1 x_1 + \ldots\ldots + \beta_i \times 0 + \ldots\ldots + \beta_k x_k)}$$

$$= \exp(\beta_i)$$

Now log of the odds ratio is defined as,

$$\log OR = g(1) - g(0) = \beta_i$$

which is the logit difference or log-odds, where $g(x)$ is the logit as defined previously. Thus, we can get the estimate of the coefficients of a logistic regression model directly from $\log \hat{OR}$ can easily be interpreted. That is the main reason why logistic regression is proved such a powerful analytic tool for epidemiologic research.

In case of continuous independent variable, the interpretation of the estimated coefficient is similar to that of nominal scaled variables, an estimated log odds ratio. A meaningful change must be defined for the continuous variable, which is the primary difference (Hosmer and Lemeshow, 1989).

Hosmer–Lemeshow test

Hosmer–Lemeshow test is a statistical test for goodness of fit for logistic regression models. It is used frequently in risk prediction models. The test assesses whether or not the observed event rates match expected event rates in subgroups of the model population. The Hosmer–Lemeshow test specifically identifies subgroups as the deciles of fitted risk values. Models for which expected and observed event rates in subgroups are similar are called well calibrated.

The Hosmer–Lemeshow test statistic is given by:

$$H = \sum_{g=0}^{n} \frac{(O_g - E_g)^2}{N_g \pi_g (1-\pi_g)}$$

where O_g, E_g, N_g, and π_g denote the observed events, expected events, observations, predicted risk for the g^{th} risk decile group, respectively and *n* is the number of groups. The test statistic asymptotically follows a χ^2 distribution with *n-2* degrees of freedom. The number of risk groups may be adjusted depending on how many fitted risks are determined by the model. This helps to avoid singular decile groups.

There are several methods in logistic regression analysis: enter, forward conditional, forward LR, forward Wald, backward conditional and backward LR, or backward Wald. Method selection allows us to specify how independent variables are entered into the analysis. We use enter method to construct regression models from the same set of variables. **Enter method** is a procedure

for variable selection in which all variables in a block are entered in a single step.

Receiver Operating Characteristic (ROC) curve

ROC curve is a graphical plot which illustrates the performance of a binary classifier system as its discrimination threshold is varied. It is created by plotting the fraction of true positives out of the total actual positives (TPR = true positive rate) vs. the fraction of false positives out of the total actual negatives (FPR = false positive rate), at various threshold settings. TPR is also known as sensitivity (also called recall in some fields), and FPR is one minus the specificity or true negative rate. In general, if both of the probability distributions for detection and false alarm are known, the ROC curve can be generated by plotting the Cumulative Distribution Function of the detection probability in the y-axis versus the Cumulative Distribution Function of the false alarm probability in x-axis.

ROC analysis provides tools to select possibly optimal models and to discard suboptimal ones independently from (and prior to specifying) the cost context or the class distribution. ROC analysis is related in a direct and natural way to cost/benefit analysis of diagnostic decision making. The ROC curve was first developed by electrical engineers and radar engineers during World War II for detecting enemy objects in battlefields.

Area under ROC Curve (AUC)

The area under the ROC curve (AUC) that relates the hit rate to the false alarm rate has become a standard measure in tests of predictive modeling accuracy. The AUC is an estimate of the probability that a classifier will rank a randomly chosen positive instance higher than a randomly chosen negative instance. For this reason, the AUC is widely thought to be a better measure than a classification error rate based upon a single prior probability. Usually the value of AUC is larger than 0.5 is preferable and larger values indicate better prediction accuracy, although the value 1 does not indicate perfect prediction accuracy.

Microsoft Excel version 2010 has been used for producing graph. The STATA 11 and SAS version 9.4 software has been used for statistical analysis. Microsoft Word has been used to prepare document.

CHAPTER THREE

CHARACTERISTICS OF STUDY SUBJECTS

3.1 Introduction

In the previous chapter, descriptions of data and methodology have been discussed. Generally, it is very important to know the characteristics or natures of the data before performing any advance analysis. These are useful for discussing the result and drawing meaningful conclusion in the subsequent sections of the report. In order to know the nature of the study subjects the frequency distribution and graphical representation could be very useful. This chapter provides information on socio-demographic and economic characteristics of the respondents such as age, gender, residence, educational level, working status and wealth index. The main study variables knowledge and awareness of tobacco use have been discussed here. Also the information on knowledge and awareness has been summarized in this chapter. Various descriptive statistical methodologies have been used to know the characteristics of the study subjects. The means with standard deviation (SDs) have been calculated for continuous variables and frequencies with percentages have been calculated for categorical variables. Statistical analyses have been conducted by using STATA version 11, SAS version 9.4 and for graphical representation Microsoft Excel 2010 has been used.

3.2 Characteristic of the study subjects

The variables considered in the analysis are chosen on the basis of prior knowledge and published documents. In this section descriptive analysis has been performed and the results have been summarized in Table 3.2.1

Prevalence of Tobacco used in Bangladesh, 2010.

The total number of respondents is 9629. Among them the tobacco smokers are 21.16%, smokeless tobacco users are 24.26% and secondhand smokers are 47.25%. However, these three tobacco user groups are not mutually exclusive.

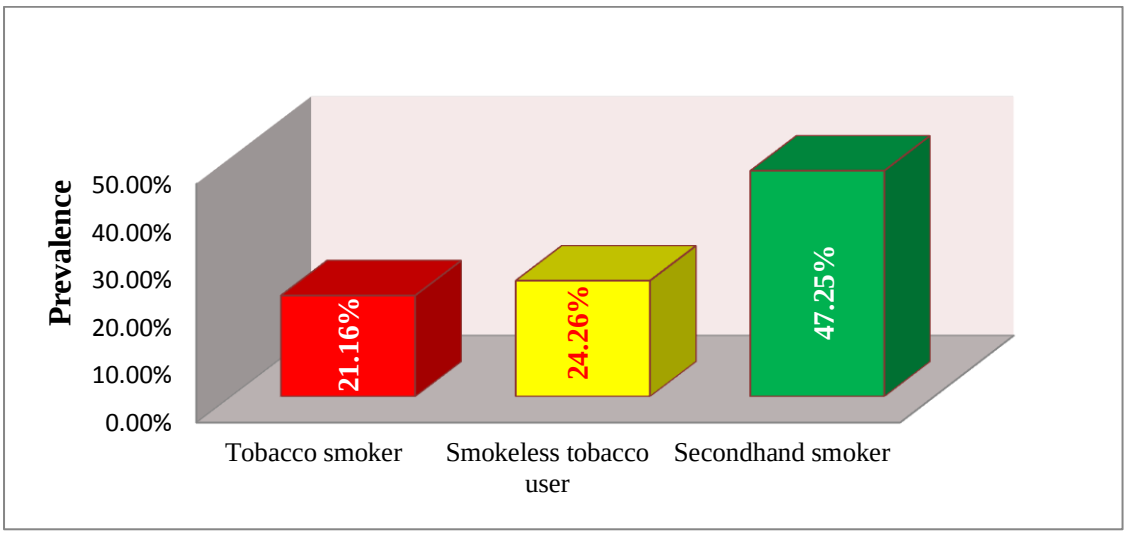


Figure 3.2.1 Prevalence of tobacco smoker, smokeless tobacco user and secondhand smoker.

Table 3.2.1: Characteristics of the study subjects.

Characteristics	**Total (N=9629) Frequency (%)**	**Tobacco Smoker (N=2038) Frequency (%)**	**Smokeless tobacco user (N=2336) Frequency (%)**	**Secondhand smoker (N=4550) Frequency (%)**
Gender				
Male	4468 (46.40)	1972 (96.76)	980 (41.95)	3381 (74.31)
Female	5161 (53.60)	66 (3.24)	1356 (58.05)	1169 (25.79)
Residence				
Urban	4857 (50.44)	964(47.30)	978 (41.87)	2401(52.77)
Rural	4772 (49.56)	1074(52.70)	1358 (58.13)	2149(47.23)
Age(yrs)*	36.90 (14.90)	40.50 (13.57)	37.00 (14.58)	36.30 (13.65)
Educational level				
No formal schooling	3430 (35.62)	958(47.01)	101(47.33)	1425 (31.32)
Less than primary school completed	1487 (15.44)	372(18.25)	378 (16.25)	711(15.63)
Primary School Completed	1115 (11.58)	184(9.03)	259 (11.13)	502 (11.03)
Less than secondary school completed	1937 (20.12)	315(15.46)	387 (16.64)	943 (20.73)
Secondary school completed	663 (6.89)	88(4.32)	102 (4.39)	354 (7.78)
High school completed	463 (4.81)	51 (2.50)	64 (2.75)	271 (5.96)
College/University Completed and higher	484 (5.03)	70 (3.43)	33 (1.42)	338 (7.43)
Don't Know	50 (0. 52)	0 (0.00)	2 (0.09)	6 (0.13)
Occupation				
Employment (Government, Non-Government)	961 (9.98)	225(11.04)	128 (5.50)	674 (14.81)
Business (small, large)	993 (10.31)	440(21.59)	196 (8.43)	851 (18.70)
Farming (land owner & farmer)	826 (8.58)	411(20.17)	196 (8.43)	582 (12.79)
Agricultural / Industrial worker/ daily laborer/Other self-employed	1537(15.96)	74(3.63)	46 (1.98)	998 (21.93)
Homemaker/Housework	4030 (41.85)	628(30.81)	371 (15.95)	833 (18.31)
Retired and unemployed (able to work/unable to work)	431 (4.48)	42(2.06)	1111 (47.76)	145 (3.19)
Student/Other	851 (8.84)	83(4.07)	73 (3.14)	467 (10.26)
Wealth index				
Lowest	1866 (19.38)	492(24.14)	594 (25.54)	720 (15.82)
Low	2068 (21.48)	516(25.32)	587 (25.24)	917 (20.15)
Middle	1732 (17.99)	375(18.40)	440 (18.92)	821 (18.04)
High	2040 (21.19)	392(19.23)	458 (19.69)	1064 (23.38)
Highest	1923 (19.97)	263(12.90)	247 (10.62)	1028 (22.59)

*****Mean (Standard deviation) has been reported.

Gender

In Bangladesh, gender is an important factor in case of tobacco use. From Table 3.2.1 we have observed that female are 53.60% and male are 46.40% of total respondents. We have also observed that 97.76% male and 3.24% female respondents are tobacco smokers, 41.95% male and 58.05% female respondents are smokeless tobacco users and 74.31% male and 25.79% female respondents are secondhand smokers.

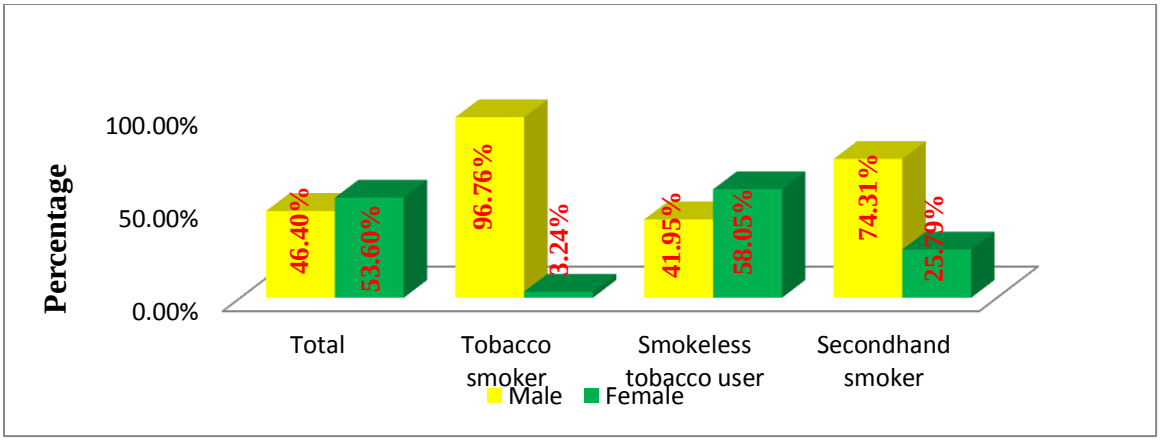


Figure 3.2.2 Prevalence of the tobacco smoker, smokeless tobacco user and secondhand smoker to gender.

Residence

Residential places are arranged in two groups: urban and rural. Overall 50.44% respondents are from urban area and 49.56% are from rural area. Among tobacco smokers 47.30% are from urban area and 52.70% are from rural area. Among the smokeless tobacco users 41.87% are from urban area and 58.13% are from rural area. And among secondhand smokers 52.77% are from urban area and 47.23% are from rural area.

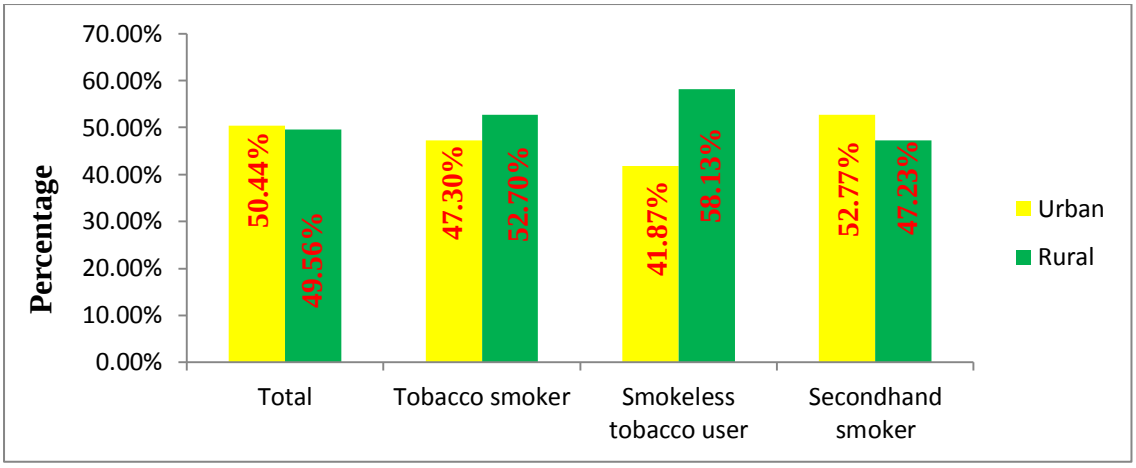


Figure 3.2.3 Residential status of the respondents.

Age

Age is a very important variable for research in health sciences. From the Table 3.2.1 we have observed that overall mean age of the respondents is 36.90 years with standard deviation 14.90. Mean age of tobacco smokers is 40.50 years with standard deviation 13.57. Mean age of smokeless tobacco users is 37.00 years with standard deviation 14.58. And mean age of secondhand smoker is 36.30 years with standard deviation 13.47.

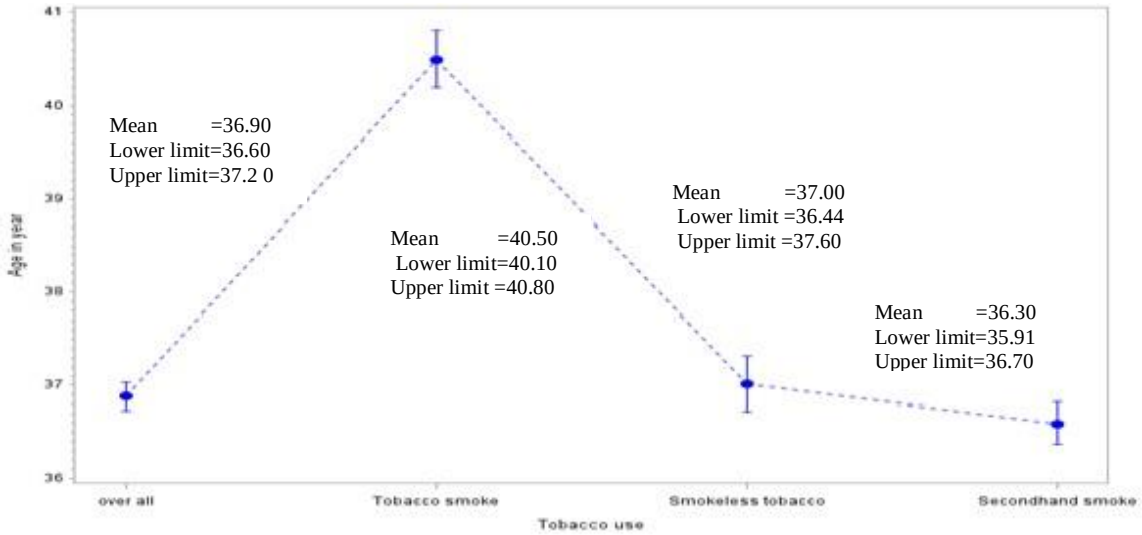


Figure 3.2.4 Age of the study subjects.

Educational level

Education also might be an important factor for use of tobacco in Bangladesh. We have found that among the respondents overall 35.62% respondents have no formal education, 15.44% have education less than primary, 11.58% have completed primary school, and 20.12% have less than secondary school completed, 6.89% have secondary school completed, 4.81% have high school completed and 5.03% have completed collage/university/higher education.

Among the tobacco smokers 47.01% have no formal education, 18.25% have education less than primary, 9.03% have completed primary school, 15.46% have less than secondary school completed, 4.32% have secondary school completed, 2.50% have high school completed and 3.43% have completed collage/university/higher education.

Among the smokeless tobacco users 47.33% have no formal education, 16.25% have education less than primary, 11.13% have completed primary school, 16.64% have less than secondary school completed, 4.39% have secondary school completed, 2.75% have high school completed and 1.42% have completed collage/university/higher education.

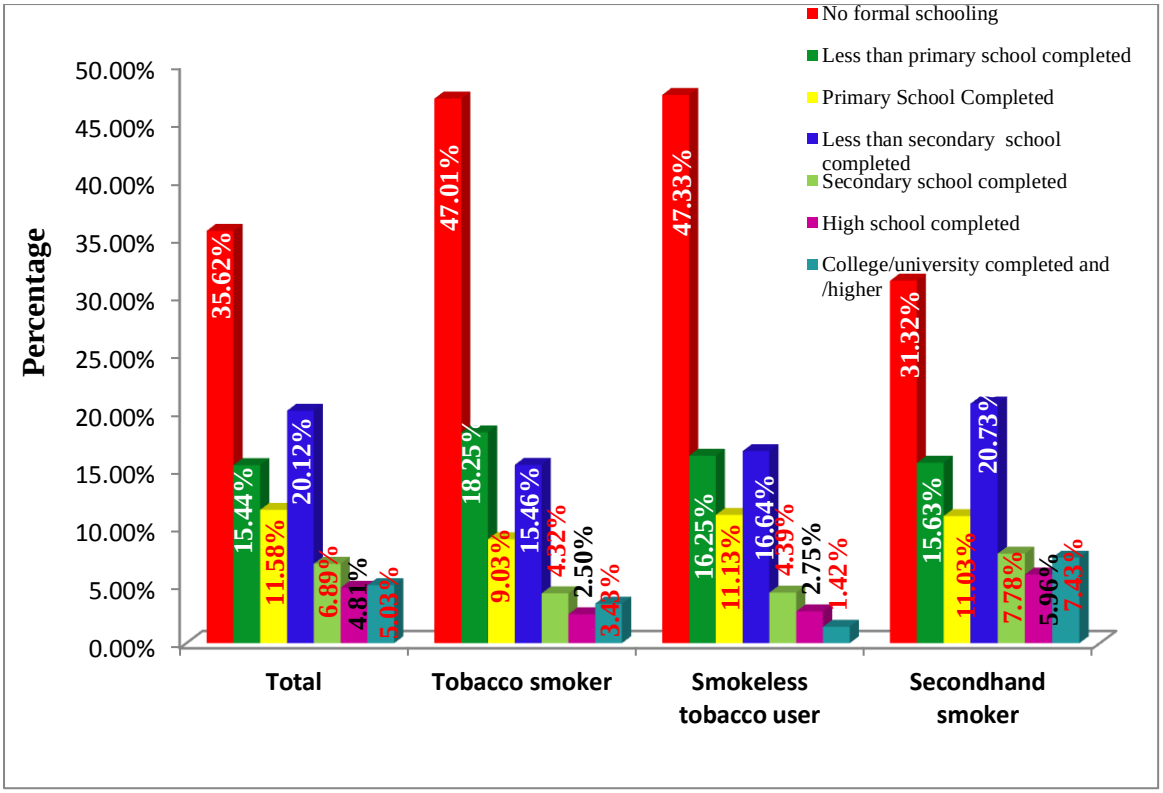


Figure 3.2.5 Educational status of the respondents

On the other hand, for secondhand smokers we have observed that 31.32% have no formal education, 15.63% have education less than primary, 11.03% have completed primary school, 20.73% have less than secondary school completed, 7.78% have secondary school completed, 5.96% have high school completed and 7.43% have completed collage/university/higher education.

Working status

The occupation of respondents is also known as respondents working status. Among the respondents overall 9.98% are employer (Government, Non-government), 10.31% are business man (small, large), 8.58% are farming (land owner and farmer), 15.96% are agricultural/industrial worker/daily laborer/other self-employed, 41.85% are homemaker/house worker, 4.48 are

retired and unemployed (able to work/unable to work) and 4.84% are student/other.

Among the tobacco smokers 11.04% are employer (Government, Non-government), 21.59% are business man (small, large), 20.17% are farming (land owner and farmer), 3.63% are agricultural/industrial worker/daily laborer/other self-employed, 30.81% are homemaker/house worker, 2.06% are retired and unemployed (able to work/unable to work) and 4.07% are student/other.

Among the smokeless tobacco users 5.50% are employer (Government, Non-government), 8.43% are business man (small, large), 8.43% are farming (land owner and farmer), 1.98% are agricultural/industrial worker/daily laborer/other self-employed, 15.95% are homemaker/house worker, 47.76% are retired and unemployed (able to work/unable to work) and 3.14 % are student/other.

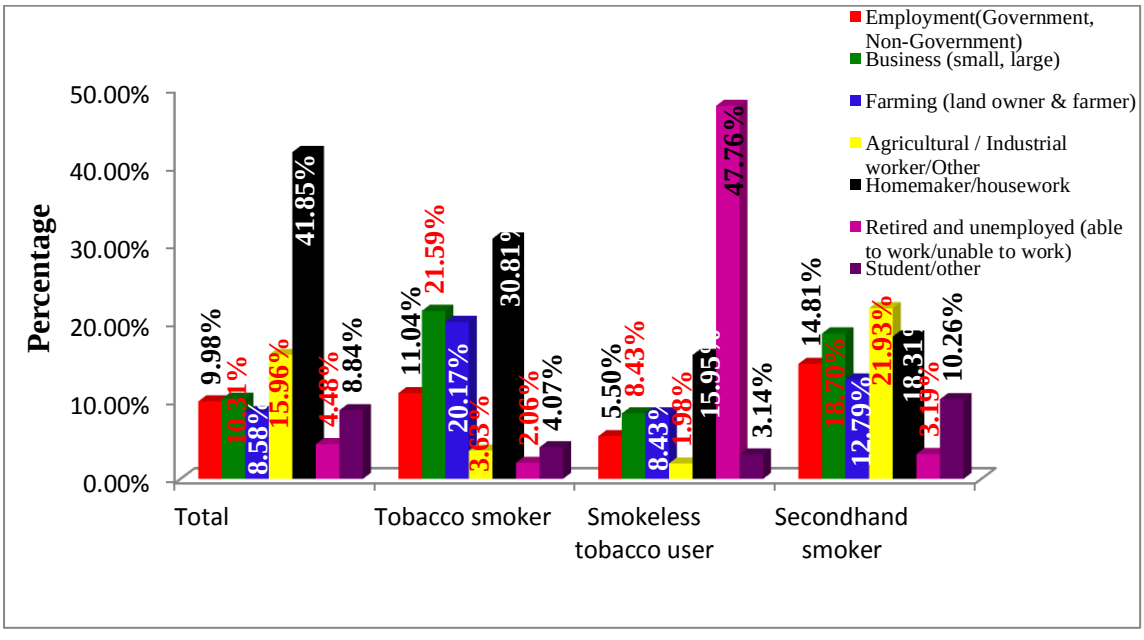


Figure 3.2.6 working status of the respondents.

Among the secondhand smokers 14.81% are employer (Government, Non-government), 18.70% are business man (small, large), 12.79% are farming (land owner and farmer), 21.93% are agricultural/industrial worker/daily laborer/other self-employed, 18.31% are homemaker/house worker, 3.19% are retired and unemployed (able to work/unable to work) and 10.26% are student/other.

Wealth index

Among the respondents overall 19.38% are lowest, 21.48% are low, 17.99% are middle, 21.19% are high, and 19.97% are highest wealth index. Among the tobacco smokers 24.14% are lowest, 25.32% are low, 18.40% are middle, 19.23% are high and 12.90% are highest wealth index. And among the smokeless tobacco users 25.54% are lowest, 25.24% are low, 18.92% are middle, 19.69% are high, and 12.90% are highest wealth index.

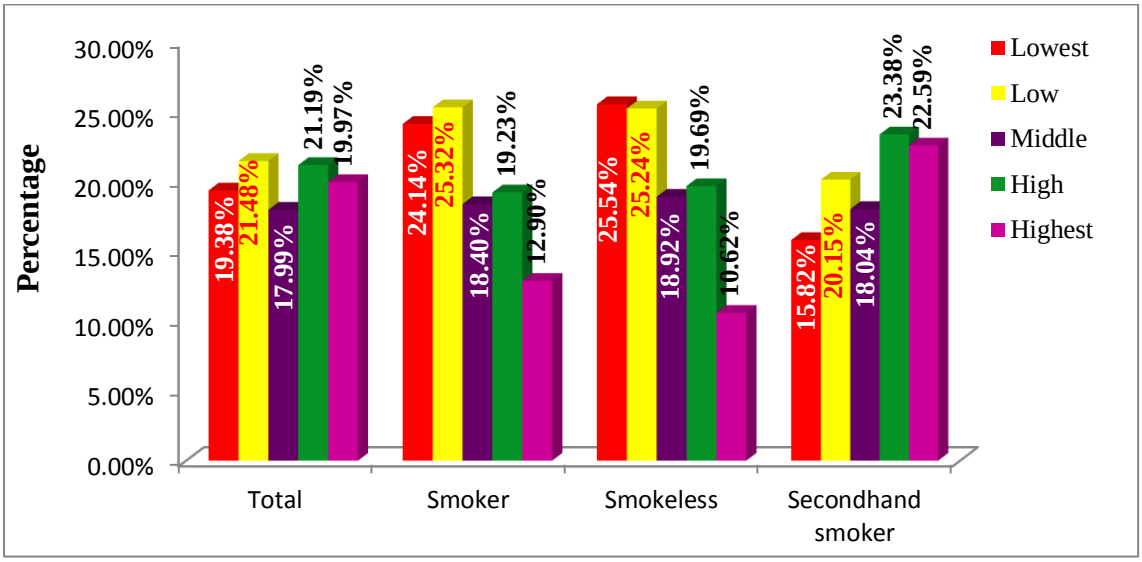


Figure 3.2.7 wealth index of the respondents.

And for the secondhand smokers 15.82% are lowest, 20.15% are low, 18.04% are middle, 23.38% are high, and 22.59% are highest wealth index.

3.3 Knowledge of health consequence of tobacco use

To measure the knowledge of health consequences of tobacco use respondents were asked about various diseases caused by tobacco use. Obtained results have been summarized in Table 3.3.1.

Table 3.3.1: Knowledge of health consequences of tobacco use.

Characteristics (%)	Smoking (N=2038)	Smokeless (N=2336)	Secondhand smoking (N=4550)
Causing Serious illness	1968(96.61)	2145(91.82)	4430(97.36)
Causing Stroke	1715(85.88)	1656(72.47)	--
Causing heart attack	1766 (88.43)	1696(74.22)	--
Causing lung cancer	1882(94.24)	1864(81.58)	--

--Indicates statistics cannot be calculated because of no data available.

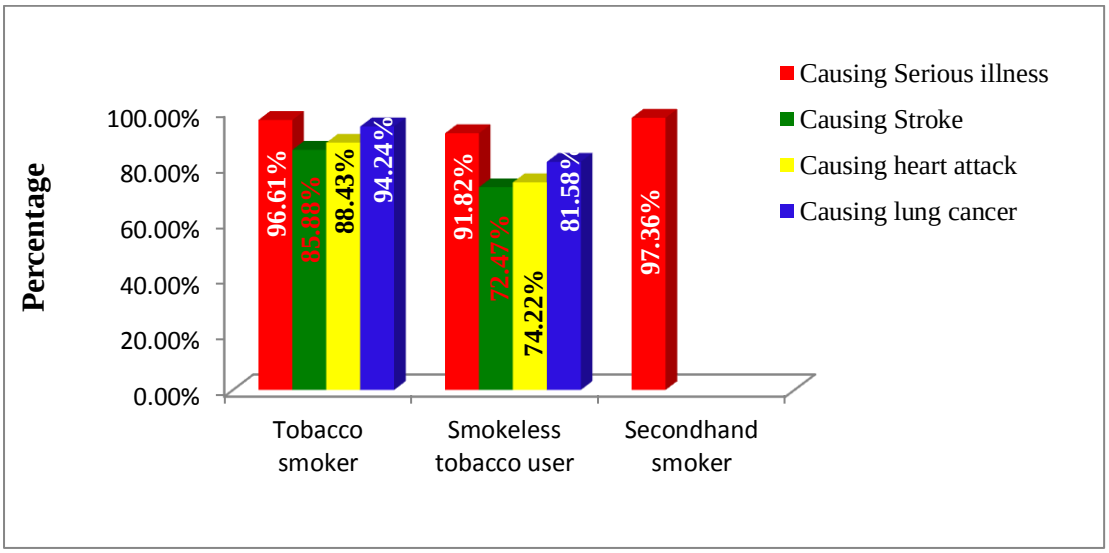


Figure 3.3.1 Knowledge of the health consequences of tobacco use.

From Table 3.3.1 we have seen that among the tobacco smokers 96.61% know that tobacco smoking causes serious illness, 85.88% know that it causes stroke,

88.43% know that it causes heart attack and 94.24% know that it causes lung cancer. Among smokeless tobacco users 91.82% know that smokeless tobacco use causes serious illness, 72.47% know that it causes stroke, 74.22% know that it causes heart attack and 81.58% know that it causes lung cancer. And among the secondhand smokers 97.36% know that it causes serious illness.

3.4 Attitudes towards tobacco use

Attitudes of tobacco users are average number of tobacco use per day, time of first start using after wake up, smoking policy at home and smoking policy in job place. In Bangladesh there are several types of tobacco like manufactured cigarettes, hand-rolled cigarettes, kreteks, pipes full of tobacco, cigars, cheroots, or cigarillos and number of water pipe sessions per day. Manufacturing cigarettes are widely used in Bangladesh. Descriptive statistics of attitudes towards tobacco use are summarized in Table 3.4.1. The total number of smokers is n=2038 who have used on an average 5.91 cigarettes per day with standard deviation (SD) is 6.87. Other than cigarette they have used hand-rolled cigarettes, kreteks, pipes full of tobacco, cigars, cheroots, cigarillos and number of water pipe sessions per day. The average number of other tobacco product used for smoking in Bangladesh is 6.53 with SD is 9.25. On the other hand, total number of smokeless tobacco users is 2336 and they are using in several ways like snuff by mouth, snuff by nose, chewing tobacco, betel quid with tobacco and others. Among them betel quid with tobacco is more popular in Bangladesh. From Table 3.4.1 it is seen that for the smokeless

tobacco users the mean number of betel quid with tobacco per day is 4.19 with SD is 5.20. The mean number of other smokeless tobacco products used is 4.03 with SD is 6.47.

Table 3.4.1: Attitudes towards tobacco use

Characteristics	**Smoking (N=2038)**	**Smokeless (N=2336)**	**Secondhand smoking (N=4550)**
Average number of tobacco use per day, Mean (SD)			
Manufactured cigarettes	5.91(6.87)	--	--
Others	6.53 (9.25)	--	--
Average number of Smokeless tobacco use per day, Mean (SD)			
Betel quid with tobacco		4.19 (5.20)	
Other		4.03 (6.47)	
Time of first start after wake-up (%)			
Within 5 Minutes	234 (11.48)	195 (8.35)	--
6 To 30 Minutes	680 (33.37)	591 (25.30)	
31 To 60 Minute	517 (25.37)	541 (23.16)	
More Than 60 Minutes	602 (29.54)	1005 (43.02)	
Refused	5 (0.25)	4 (0.17)	

--Indicates statistics cannot be calculated because of no data available.

In our data 234 (11.48%) respondents have smoked within 5 minutes after wake up; 680 (33.37%) respondents have smoked within 6 to 30 minutes, 517 (25.37%) respondents have smoked after 30 minutes and within 1 hour, and 602 (29.54%) respondents have smoked in 1 hour after wake up. Among smokeless tobacco users, 195 (8.35%) respondents have used smokeless tobacco products within 5 minutes after wake up, 591 (25.30%) respondents have used between 6 to 30 minutes, 541 (23.16%) respondents have used after

30 minutes and within 1 hour, and 1005 (43.02%) respondents have used in 1 hour after wake up.

3.5 Awareness policy of tobacco use

Secondhand smoke exposure causes disease and premature death in children and adults who do not smoke. Secondhand smoke (SHS) is one of the most important and most widespread exposures in the indoor environment. It affects a large proportion of the population, as smoking is prevalent (up to three quarters of adult men in some countries) and is seldom confined to outdoor settings. Children are commonly exposed to SHS when their parents are smokers. Some countries have passed legislation that prohibits smoking in the workplace, but elsewhere workers in the entertainment and food industries are frequently exposed to SHS on a daily basis. It has been known for many years that tobacco smoke is hazardous to health, and there is now a substantial literature that documents the risks associated specifically with exposure to SHS. Therefore, various awareness policies has been analysed in this section.

Noticing of cigarette or bidi marketing policy includes (i) advertisements (ii) signs promotion of cigarette or bidi and (iii) sponsorship of cigarette or bidi company in sports or sporting events in the preceding 30days that inspired the user(s). Cigarette or bidi marketing policy in stores (where cigarettes or bidi are sold) includes (i) cigarettes or bidi at sale prices, (ii) free gifts, or (iii) discount offers on other products while buying cigarettes or bidi, (iv) any advertisements or signs promoting cigarettes or bidi in the preceding 30 days

that encouraged the user(s) . Cigarette or bidi marketing policy in places other than stores (where cigarettes or bidi are sold) includes (i) advertisements or signs promoting cigarettes or bidi and (ii) sponsorship of cigarette or bidi company in sporting events in the preceding 30 days that inspired the users.

Again the noticing of smokeless tobacco marketing policy includes (i) advertisements (ii) signs promotion of smokeless tobacco and (iii) sponsorship of smokeless tobacco company in sports or sporting events in the preceding 30days that inspired the users. Smokeless tobacco marketing policy in stores (where smokeless tobacco products are sold) includes (i) smokeless tobacco at sale prices, (ii) free gifts, or (iii) discount offers on other products while buying smokeless tobacco (iv) any advertisements or signs promoting smokeless tobacco in the preceding 30 days that inspired the users. Smokeless tobacco marketing policy in places other than stores (where smokeless tobacco are sold) includes (i) advertisements or signs promoting smokeless tobacco and (ii) sponsorship of smokeless tobacco company in sporting events in the preceding 30 days that inspired the users.

Table 3.5.1: Awareness policy of tobacco use

Characteristics	**Smoking (N=2038)**	**Smokeless (N=2336)**	**Secondhand smoking (N=4550)**
Smoking policy at home (%)			
Allowed	--	--	1008(22.15)
Not allowed, but exceptions	--	--	739 (16.24)
Never allowed	--	--	1409(30.97)
No rules	--	--	1357(29.82)
Don’t know	--	--	36 (0.79)

Characteristics	**Smoking (N=2038)**	**Smokeless (N=2336)**	**Secondhand smoking (N=4550)**
Refused	--	--	1 (0.02)
Smoking policy at job place			
Allowed anywhere	--	--	479 (26.03)
Allowed only in some indoor Areas	--	--	273 (14.84)
Not allowed in any indoor areas	--	--	545 (29.62)
No policy	--	--	506 (27.50)
Don't know	--	--	36 (1.96)
Refused	--	--	1 (0.05)
Marketing policy			
Any advertisement (Cigarettes)	1748(85.77)	--	--
In store	1017(49.90)	--	--
Other than store	731(35.87)	--	--
Sport or promotion event	29(2.07)		
Other promotions	603(31.00)		
Any advertisement (Bidi)	980(48.58)	--	--
In store	525(26.25)	--	--
Other than store	455(22.33)	--	--
Sport or promotions event	9(0.65)		
Other promotions	255(13.14)		
Any advertisement (Smokeless tobacco products)	--	474(22.49)	--
In store	--	275(13.97)	--
Other than store	--	199(8.52)	--
Sport or promotion event		3(0.21)	
Other promotions		84(4.02)	

--Indicates not applicable.

From Table 3.5.1 we have found that 1008(22.15%) secondhand smokers reported that smoking is allowed at home; 739 (16.24%) reported that smoking is not allowed but exceptions; 1409 (30.97%) reported that smoking never allowed at home and 1357 (29.82%) had no such rules of smoking policy at home.

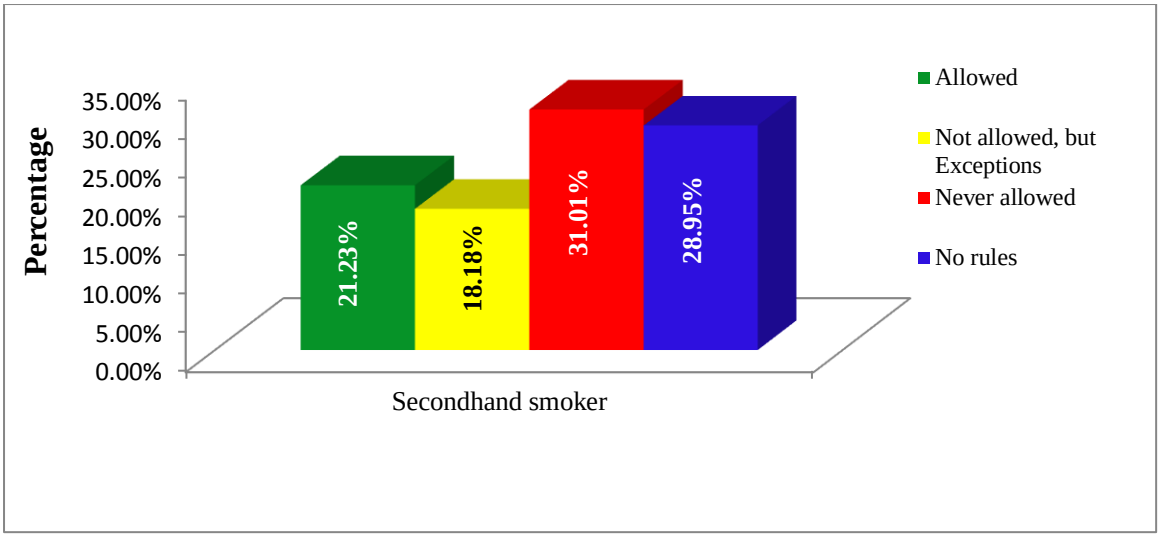


Figure 3.5.1 Smoking policy at home.

It is becoming increasingly sensitive to health and safety practices at the workplace to protect employees. Tobacco cessation continues to be one of the most cost-effective measures to reduce health care costs and increase productivity at the workplace. For this reason, more and more companies across the nation are adopting tobacco free policies and providing worker benefits and services that support prevention and cessation of tobacco use. To protect all individuals from exposure to secondhand smoke, companies will ideally implement policies that require a smoke-free environment on all company property (including vehicles), and provide smoking cessation support for their employees and covered dependents.

From our data we have found that 479 (26.03%) secondhand smokers reported smoking is allowed at job place; 273 (14.84%) reported that smoking is not allowed everywhere but some indoor area; 545 (29.62%) reported that smoking not allowed in any indoor area and 506 (27.50%) had no such rules of smoking policy at job place.

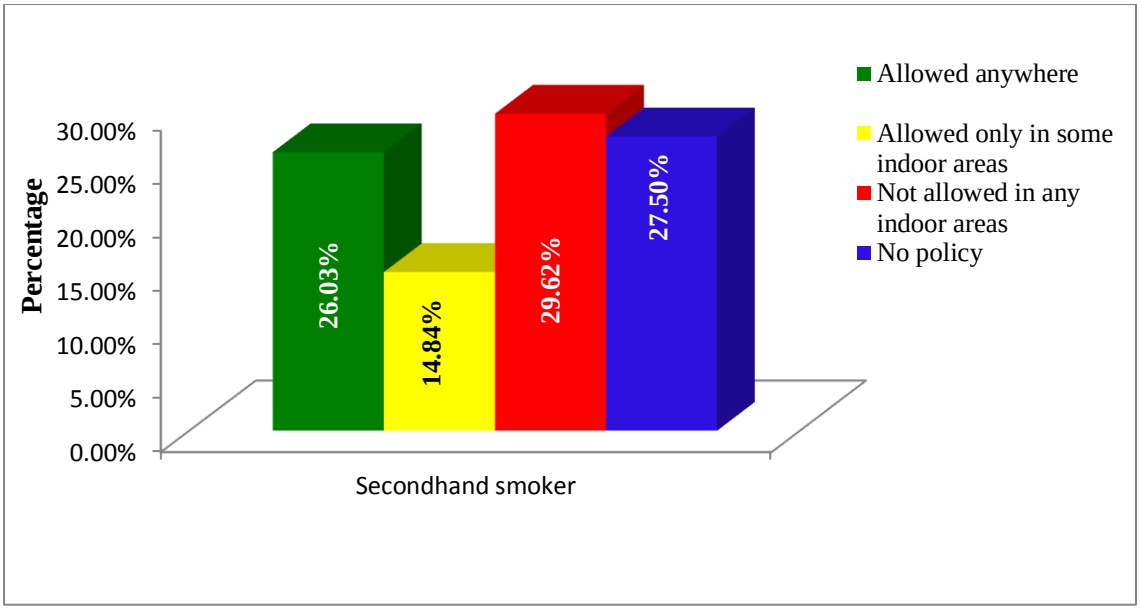


Figure 3.5.2 Smoking policy at job place

Table 3.5.1 shows the distribution of adults aged 15 years and above who noticed cigarette marketing in public places and media, such as in stores where cigarettes are sold, on television, radio, billboards, posters, newspapers or magazines, Internet and cinemas, as well as cigarette promotion by methods such as free samples, sale price, coupons and free gifts, in last 30 days that encouraged the users. The percentage of people aged 15 years or above who noticed some cigarette advertisement in anywhere were 1748 (85.77%). The most common site for noticing cigarette advertisements was in a store 1017 (49.90%) and other than store were 731 (35.87%). Sport promotional event were 29(2.07%) and other than promotional event were 603(31.00).

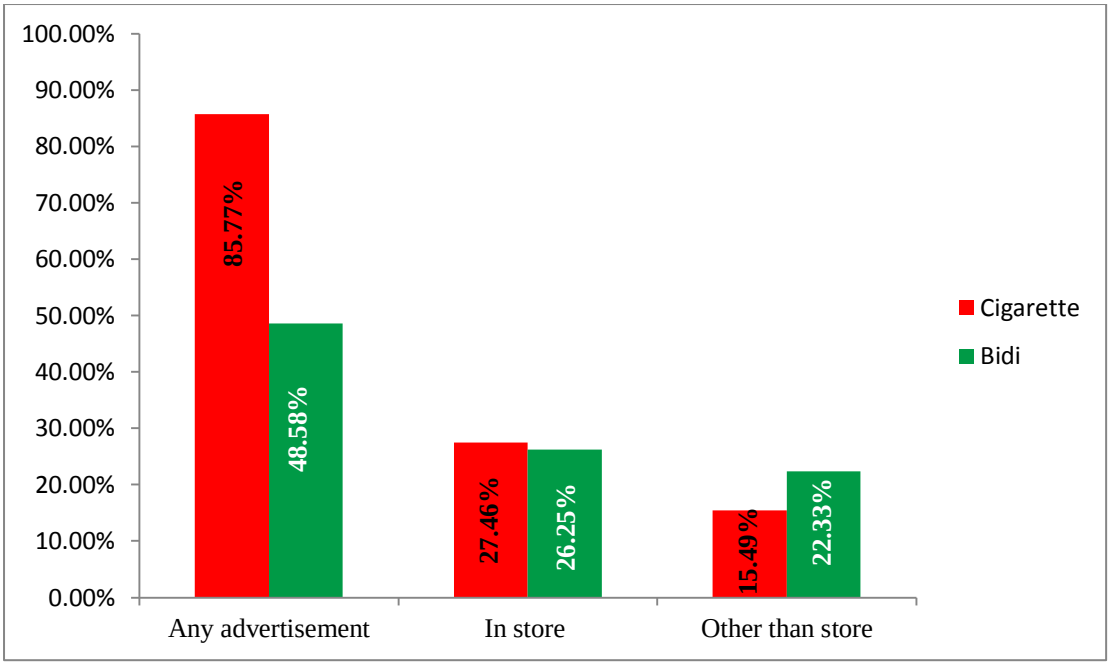


Figure 3.5.3 Marketing policy (tobacco smoking products).

The percentage of people who noticed some *bidi* advertisement in anywhere was 980 (48.58). The most common site for noticing such advertisement was in stores 525 (26.25%) and other than store were 455 (22.33%). Sport promotional event were 9(0.65%) and other than promotional event were 255(13.14%)

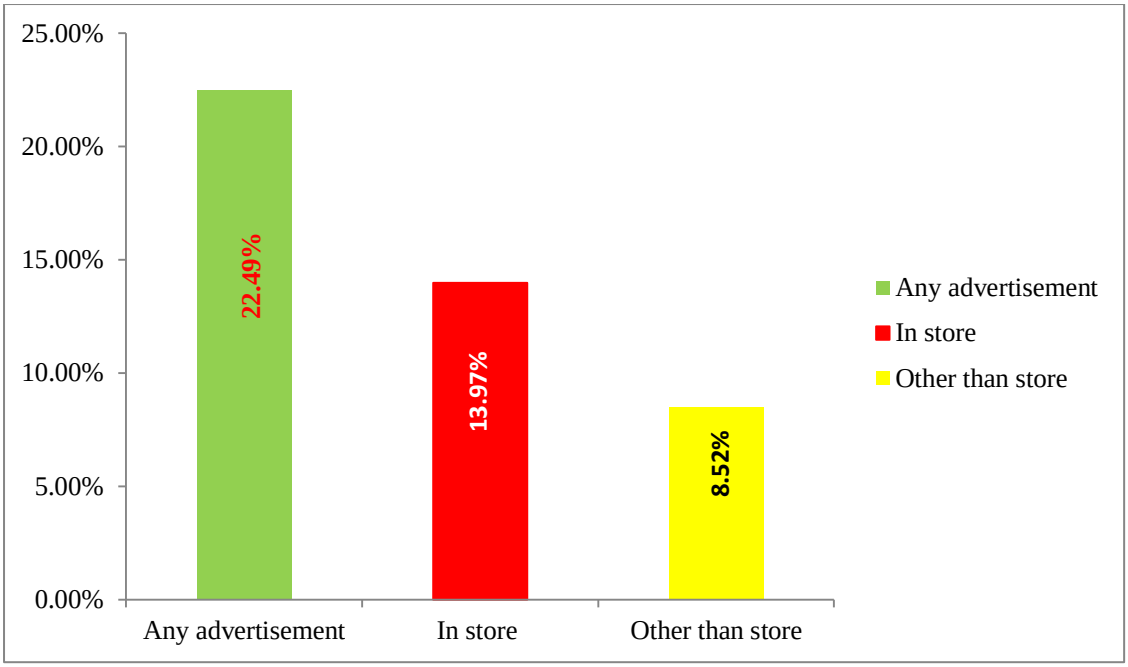


Figure 3.5.4 Marketing policy (smokeless tobacco products).

The percentage of people who noticed some smokeless tobacco product advertisement ware 474 (22.49%). The most common site was in a store 275 (13.97%) and other than store were 199 (8.52%). Sport promotional event were 3(0.21%) and other than promotional event were 84(4.02%)

3.6 Conclusion

We have observed that respondents from urban and rural are approximately equal. We have also seen that among tobacco smokers male are more than female. But the female respondents have used more smokeless tobacco than males. Education is an important factor to measure smoking status i.e., the amount of smoker decreases when educational level increases which is an inverse relationship. Higher educated people are largely affected by secondhand smoking. Among the respondents, employed respondents have

been more affected by secondhand smoking. The respondents who are retired and unemployed have used more smokeless tobacco. From the table we have seen that respondents with lowest and lower wealth index have used more tobacco smoking and smokeless product. On the other hand, respondents with high and highest wealth index have been more affected by secondhand smoke than lowest.

CHEPTER FOUR

COMPARING CHARACTERISTICS TO CONFOUNDING FACTORS

4.1 Introduction

In the previous chapter, the information on socio-demographic and economic characteristics of the study subjects have been provided through descriptive analysis and graphical representation. The main study variables knowledge and awareness of tobacco use have been discussed in that chapter, too. Mean with standard deviations (SDs) have been reported for continuous variables. Also frequencies and percentages have been reported for categorical variables.

In this chapter, the comparisons of socio-demographic and economic characteristics of study subjects to gender and residence have been discussed. To compare variables, chi-square test (Pearson Chi-square or Likelihood Ratio Chi-square) has been used for categorical variables, t-test has been used for continuous variables and prevalence with 95% confidence interval has been reported for categorical variables. Mean with 95% confidence interval has been reported for continuous variable. P-values have been reported from the test results. All the tests have been performed at 5% level of significance.

4.2 Comparing characteristics of study subjects to gender

In this section, comparison of characteristics of study subjects to gender has been reported. Results are summarized in Table 4.2.1.

Table 4.2.1: Comparing socio-economic and demographic characteristics to gender

Characteristics	Tobacco Smoking			Tobacco Smokeless			Secondhand smoking		
	Male*	Female*	p-value	Male*	Female*	p-value	Male*	Female*	p-value
Residence									
Urban	47.77 (45.57,49.98)	33.33 (21.86,44.80)	0.021	42.33 (39.23,45.43)	57.66 (54.56,60.76)	0.753	74.09 (72.34,75.84)	25.90 (24.15, 27.65)	0.727
Rural	52.23 (50.02, 54.43)	66.67 (55.19,78.13)		41.67 (39.05,44.30)	58.32 (55.69,60.94)		74.54 (72.70,76.38)	25.45 (23.61,27.29)	
Age**	40.16 (39.57, 40.75)	50.57 (48.62,52.53)	<0.001	45.78 (44.85,46.72)	45.62 (44.86, 46.39)	0.790	36.93 (36.46,37.39)	34.50 (33.74, 35.26)	<0.001
Educational level									
No formal schooling	45.63 (43.43, 47.83)	87.87 (79.93,95.81)	<0.001	46.53 (43.40,49.65)	65.01 (62.45, 67.57)	<0.001	30.34 (28.79,31.89)	34.13 (31.41, 36.85)	<0.001
Less than primary school completed	18.67 (16.94, 20.38)	6.06 (0.25,11.86)		18.16 (15.74,20.57)	14.08 (12.21, 15.94)		16.77 (15.51,18.03)	12.31 (10.43, 14.20)	
Primary School Completed	9.17 (7.90, 10.45)	4.54 (0.00, 9.61)		11.93 (9.90, 13.97)	10.26 (8.63, 11.89)		10.52 (9.49, 11.56)	12.48 (10.59, 14.38)	
Less than secondary school completed	15.92 (14.30, 17.53)	1.51 (0.00, 4.48)		13.87 (11.71,16.04)	8.01 (6.55, 9.47)		20.28 (18.93,21.64)	21.98 (19.60, 24.36)	
Secondary school completed	4.46 (3.55, 5.37)	0.00		4.38 (3.10, 5.67)	1.34 (0.72, 1.96)		8.26 (7.32, 9.19)	8.72 (6.63, 10.82)	
High school completed	2.58 (1.88, 3.28)	0.00		1.93 (1.07, 2.80)	0.74 (0.28, 1.21)		7.86 (6.95, 8.77)	7.52 (6.01, 9.04)	
College/University Completed and /higher	3.54 (2.73, 4.36)	0.00		3.16 (2.06, 4.26)	0.52 (0.13, 0.91)		6.15 (5.34, 6.96)	5.38 (4.09, 6.68)	
Occupation									
Employment (Government, Non-Government)	11.40 (10.00, 12.81)	0.00		10.30 (8.04, 12.21)	2.94 (2.04, 3.85)		18.06 (16.68,19.44)	11.82 (9.05, 13.76)	

Characteristics	Tobacco Smoking			Tobacco Smokeless			Secondhand smoking		
	Male*	**Female***	**p-value**	**Male***	**Female***	**p-value**	**Male***	**Female***	**p-value**
Business (small, large)	22.31 (20.47,24.15)	0.00	<0.001	19.59 (17.10,22.07)	1.47 (0.8, 2.11)	<0.001	25.20 (23.72,26.68)	2.13 (1.06, 3.21)	<0.001
Farming (land owner & farmer)	20.68 (18.90, 22.47)	4.54 (0.00, 9.61)		24.18 (21.50,26.85)	0.14 (0.00, 0.35)		15.79 (14.55,17.03)	0.28 (0.00, 0.68)	
Agricultural / Industrial worker/ daily laborer/Other self-employed	34.73 (32.63, 36.83)	25.75 (15.12,36.39)		32.14 (29.21, 35.06)	7.00 (5.64, 8.36)		26.73 (25.14,28.31)	11.22 (8.44, 13.99)	
Home maker/ Housework	0.10 (0.00, 0.24	60.60 (48.72,72.49)		0.61 (0.12, 1.10)	78.24 (76.04, 80.44)		0.10 (0.00, 0.21)	62.32 (58.06, 66.58)	
Retired and unemployed (able to work/unable to work)	4.10 (3.23, 4.98)	3.03 (0.00, 7.20)		7.14 (5.52, 8.75)	4.42 (3.32, 5.52)		3.53 (3.04, 4.33)	63.05 (59.47, 66.62)	
Student/Other	6.64 (5.54, 7.74)	6.06 (0.25, 11.66)		6.02 (4.52, 7.51)	5.75 (4.51, 6.99)		9.83 (8.76, 10.89)	11.22 (8.44, 13.99)	
Wealth index									
Lowest	22.81 (20.96, 24.67)	63.63 (51.93,75.33)	<0.001	24.08 (21.40,26.76)	29.64 (27.21, 32.07)	0.028	14.58 (13.38,15.78)	16.11 (13.39, 18.84)	<0.001
Low	25.25 (23.33, 27.17)	27.27 (16.43,38.10)		25.20 (22.48,27.92)	24.70 (22.40, 27.00)		20.18 (18.81,21.55)	13.98 (11.41, 16.54)	
Middle	18.96 (17.23, 20.69)	1.51 (0.00, 4.48)		18.87 (16.42,21.33)	17.62 (15.59, 19.65)		17.89 (16.48,19.09)	16.69 (13.62, 19.45)	
High	19.62 (17.87, 21.37)	7.57 (1.13, 14.01)		20.81 (18.27,23.36)	17.25 (15.24, 19.26)		24.47 (23.01,25.94)	21.25 (18.22, 24.28)	
Highest	13.33 (11.83, 14.83)	0.00		11.02 (9.05, 12.98)	10.76 (9.11, 12.41)		22.96 (21.53,24.39)	31.95 (28.49, 35.40)	

* Proportion with 95% confidence Interval has been reported

** Mean with 95% CI has been reported

Comparison of residence to gender

From Table 4.2.1, among smokers we have observed that by gender, 47.77% of urban and 52.25% of rural respondents are male and 33.33% of urban and 66.67% of rural respondents are female. Hence the difference of residence to gender are not statistically significant for tobacco smokers (p=0.021).

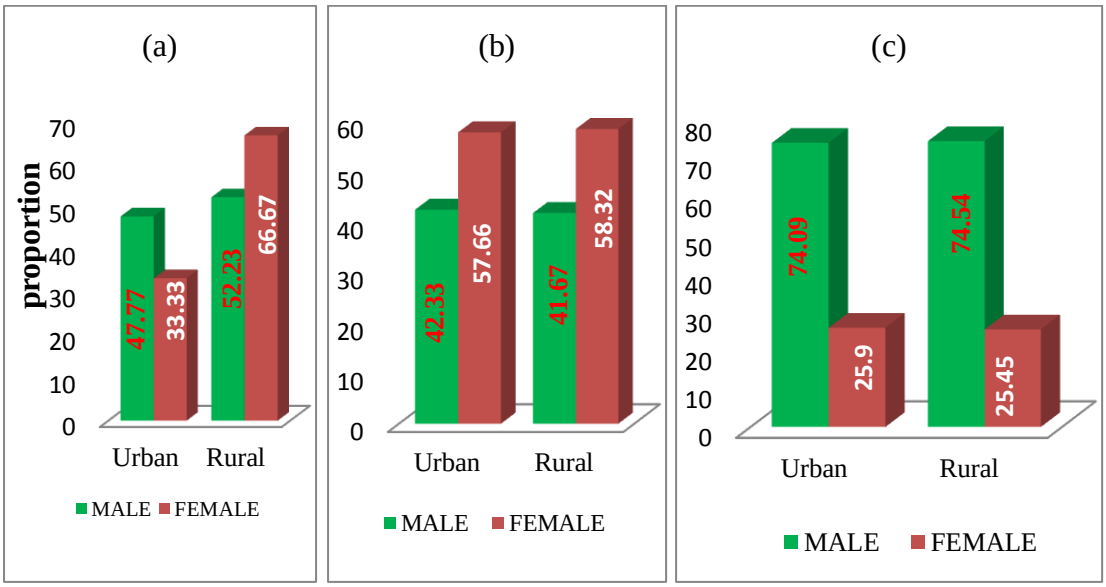


Figure 4.2.1: Comparison of residence to gender for (a) tobacco smoker, (b) smokeless tobacco user and (c) secondhand smoker

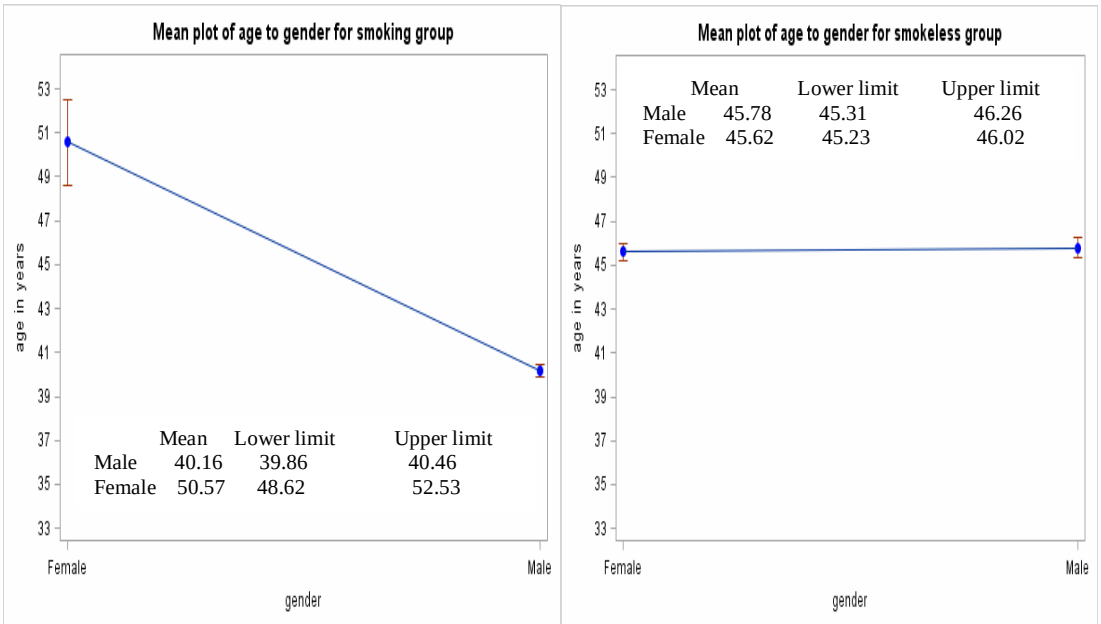
For smokeless tobacco users 42.33% of urban and 41.67% of rural respondents are male and 57.66% of urban and 58.32% of rural respondents are female. Hence the different of residence to gender are not statistically significant for smokeless tobacco users (p=0.753).

Among the secondhand smokers 74.90% of urban and 74.54% of rural respondents are male and 25.09% of urban and 25.45% of rural respondents are female. Hence the difference of residence to gender are not statistically significant for secondhand smokers (p=0.727).

Comparison of age to gender

From the Table 4.2.1, we have observed that the average age of male respondents who are smokers is 40.16 with 95% CI= (39.57, 40.75), whereas average age of female respondents who are smokers is 50.57 with 95% CI= (48.62, 52.53).

On the other hand, the average age of male respondents who are smokeless tobacco users is 45.78 with 95% CI= (44.85, 46.72), whereas average age of female respondents who are smokeless tobacco users is 45.62 with 95% CI= (44.86, 46.39). However, average age of males who are secondhand smokers is 36.93 with 95% CI = (36.46, 37.39) and average age of female secondhand smokers is 34.50 with 95% CI= (33.74, 35.26). It is also found that there exist statistically significant difference between age of male and female for tobacco smoker and secondhand smoker ($p<0.001$) but not statistically significant for smokeless tobacco user ($p=0.790$). Obtained results are presented in Figure 4.2.2



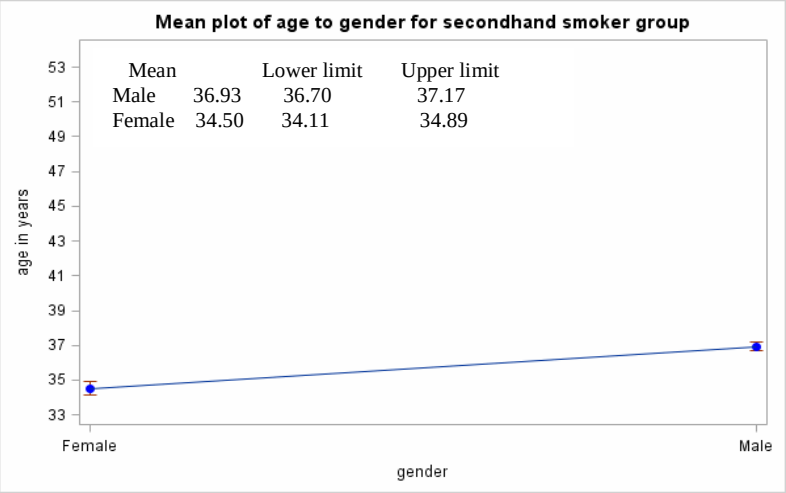
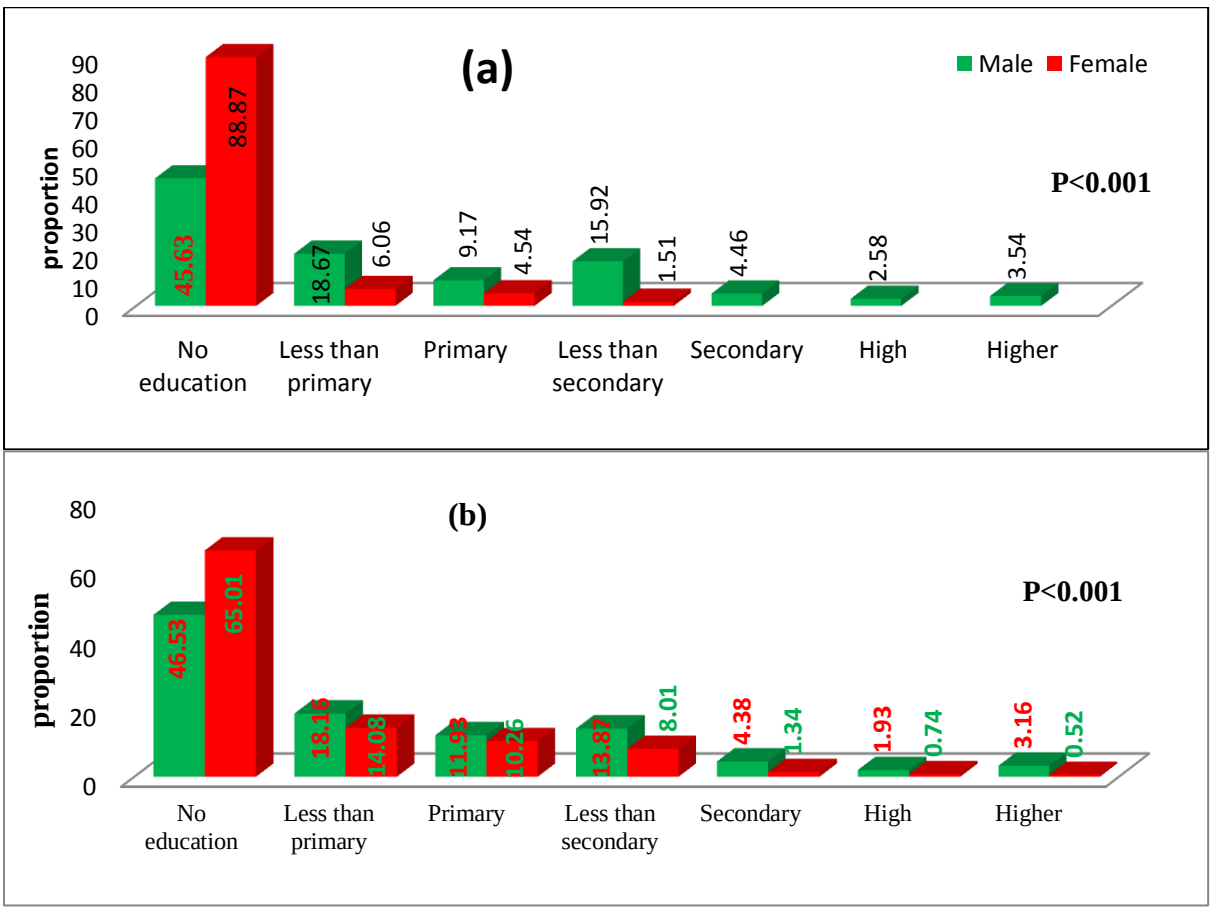


Figure 4.2.2: Comparison of age to gender

Comparison of educational level to gender

Education is an important factor for tobacco use.



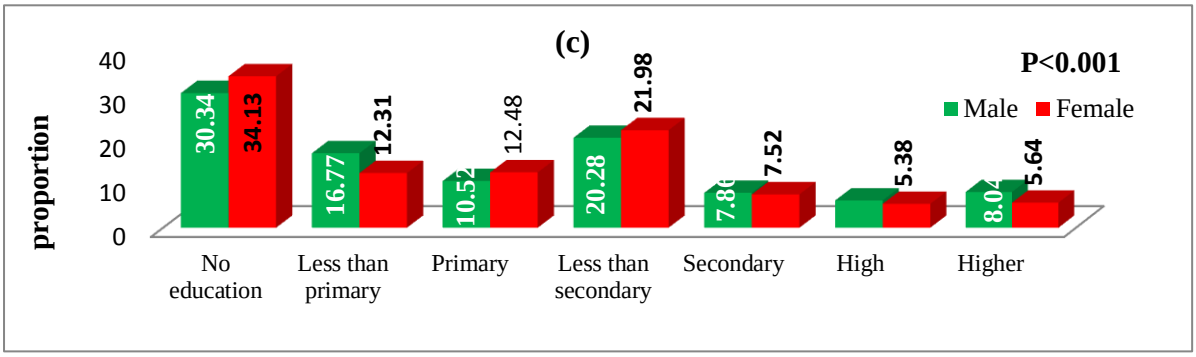


Figure 4.2.3: Comparison of educational levels to gender for (a) tobacco smoker, (b) smokeless tobacco user and (c) secondhand smoker

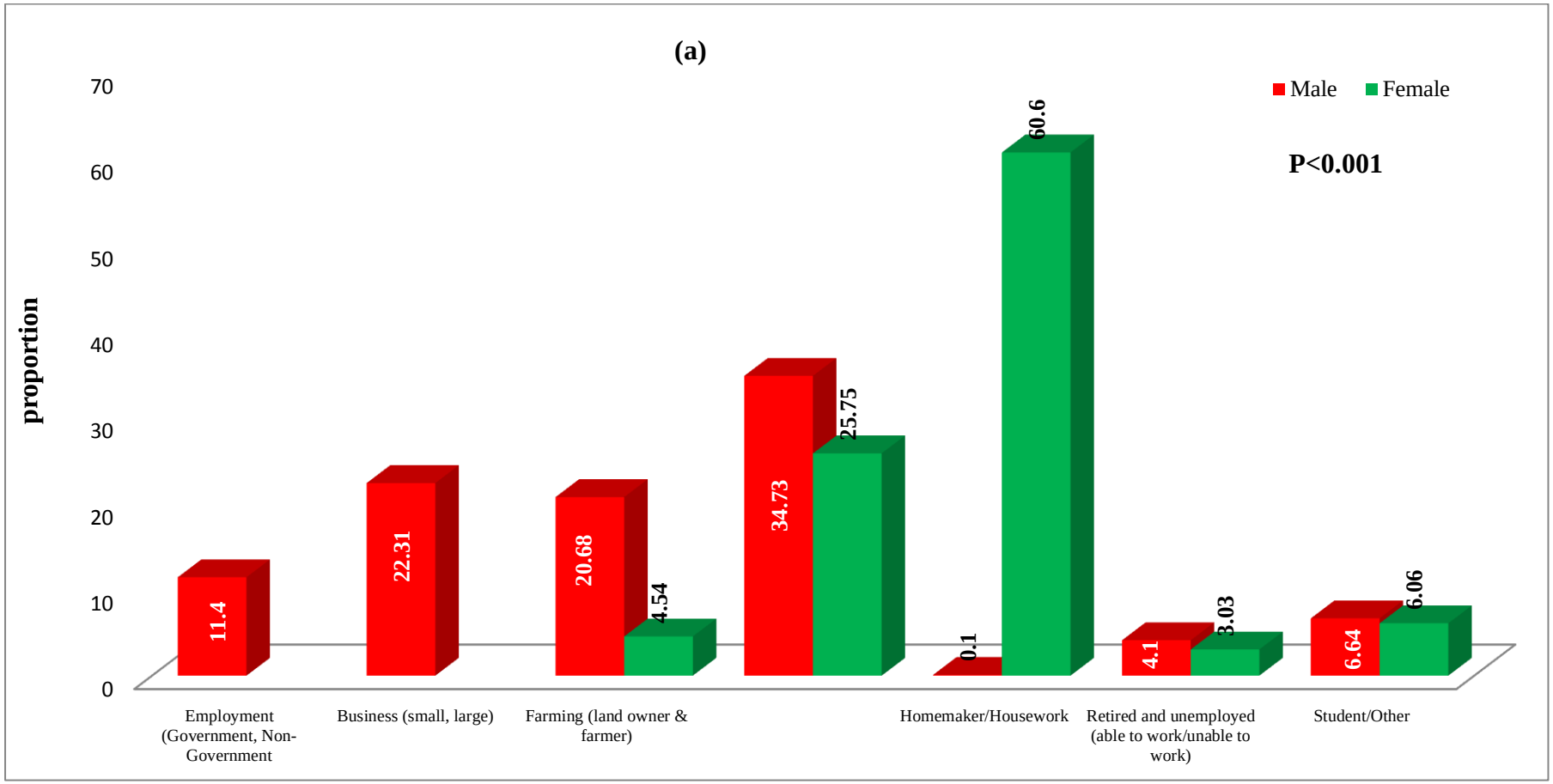
From Table 4.2.1, we have observed that among the male tobacco smokers 45.63% are with no formal schooling, 18.67% are with less than primary school completed, 9.17% are with primary school completed, 15.92% are with less than secondary school completed, 4.46% are with secondary school completed, 2.58% are with high school completed, and 3.54% are with college/university completed and /higher. Again for female tobacco smokers 88.87% are with no formal schooling, 6.06% are with less than primary school completed, 4.54% are with primary school completed, 1.51% are with less than secondary school completed. The level of education is significantly different between male and female for tobacco smokers ($p<0.001$).

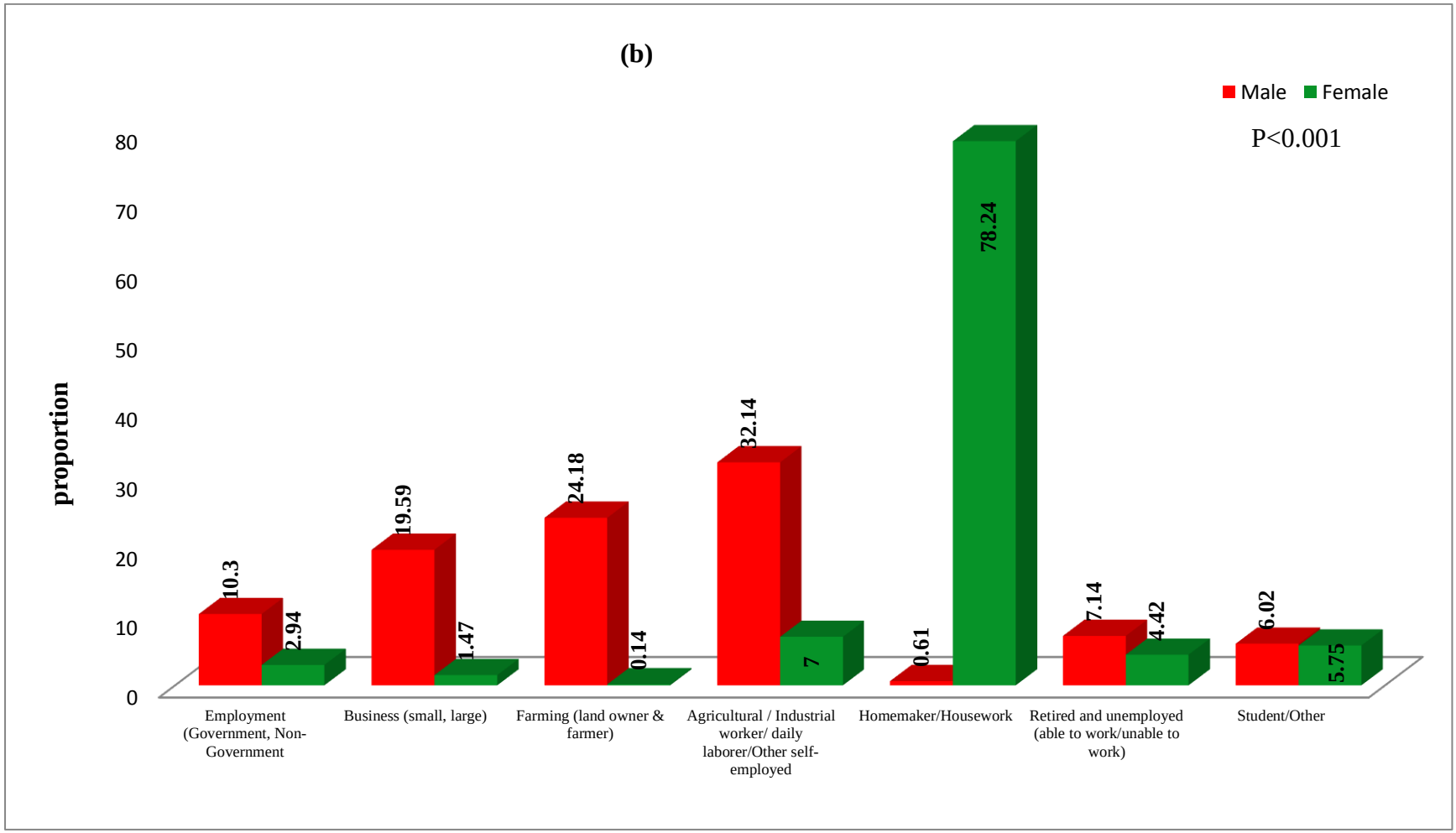
Also among the male smokeless tobacco users 46.53% are with no formal schooling, 18.16% are with less than primary school completed, 11.93% are with primary school completed, 13.87% are with less than secondary school completed, 4.38% are with secondary school completed, 1.93% are with high school completed and 3.16% are with college/university completed and /higher. Again among female smokeless tobacco users 65.01% are with no formal

schooling, 14.08% are with less than primary school completed, 10.26% are with primary school completed, 8.01% are with less than secondary school completed, 1.34% are with secondary school completed, 0.74% are with High school completed and 0.52% are with college/university completed and /higher. The level of education is significantly different between male and female for smokeless tobacco users group ($p<0.001$).

On the other hand for secondhand smokers, we have observed that among the male secondhand smokers 30.34% are with no formal schooling, 16.77% are with less than primary school completed, 10.52% are with primary school completed, 20.28% are with less than secondary school completed, 7.86% are with secondary school completed, 6.15% are with high school completed and 8.04% are with college/university completed and /higher. Again for female secondhand smokers 30.34% are with no formal schooling, 12.31% are with less than primary school completed. 12.48% are with primary school completed, 21.98% are with less than secondary school completed, 7.52% are with secondary school completed, 5.38% are with high school completed and 5.64% are with college/university/higher completed. Hence the level of education is significantly different between male and female for secondhand smokers group ($p<0.001$)

Comparison of occupation of tobacco users to gender




(b)
Male
Female
P<0.001
proportion
80
70
60
50
40
30
20
10
0
10.3
2.94
19.59
1.47
24.18
0.14
32.14
7
0.61
78.24
7.14
4.42
6.02
5.75
Employment (Government, Non-Government
Business (small, large)
Farming (land owner & farmer)
Agricultural / Industrial worker/ daily laborer/Other self-employed
Homemaker/Housework
Retired and unemployed (able to work/unable to work)
Student/Other

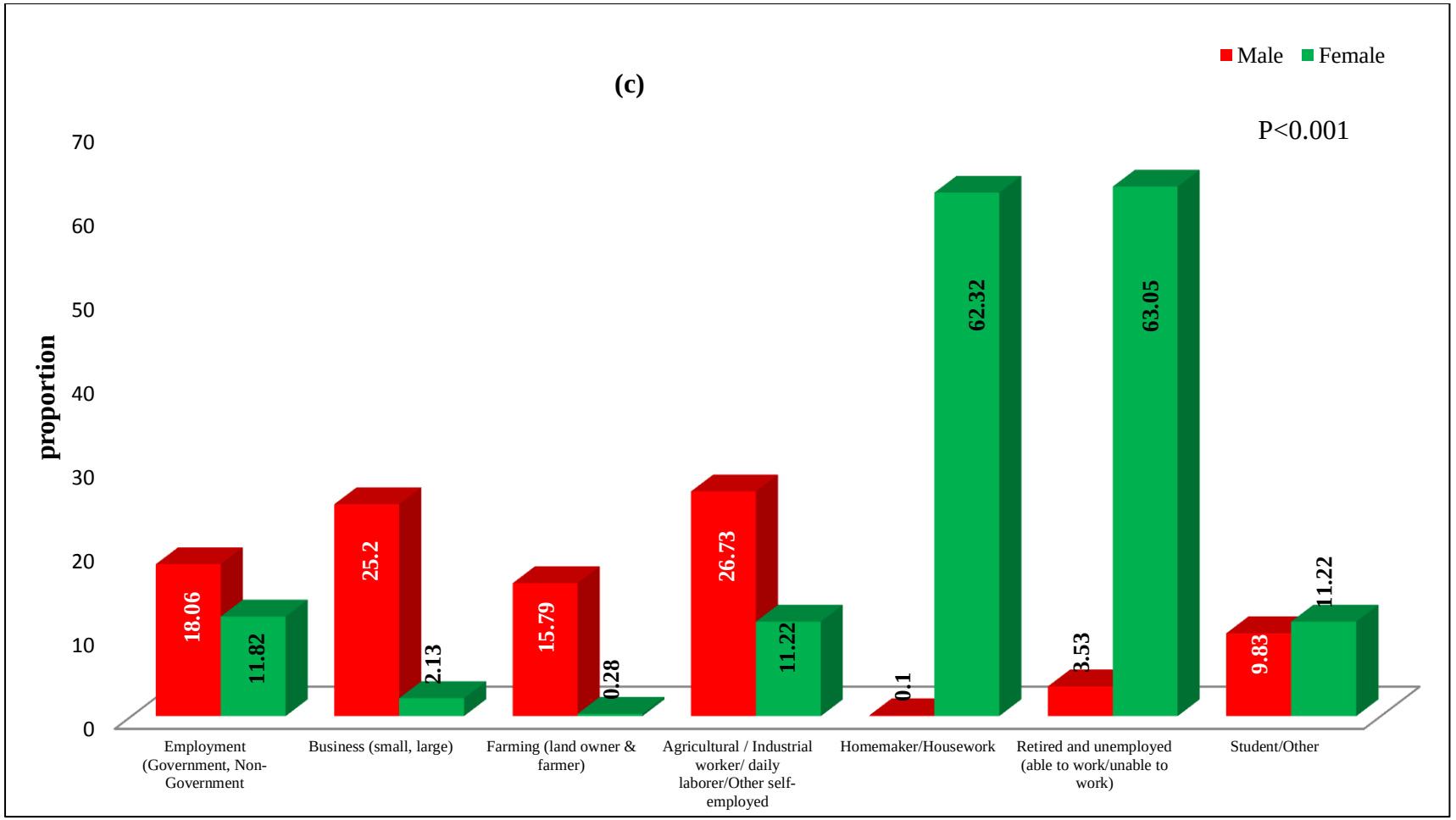


Figure 4.2.4: Comparison of employment level to gender for (a) tobacco smoker, (b) smokeless tobacco user and (c) secondhand smoker

From Table 4.2.1, we have observed that among the male tobacco smokers 11.40% are employer (Government, non-government), 22.31% are business man (small, large), 20.68% are farmer (land owner & farmer), 34.73% are agricultural /industrial worker/ daily laborer/other self- employed, 0.10% are home maker/housework, 4.10 % are retired and unemployed (able to work/unable to work) and 6.64% are student/other. Again for female smoker, we have observed that 4.54% are farmer, 25.75% are agricultural / industrial worker/daily laborer/other self- employed, 60.60% are home maker/housework, 3.03% are retired and unemployed (able to work/unable to work) and 6.06% are with student/other. We have also found that pattern of occupation is significantly different between male and female tobacco smokers ($p<0.001$).

Among the male smokeless tobacco users we have found that 10.30% are employer (Government, non-government), 19.59% are business man (small, large), 24.18% are farmer (land owner & farmer), 32.14% are agricultural/ industrial worker/ daily laborer/other self- employed, 0.61% are home maker/housework, 7.14% are retired and unemployed (able to work/unable to work) and 6.02% are student/other. Again for female smokeless tobacco users 2.94 are employer, 1.47% are business man (small, large), 0.14% are farmer, 7.00% are agricultural/industrial worker/daily laborer/other self- employed, 78.24% are home maker/housework, 4.42% are retired and unemployed (able to work/unable to work) and 5.75% are student/other. We have also found that pattern occupation is significantly different between male and female smokeless tobacco users ($p<0.001$).

Again among the male secondhand smokers we have found that 18.06% are employer (Government, non-government), 25.20% are business man (small, large), 15.79% are farmer (land owner & farmer), 26.73% are agricultural/ industrial worker/ daily laborer/other self- employed, 0.10% are home maker/housework, 3.53% are retired and unemployed (able to work/unable to work) and 9.83% are student/other. Again for female secondhand smokers 11.82% are employer, 2.13% are business man (small, large), 0.28% are farmer, 11.22% are agricultural/industrial worker/daily laborer/other self-employed, 62.32% are home maker/housework, 63.05% are retired and unemployed (able to work/unable to work) and 11.22% are student/other. We have also found that pattern occupation is significantly different between male and female secondhand smokers ($p<0.001$).

Comparison of wealth index to gender

From Table 4.2.1, among the tobacco smokers we have observed that 22.81% of male and 63.63% of female are of lowest wealth index, 25.25% of male and 27.27% of female are of low wealth index, 18.96% of male and 1.51% of female are of middle wealth index, 19.62% of male and 7.57% of female are of high wealth index and 13.33% of male are highest wealth index. It is also observed that level of wealth index is significantly different between male and female tobacco smokers ($p<0.001$).

On the other hand for smokeless tobacco users 24.08% of male and 29.64% of female are of lowest wealth index, 25.20% of male and 24.70% female are of

low wealth index, 18.87% of male and 17.62% of female are of middle wealth index, 20.81% of male and 17.25% of female are of high wealth index and 11.02% of male and 10.76% of female are of highest wealth index. It is also observed that level of wealth index is significantly different between male and female smokeless tobacco users (p<0.001).

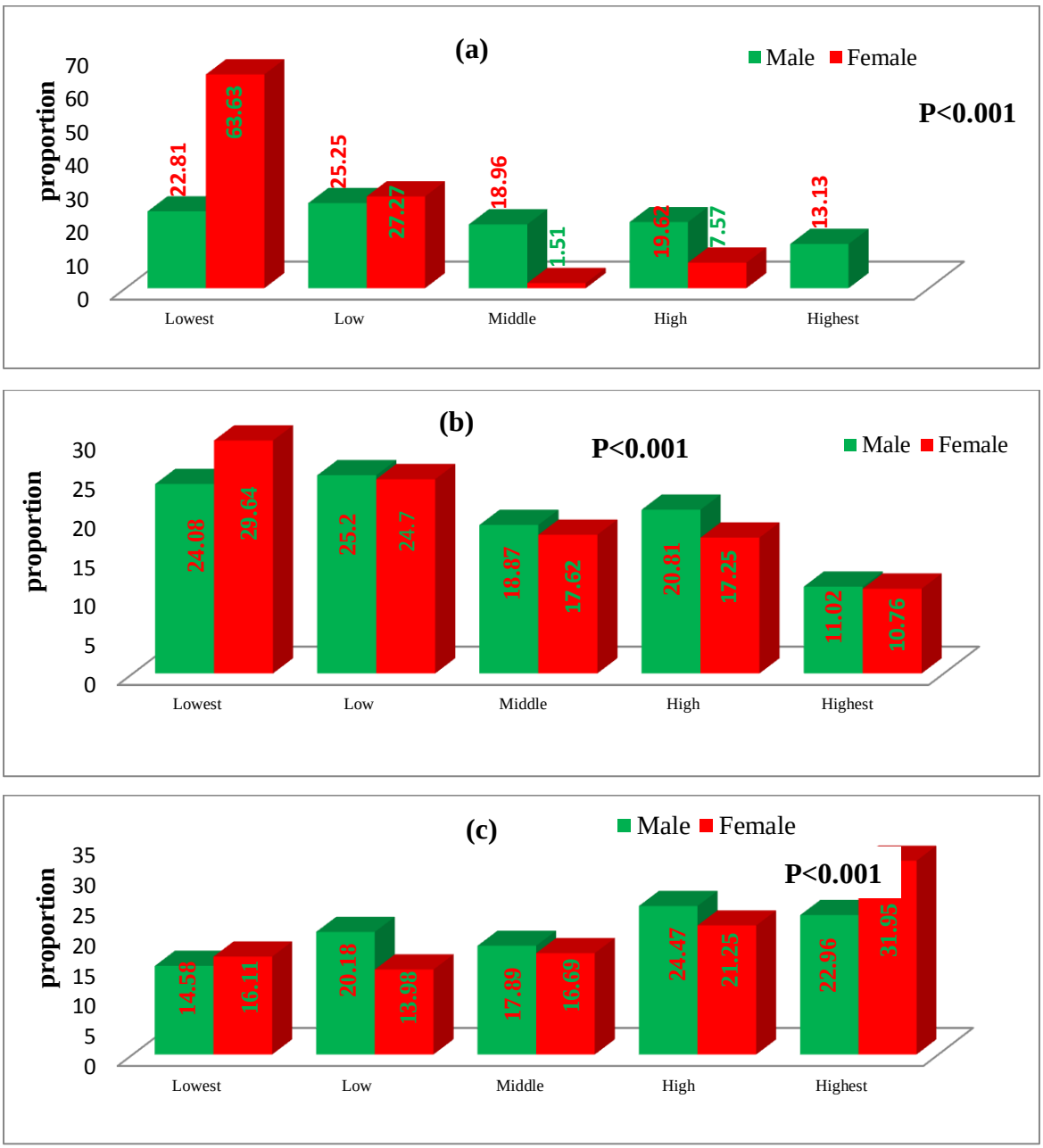


Figure 4.2.5: Comparison of wealth index to gender for (a) tobacco smoker, (b) smokeless tobacco user and (c) secondhand smoker

Among the secondhand smokers, 14.58% of male and 16.11% of female are of lowest wealth index, 20.18% of male and 13.91% female are of low wealth index, 17.89% of male and 16.69% of female are of middle wealth index, 24.47% of male and 21.25% of female are of high wealth index and 22.96% of male and 31.95% of female are of highest wealth index. We have also found that level of wealth index is significantly different between male and female secondhand smokers ($p<0.001$).

4.3 Comparing characteristics of the study subjects to place of residence

In this section comparison of characteristics of study subjects to residence has been reported. Results are summarized in Table 4.3.1.

Table 4.3.1: Comparing socio-economic and demographic characteristics to place of residence

Characteristics	Smoking			Smokeless			Secondhand smoking		
	Urban*	**Rural***	**p-value**	**Urban***	**Rural***	**p-value**	**Urban***	**Rural***	**p-value**
Gender									
Male	97.72 (96.77,98.66)	95.91 (94.71,97.08)	0.021	42.33 (39.23,45.43)	41.67 (39.05,44.30)	0.753	80.90 (79.26,82.52)	84.51 (82.83,86.19)	0.152
Female	2.28 (1.33, 3.22)	4.09 (2.91,5.28)		57.67 (54.56,60.76)	58.33 (55.69,60.54)		19.10 (17.47,20.73)	15.48 (13.80,17.16)	
Age**	39.36 (38.53,40.20)	41.51 (40.69,42.33)	<0.001	45.12 (44.23,46.02)	46.10 (45.31,46.88)	0.056	35.73 (35.20,36.26)	36.94 (36.35,37.54)	<0.001
Educational level									
No formal schooling	38.38 (35.30,41.45)	54.78 (51.76,57.72)	<0.001	52.31 (49.17,55.46)	60.71 (58.10,63.32)	<0.001	23.32 (21.57,25.08)	37.01 (34.76,39.26)	<0.001
Less than primary school completed	17.42 (15.03,19.82)	18.99 (16.64,21.34)		14.83 (12.59,17.06)	16.51 (14.53,18.50)		13.81 (12.38,15.25)	18.47 (16.67,20.28)	
Primary School Completed	9.43 (7.59, 11.28)	8.65 (6.97, 10.34)		11.74 (9.71, 13.76)	10.41 (8.78, 12.05)		10.00 (8.75, 11.25)	11.15 (9.68, 12.62)	
Less than secondary school completed	19.60 (17.09,22.11)	11.73 (9.80, 13.65)		12.87 (10.76,14.98)	8.77 (8.26, 10.29)		20.95 (19.26,22.64)	19.88 (18.02,21.74)	
Secondary school completed	5.91 (4.42, 7.40)	2.88 (1.88, 3.88)		3.50 (2.34, 4.65)	2.00 (1.25, 2.75)		10.22 (8.97, 11.48)	5.97 (4.86, 7.07)	
High school completed	3.00 (1.92, 4.08)	2.04 (1.20, 2.89)		1.95 (1.08, 2.82)	0.70 (0.2, 1.20)		7.94 (6.81, 9.06)	4.73 (3.74, 5.72)	
College/University Completed and /higher	6.22 (4.69, 7.75)	0.93 (0.35, 1.50)		2.78 (1.74, 3.81)	0.81 (0.33, 1.30)		13.72 (12.29,15.15)	2.76 (1.99, 3.52)	

Characteristics	Smoking			Smokeless			Secondhand smoking		
	Urban*	**Rural***	**p-value**	**Urban***	**Rural***	**p-value**	**Urban***	**Rural***	**p-value**
Occupation									
Employment (Government, Non-Government)	18.36 (15.91,20.80)	4.46 (3.23, 5.70)		11.55 (9.54, 13.55)	2.06 (1.30, 2.81)		25.06 (23.26,26.86)	7.54 (6.31, 8.77)	
Business (small, large)	28.83 (25.97,31.70)	15.08 (12.94,17.22)		12.26 (10.21,14.32)	6.77 (5.43, 8.11)		24.21 (22.43,25.99)	17.34 (15.58,19.10)	
Farming (land owner & farmer)	6.32 (4.78, 7.86)	32.58 (29.78,35.39)	<0.001	3.68 (2.49, 4.86)	14.94 (13.05,16.84)	<0.001	4.21 (3.38, 5.04)	24.21 (22.21,26.20)	
Agricultural / Industrial worker/ daily laborer/Other self-employed	31.22 (28.29,34.15)	37.33 (34.44,40.23)		18.30 (15.87, 0.72)	17.01 (15.01,19.01)		21.50 (19.66,23.34)	28.17 (25.95,30.39)	<0.001
Homemaker/Housework	1.55 (0.77, 2.33)	2.51 (1.57, 3.45)		40.69 (37.61,43.77)	49.26 (46.60,51.92)		8.03 (6.81,9.25)	10.10 (8.62,11.59)	
Retired and unemployed (able to work/unable to work)	4.66 (3.33, 6.00)	3.53 (2.43, 4.64)		6.03 (4.53, 7.52)	5.22 (4.04, 6.41)		3.81 (2.95, 4.66)	2.40 (1.64, 3.15)	
Student/Other	9.02 (7.21, 10.83)	4.46 (3.23, 5.70)		7.46 (5.81,9.11)	4.71 (3.58,5.84)		11.32 (9.90,12.74)	8.86 (7.09,9.83)	
Wealth index									
Lowest	16.39 (14.05,18.72)	31.09 (28.32,33.87)		19.73 (17.23,22.23)	32.76 (30.27,35.26)		9.91 (8.66, 11.15)	21.05 (19.16,22.95)	
Low	20.02 (17.49,22.54)	30.07 (27.32,32.82)		19.22 (16.75,1.59)	29.01 (26.59,31.42)		13.18 (11.77,14.58)	26.52 (24.46,28.57)	

Characteristics	Smoking			Smokeless			Secondhand smoking		
	Urban*	**Rural***	**p-value**	**Urban***	**Rural***	**p-value**	**Urban***	**Rural***	**p-value**
Middle	18.15 (15.71,20.58)	18.62 (16.29,20.95)		17.68 (15.29, 0.08)	18.48 (16.41,20.54)		14.12 (12.67,15.57)	21.95 (20.03,23.88)	
High	22.19 (19.57,24.82)	16.57 (14.34,18.79)	<0.001	23.61 (20.95,26.28)	15.24 (13.32,17.15)	<0.001	24.93 (23.13,26.72)	22.63 (20.68,24.58)	
Highest	23.23 (20.56,25.90)	3.63 (2.51, 4.75)		19.73 (17.23,22.23)	4.49 (3.38, 5.59)		37.84 (35.83,39.86)	7.82 (6.57,9.07)	<0.001

* Proportion with 95% confidence Interval has been reported

Comparison of gender to residence

From Table 4.3.1, among smokers we have observed that by residence, 97.72% of urban and 95.91% of rural respondents are male and 2.28% of urban and 4.09% of rural respondents are female. The difference of residence to gender are not statistically significant for tobacco smokers (p=0.021).

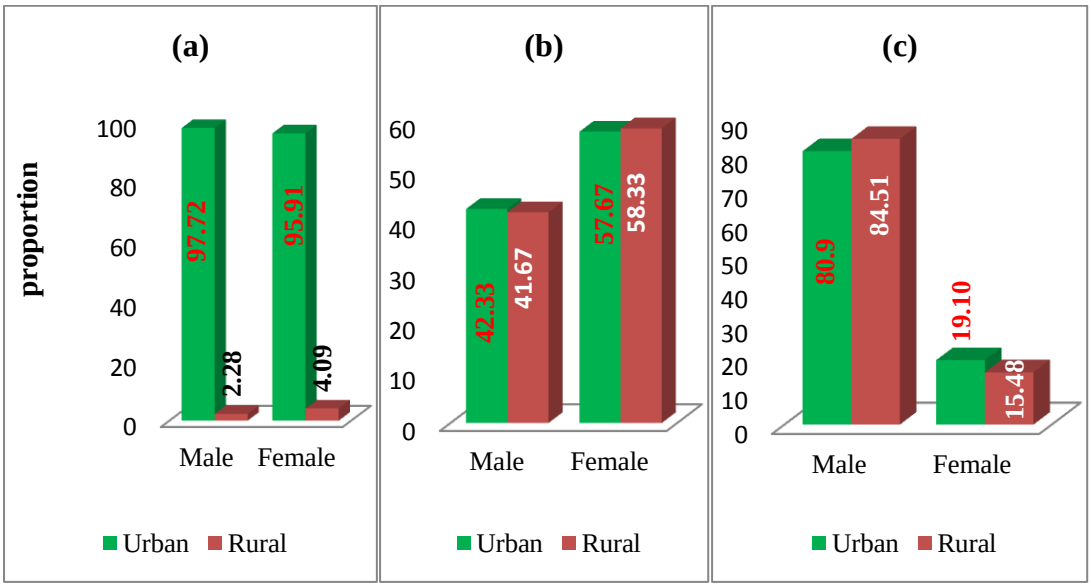


Figure 4.3.1: Comparison of gender to residence for (a) tobacco smoker, (b) smokeless tobacco user and (c) secondhand smoker

Among smokeless tobacco users 42.33% of urban and 41.67% of rural respondents are male and 57.67% of urban and 58.33% of rural respondents are female. The different of residence to gender are not statistically significant for smokeless tobacco users (p=0.753).

Among the secondhand smokers 80.90% of urban and 84.51% of rural respondents are male and 19.10% of urban and 15.49% of rural respondents are female. The difference of residence to gender are not statistically significant, too (p=0.152).

Comparison of age to residence

From the Table 4.2.2, we have observed that the average age of urban respondents who are smokers is 39.36 with 95% CI= (38.53, 40.20), whereas average age of rural respondents who are smokers is 41.51 with 95% CI= (40.69, 42.33). On the other hand, the average age of urban respondents who are smokeless tobacco users is 45.12 with 95% CI= (44.23, 46.02), whereas average age of rural respondents who are smokeless tobacco users is 46.10 with 95% CI= (45.31, 46.88). However, average age of urban respondents who are secondhand smokers is 35.73 with 95% CI = (35.20, 36.20) and average age of rural respondents secondhand smokers is 36.94 with 95% CI= (36.35, 37.54). It is also found that there exist statistically significant difference between age of urban and rural for tobacco smoker and secondhand smoker ($p<0.001$) but not statistically significant for smokeless tobacco user ($p=0.056$).

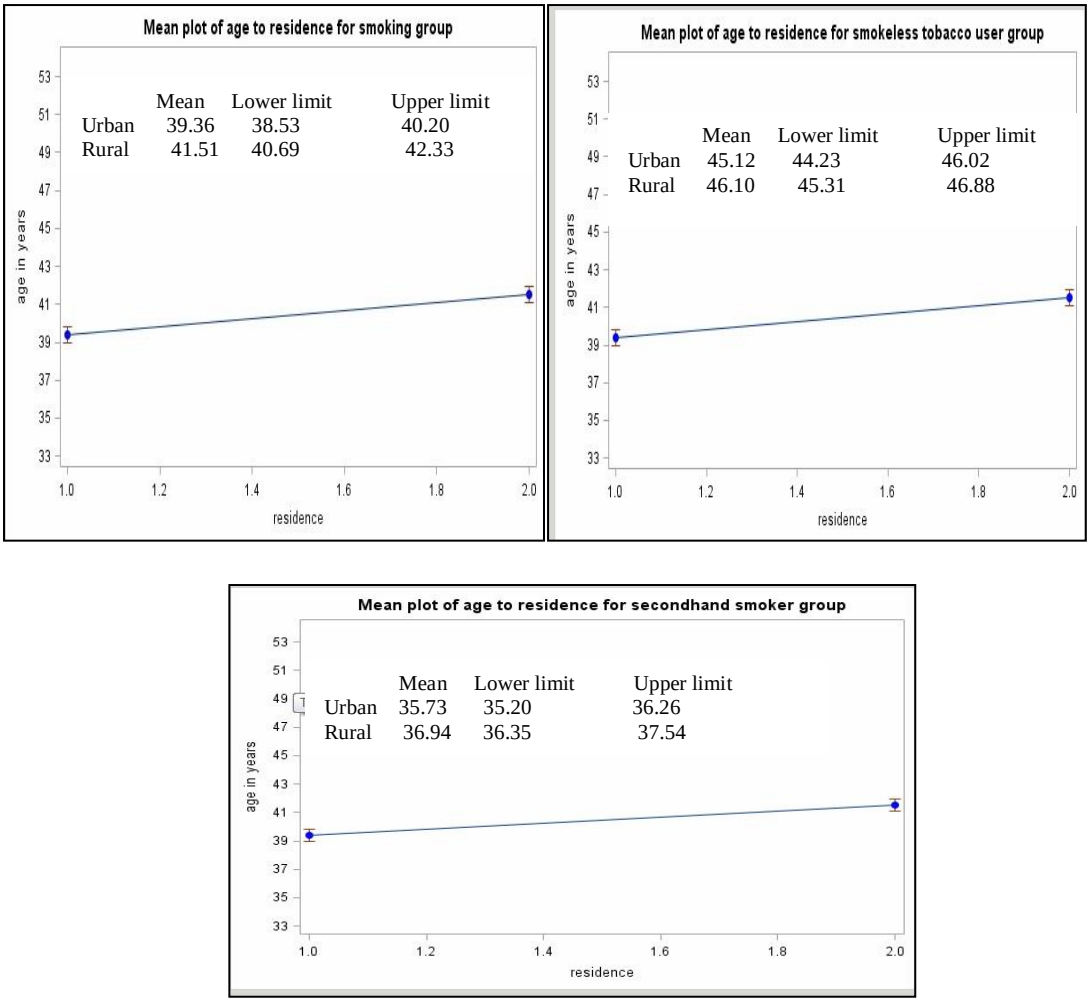


Figure 4.3.2: Comparison of age to residence

Comparison of educational level to residence

From Table 4.3.1, we have observed that among urban tobacco smokers with no formal schooling are 38.38%, followed by less than primary school completed 17.42%, primary school completed 9.43%, less than secondary school completed 19.60%, secondary school completed 5.91%, high school completed 3.00% and college/university completed and /higher 6.22%. Urban with no formal schooling are 54.78%, followed by less than primary school completed 18.99%, primary school completed 8.65% and less than secondary school completed 11.73%, secondary school completed 2.88%, high school

completed 2.04% and 0.93% have completed college/university/higher degree. Level of education is significantly different between urban and rural for tobacco smokers group (p<0.001).

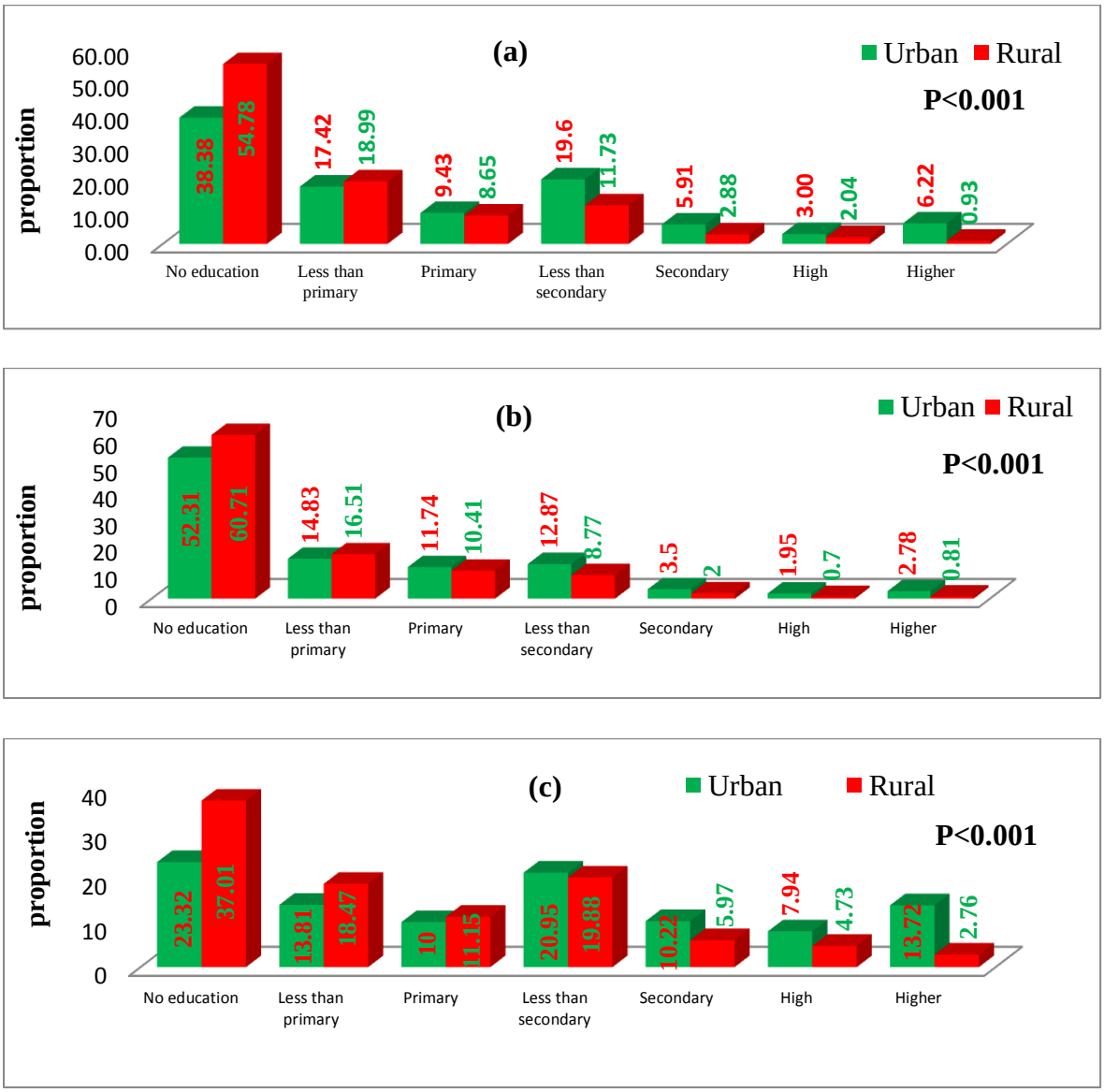


Figure 4.3.3: Comparison of educational levels to residence for (a) tobacco smoker, (b) smokeless tobacco user and (c) secondhand smoker

Also among the urban smokeless tobacco users with no formal schooling are 52.31%, followed by less than primary school completed 14.83%, primary school completed 11.74%, less than secondary school completed 12.87%,

secondary school completed 3.50%, high school completed 1.95% and college/university completed and /higher 2.78%. Rural smokeless tobacco users with no formal schooling are 60.71%, followed by less than primary school completed 16.51%, primary school completed 10.41%, less than secondary school completed 8.77%, secondary school completed 2.00%, high school completed 0.70% and college/university completed and /higher 0.81%. Level of education is significantly different between urban and rural for smokeless tobacco users ($p<0.001$).

On the other hand for secondhand smokers, we have observed that the urban secondhand smokers with no formal schooling are 23.32%, followed by less than primary school completed 13.81%, primary school completed 10.00%, less than secondary school completed 20.95%, secondary school completed 10.22%, high school completed 7.94% and college/university completed and /higher 13.72%. Rural secondhand smokers with no formal schooling are 37.01%, followed by less than primary school completed 18.47%, primary school completed 11.15% and less than secondary school completed 19.88%, secondary school completed 5.97%, high school completed 4.73% and college/university completed and /higher degree completed 2.76%. Level of education is significantly different between urban and rural area for secondhand smokers ($p<0.001$).

Comparison of working status to residence

From Table 4.3.1 for smokers group we have observed that by occupation, 18.36% urban and 4.46% of rural respondents are employer(Government and non-government), followed by 28.83% of urban and 32.58% of rural area respondents are business man(small and large), 6.32% of urban and 32.58% of rural respondents are farmer, 31.22% of urban and 37.33% of rural respondents are agricultural/industrial worker/daily laborer/other self-employed, 1.55% of urban and 2.51% of rural are homemaker, 4.66% of urban and 3.53% of rural are retired and unemployed (able to work/unable to work), 9.02% of urban and 4.46% of rural are student/other. We have seen that the occupation of respondents are significantly different between urban and rural among the tobacco smokers ($p<0.001$).

On the other hand for smokeless tobacco users from Table 4.3.1 we have observed that by occupation 11.55% urban and 2.06% of rural respondents are employer(Government and non-government), followed by 12.26% of urban and 6.77% of rural area respondents are business man (small and large), 3.68% of urban and 14.94% of rural respondents are farmer, 18.03% of urban and 17.03% of rural respondents are agricultural/industrial worker/daily laborer/other self- employed, 40.69% of urban and 49.26% of rural are homemaker/housework, 6.03% of urban and 5.22% of rural are retired and unemployed (able to work/unable to work), 7.46% of urban and 4.71% of rural are student/other. We have seen that the occupation of respondents are

significantly different between urban and rural among the smokeless tobacco users ($p<0.001$).

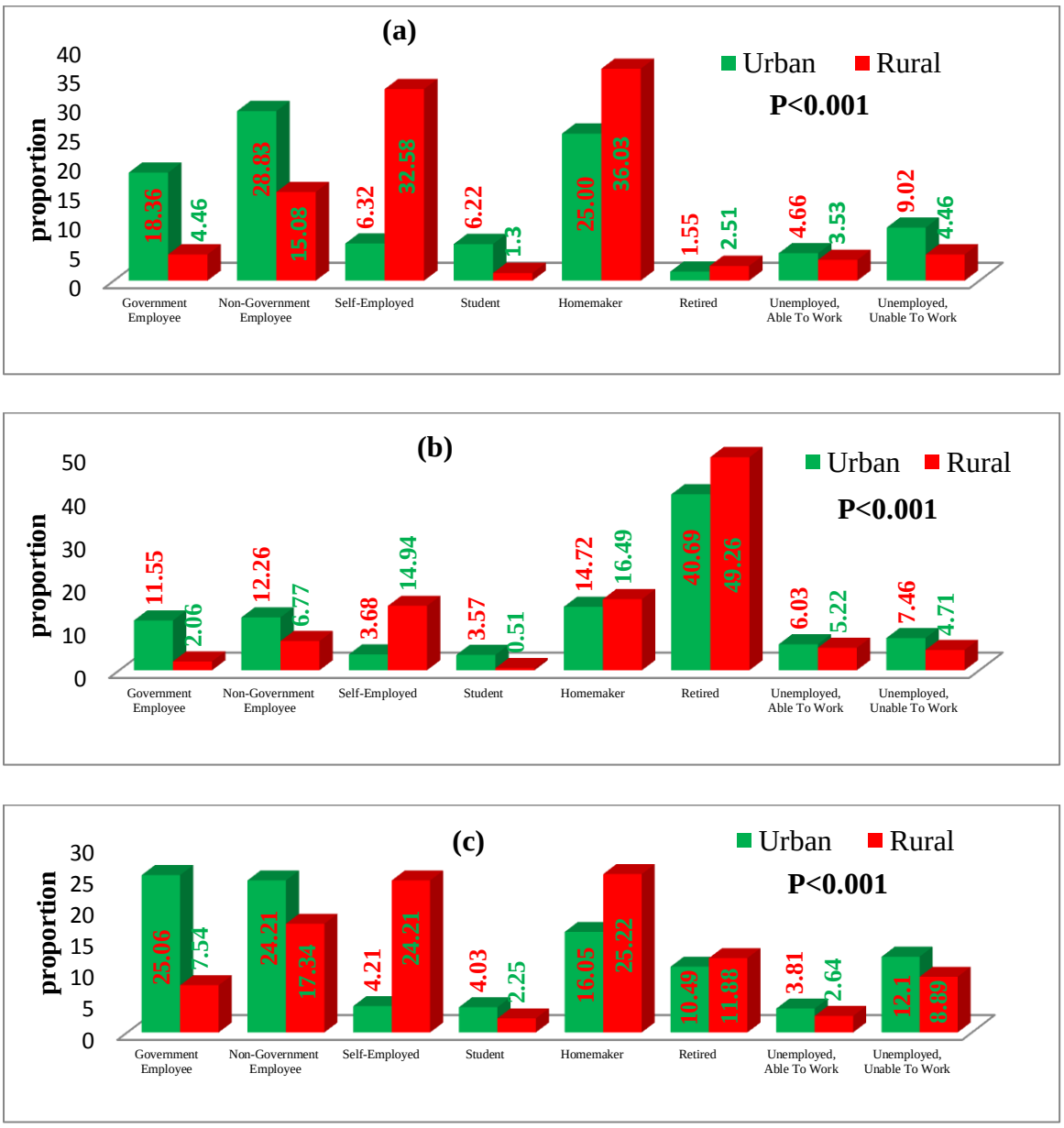


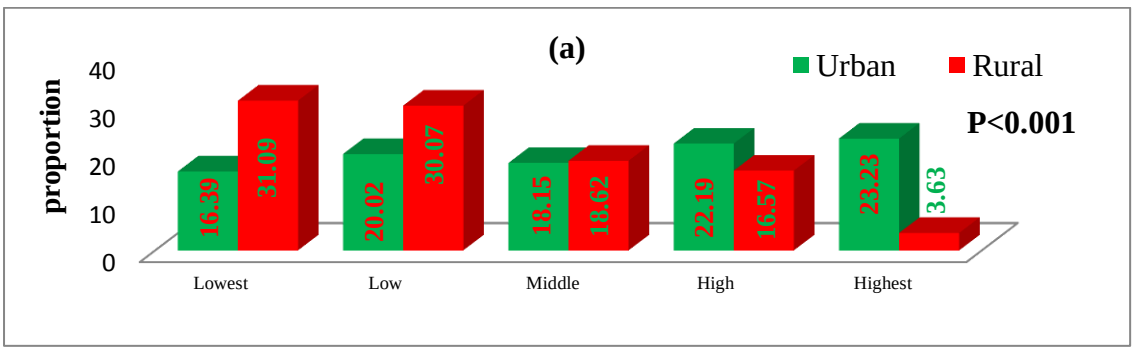
Figure 4.3.4: Comparison of employment status to residence for (a) tobacco smoker, (b) smokeless tobacco user and (c) secondhand smoker

Also among the secondhand smoking group from Table 4.3.1, we have observed that by occupation, 25.06% urban and 7.54% of rural respondents are employer (Government and non-government), followed by 24.21% of urban and 24.21% of rural area respondents are business man (small and large),

4.21% of urban and 24.21% of rural respondents are farmer, 21.50% of urban and 28.17% of rural respondents are agricultural/industrial worker/ daily laborer/other self- employed, 8.03% of urban and 10.10% of rural are homemaker/housework, 3.81% of urban and 2.24% of rural are retired and unemployed (able to work/unable to work), 11.32% of urban and 8.86% of rural are student/other. We have seen that the occupation of respondents are significantly different between urban and rural secondhand smokers ($p<0.001$).

Comparison of wealth index to residence

From Table 4.3.1, among the smokers we have observed that 16.39% of urban and 31.09% of rural are of lowest wealth index, 20.02% of urban and 30.07% of rural are of low wealth index, 18.15% of urban and 18.62% of rural are of middle wealth index, 22.19% of urban and 16.57% of rural are of high wealth index and 23.23% of urban and 3.63% of rural are of highest wealth index. It is also observed that level of wealth index is significantly different between urban and rural smokers ($p<0.001$).



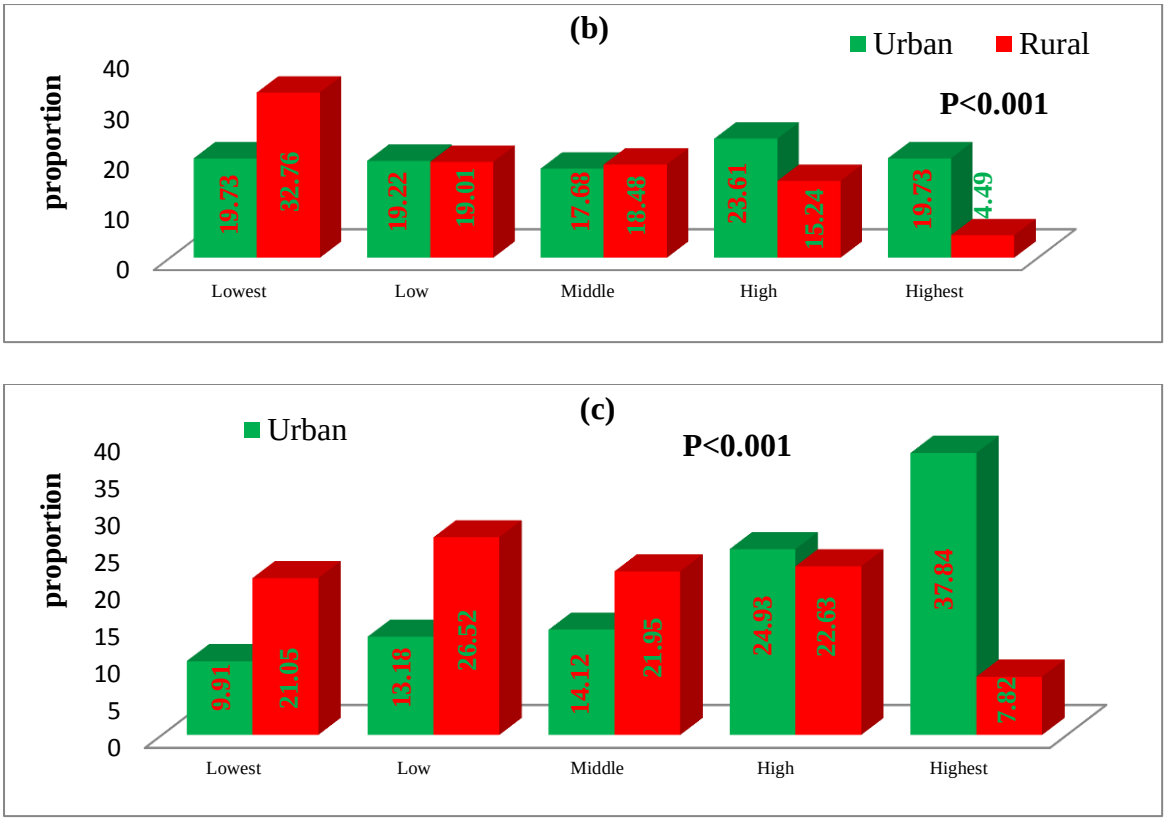


Figure 4.3.5: Comparison of wealth index to residence for (a) tobacco smoker, (b) smokeless tobacco user and (c) secondhand smoker

On the other hand for smokeless tobacco users from Table 4.3.1, we have observed that 19.73% of urban and 32.76% of rural are of lowest wealth index, 19.22% of urban and 29.01% rural are of low wealth index, 17.68% of urban and 18.48% of rural are of middle wealth index, 23.61% of urban and 15.24% of rural are of high wealth index, 29.73% of urban and 4.49% of rural are of highest wealth index. It is also observed that level of wealth index is significantly different between urban and rural smokeless tobacco users ($p<0.001$).

Also among the secondhand smoker, we have observed that 9.91% of urban and 21.05% of rural are of lowest wealth index, followed by 13.18% of urban and 26.52% rural are of low wealth index, 14.12% of urban and 21.95% of

rural are of middle wealth index, 24.93% of urban and 22.63% of rural are of high wealth index, 37.84% of urban and 7.82% of rural are of highest wealth index. It is also observed that level of wealth index is significantly different between urban and rural secondhand smokers ($p<0.001$).

4.4 Comparing knowledge of health consequences of tobacco use to gender

In this section knowledge of health consequences of tobacco use to gender has been discussed to the characteristics of the study subject and the comparison has been summarized in table 4.4.1.

Table 4.4.1: Comparing knowledge of health consequences of tobacco use to gender

Characteristics	Smoking			Smokeless			Secondhand smoking		
	Male*	Female*	p-value	Male*	Female*	p-value	Male*	Female*	p-value
Causing Serious illness	96.90 (96.13, 97.67)	87.87 (79.93,95.81)	<0.001	91.73 (90.00,93.46)	91.88 (90.43,93.34)	0.894	97.82 (97.32,98.31)	96.14 (94.72,97.57)	0.011
Causing Stroke	86.82 (85.32, 88.33)	55.73 (43.16,68.31)	<0.001	81.96 (79.54, 84.39)	65.53 (62.96,68.09)	<0.001	--	--	--
Causing heart attack	89.30 (87.93, 90.68)	60.65 (48.28,73.02)	<0.001	82.79 (80.41, 85.18)	67.95 (65.43,70.47)	<0.001	--	--	--
Causing lung cancer	94.88 (93.90, 95.86)	73.77 (62.63,84.90)	<0.001	87.25 (85.14, 89.36)	77.42 (75.16,79.68)	<0.001	--	--	--

--Indicates not applicable.

* Proportional value with 95% confidence Interval has been reported

From Table 4.4.1 among the tobacco smokers we have observed that 96.90% of male and 87.87% of female believe that smoking causes serious illness, 86.82% of male and 55.73% of female believe that smoking causes stroke, 89.30% of male and 60.65% of female believe that it causes heart attack, 94.88% of male and 73.77% of female believe smoking causes lung cancer. The probability value from two group proportion test ($p<0.001$) refers that knowledge on serious illness, stroke, heart attack and causing lunch cancer are highly significantly different between male and female respondents.

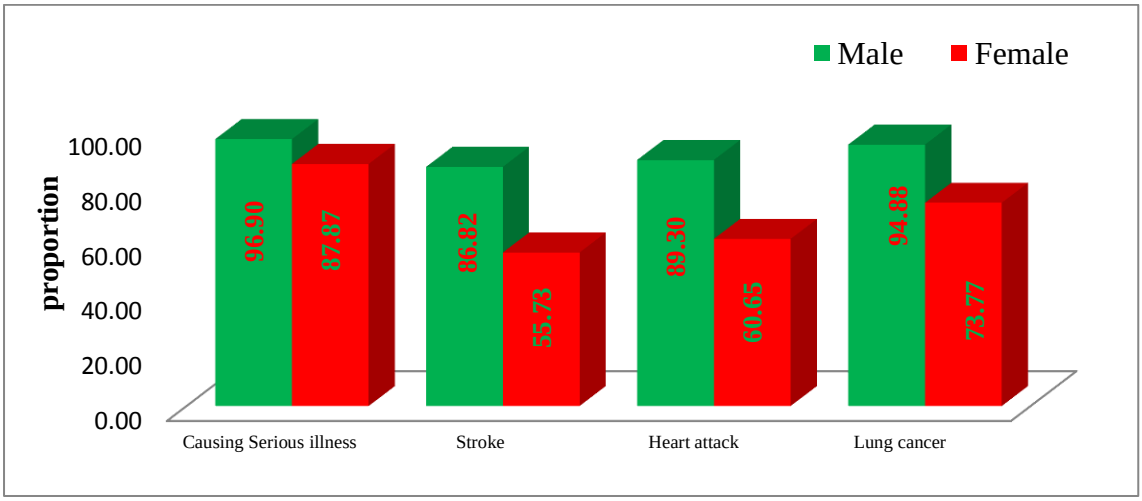


Figure 4.4.1: Comparison of knowledge of health consequences for smoking tobacco to gender

From Table 4.4.1, among the smokeless tobacco users we have seen that 91.73% of male and 91.88% of female believe that smokeless tobacco use causes serious illness, 81.96% of male and 65.53% of female believe that smokeless tobacco use causes stroke, 82.79% of male and 67.95% of female believe that it causes heart attack, 87.25% of male and 77.42% of female believe smokeless tobacco use causes lung cancer. The probability value from

two group proportion test ($p<0.001$) refers that knowledge on stroke, heart attack and causing lunch cancer are highly significantly different between male and female respondents but knowledge on serious illness there is insignificantly different.

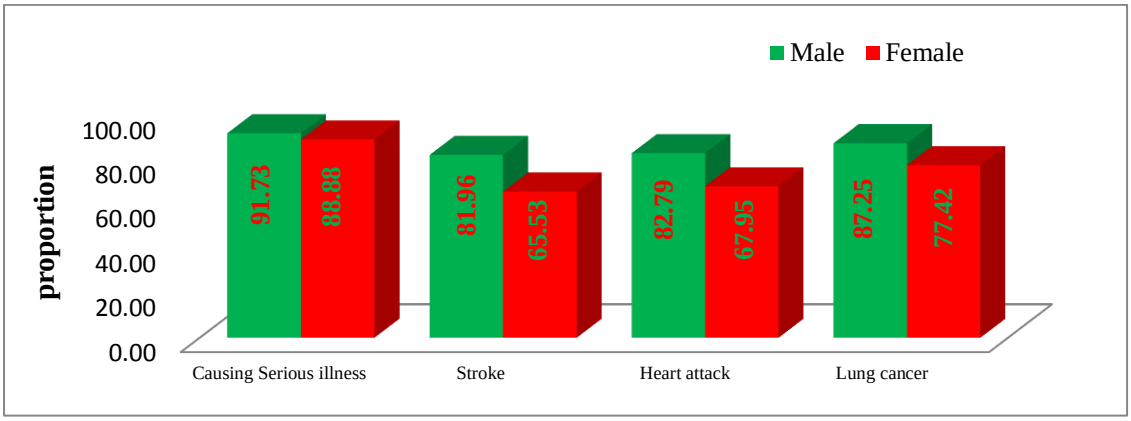


Figure 4.4.2: Comparison of knowledge of health consequences of smokeless tobacco use to gender

From Table 4.4.1, we have observed that the 97.87% of male and 95.89% of female respondents believe that secondhand smoke causes serious illness. The p value ($p=0.011$) refers that knowledge on serious illness is significantly different between male and female respondents.

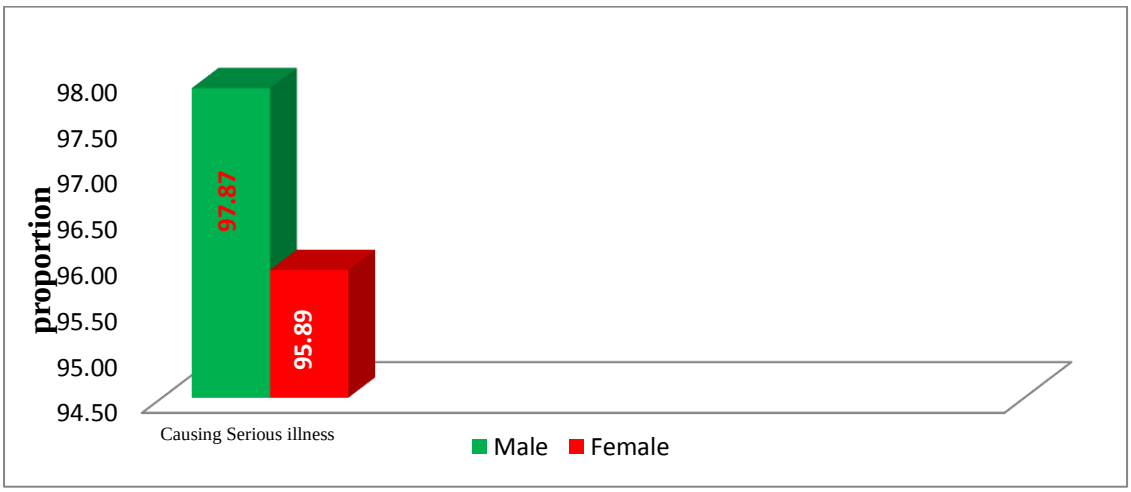


Figure 4.4.3: Comparison of knowledge of health consequences of secondhand smoke to gender

4.5 Comparing knowledge of health consequences of tobacco use to residence

In this section knowledge of health consequences of tobacco use to residence has been discussed to the characteristics of the study subject and the comparison has been summarized in table 4.5.1.

Table 4.5.1: Comparing knowledge of health consequences of tobacco use to residence

Characteristics	Smoking			Smokeless			Secondhand smoking		
	Urban*	Rural*	p-value	Urban*	Rural*	p-value	Urban*	Rural*	p-value
Causing Serious illness	96.88 (95.78,97.98)	96.36 (95.24,97.48)	0.520	93.86 (92.35,95.37)	90.35 (88.78,91.92)	<0.001	98.12 (97.34,98.52)	96.51 (96.22,97.80)	0.046
Causing Stroke	87.88 (85.79,89.97)	84.09 (81.88,86.29)	0.015	75.41 (72.69,78.12)	70.31 (67.84,72.78)	<0.001	--	--	
Causing heart attack	90.54 (88.67,92.41)	86.55 (84.49,88.61)	0.005	76.44 (73.77,79.12)	72.58 (70.17,75.00)	0.037	--	--	
Causing lung cancer	95.85 (94.58,97.13)	92.80 (91.24,94.36)	0.003	84.81 (82.55,87.07)	79.19 (77.00,81.38)	<0.001	--	--	

--Indicates not applicable.

* Proportional value with 95% confidence Interval has been reported

Knowledge is one of the most important variable in this study. Comparisons knowledge of health consequences of tobacco smoking to place of residence with respective figure is given below.

From Table 4.5.1 among the tobacco smokers we have observed that 96.88% of urban and 96.36% of rural respondents believe that smoking causes serious illness, 87.88% of urban and 84.09% of rural respondents believe that smoking causes stroke, 90.54% of urban and 86.55% of rural respondents believe that tobacco smoking causes heart attack and 95.85% of urban and 92.80% of rural respondents believe that smoking causes lunch cancer. It is also found that knowledge on stroke, heart attack and causing lunch cancer are significantly different between rural and urban respondents but knowledge on causing serious illness is statistically insignificant between rural and urban respondents for smokers (p=0.520).

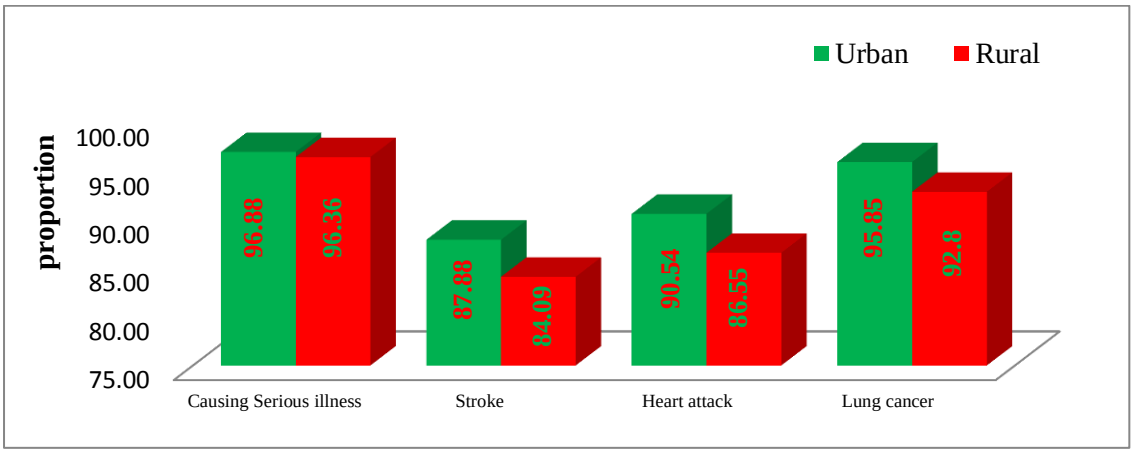


Figure 4.5.1: Comparison of knowledge of health consequences for smoking tobacco to residence

From Table 4.5.1, we have seen that the 93.86% of urban and 90.35% of rural respondents believe that smokeless tobacco use causes serious illness, 75.41% of urban and 70.31% of rural respondents believe that smokeless tobacco use

causes stroke, 76.44% of urban and 72.58% of rural respondents believe that smokeless tobacco use causes heart attack and 84.81% of urban and 79.19% of rural believe that smokeless tobacco use causes lung cancer. It is found that knowledge on serious illness, stroke, heart attack and causing lunch cancer are significantly different between rural and urban respondents who were used smokeless tobacco.

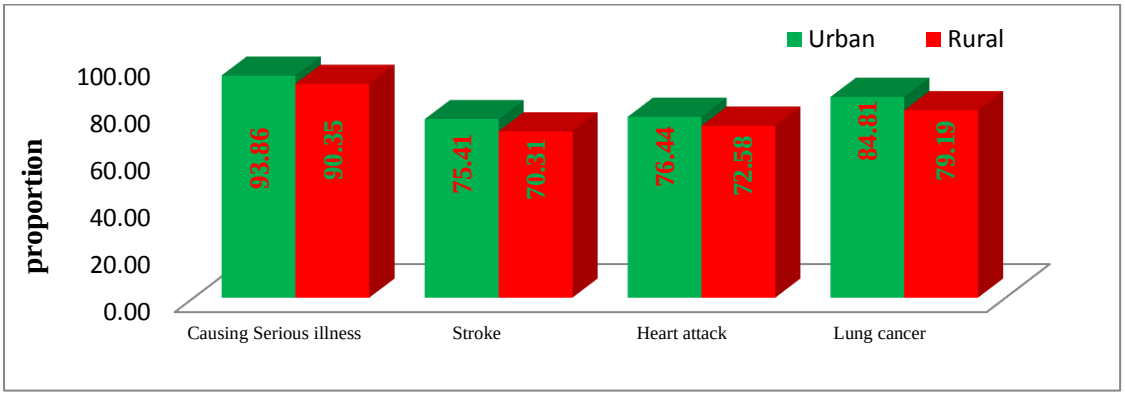


Figure 4.5.2: Comparison of knowledge of health consequences for smokeless tobacco to residence

From Table 4.5.1, we have observed that 98.12% of urban and 96.51% of rural respondents believe that secondhand smoke causing serious illness. The p value (p=0.046) refers that knowledge on serious illness is significantly different between rural and urban respondents.

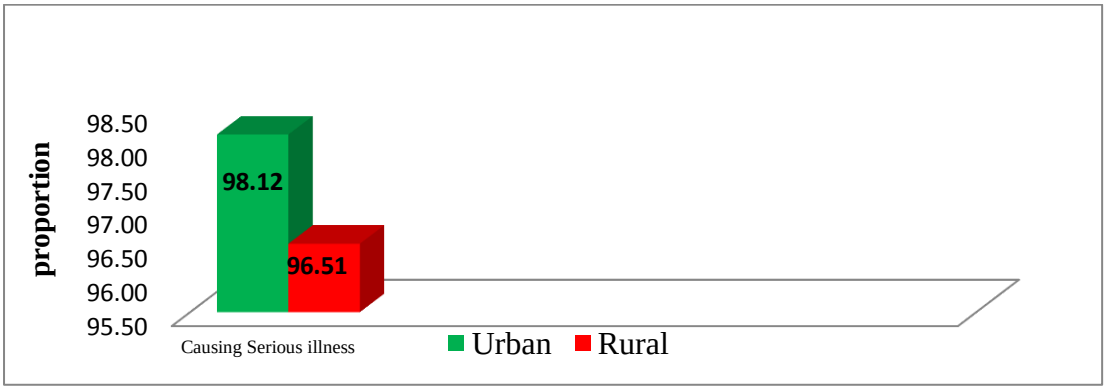


Figure 4.5.3: Comparison of knowledge of health consequences for secondhand smoke to residence

4.6 Comparing attitude of tobacco use to gender

In this section comparison of attitude of tobacco user to gender has been discussed and the results have been summarized in Table 4.6.1.

Among the male respondents on an average 6.09 cigarettes per day have been used with standard deviation (SD) 6.90 and for female respondents on an average 0.59 cigarette per day have been used with SD 1.82. Again among the male respondents on an average 6.49 other than cigarette per day have been used with SD 9.26 and for female respondents on an average 7.98 other than cigarette per day have been used with SD 9.74.

Table 4.6.1: Comparing number of tobacco use to gender

Characteristics	Smoking Total number=2038			Smokeless Total number=2336		
	Male*	**Female***	**P-value**	**Male***	**Female***	**P-value**
Average number of tobacco use per day, Mean (SD)						
Manufactured cigarettes	6.09(6.90)	0.59(1.82)	--	--	--	--
Others#	6.49(9.26)	7.98(9.74)	--	--	--	--
Average number of Smokeless tobacco use per day, Mean (SD)						
Betel quid with tobacco	--	--	--	5.03(5.60)	3.56(4.80)	
Other##	--	--	--	3.58(7.15)	4.35(5.91)	
Time of first start after wake-up (%)						
Within 5 Minutes	11.25 (9.86,12.65)	18.18 (8.79,27.56)	<0.001	6.53 (4.98,8.07)	9.66 (8.08,11.23)	0.051
6 To 30 Minutes	33.41 (31.33,35.50)	31.81 (20.48,43.14)		17.95 (15.55,20.36)	30.60 (28.14,33.05)	
31 To 60 Minute	25.81 (23.87,27.74)	12.12 (4.18,20.06)		28.77 (25.93,31.61)	19.10 (17.00,21.19)	
More than 60 Minutes	29.41 (27.39,1.42)	33.33 (21.86,44.80)		46.42 (43.30,49.55)	40.56 (37.94, 43.17)	

Includes hand-rolled cigarette, pipes full of tobacco, cigars, cheroots, or cigarillos, water pipe, and any others.

Includes snuff by mouth, snuff by nose, chewing tobacco, and any others.

-- Indicate not applicable.

* Proportional value with 95% confidence Interval has been reported

From Table 4.6.1 we have observed that among the male respondents on an average 5.03 betel quid with tobacco per day have been used with SD 5.60 and for female respondents on an average 3.56 betel quid with tobacco per day have been used with SD 4.80. Again among the male respondents on an average 3.58 other than betel quid with tobacco per day have been used with SD 7.15 and for female respondents on an average 4.35 other than betel quid with tobacco per day have been used with SD 5.91.

Among the smokers 11.25% of male and 18.18% of female have smoked within 5 minutes after wake-up, 33.41% of male and 31.81% of female have smoked between 6 to 30 minutes, 25.81% of male and 12.12% of female have smoked between 31 to 60 minutes and 29.41% of male and 33.33% of female have smoked more than 60 minutes.

The p value ($p<0.001$) refers that attitude on time of first smoked after wake-up is highly significantly different between male and female respondents.

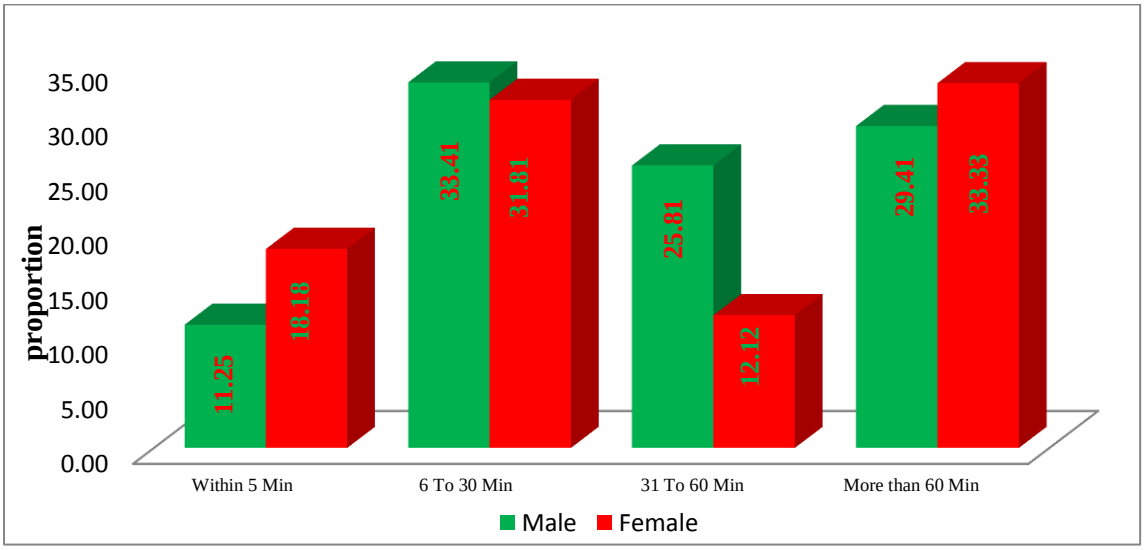


Figure 4.6.1: Comparison attitude of tobacco smoke to gender

Among the smokeless tobacco user 6.53% of male and 9.66% of female have used smokeless tobacco within 5 minutes after wake-up, 17.95% of male and 30.60% of female have used smokeless tobacco between 6 to 30 minutes, 28.77% of male and 19.10% of female have used smokeless tobacco between 31 to 60 minutes and 46.42% of male and 40.56% of female have used smokeless tobacco more than 60 minutes.

The p value (p=0.051) refers that attitude on time of first smokeless tobacco start after wake-up is insignificantly different between male and female respondents.

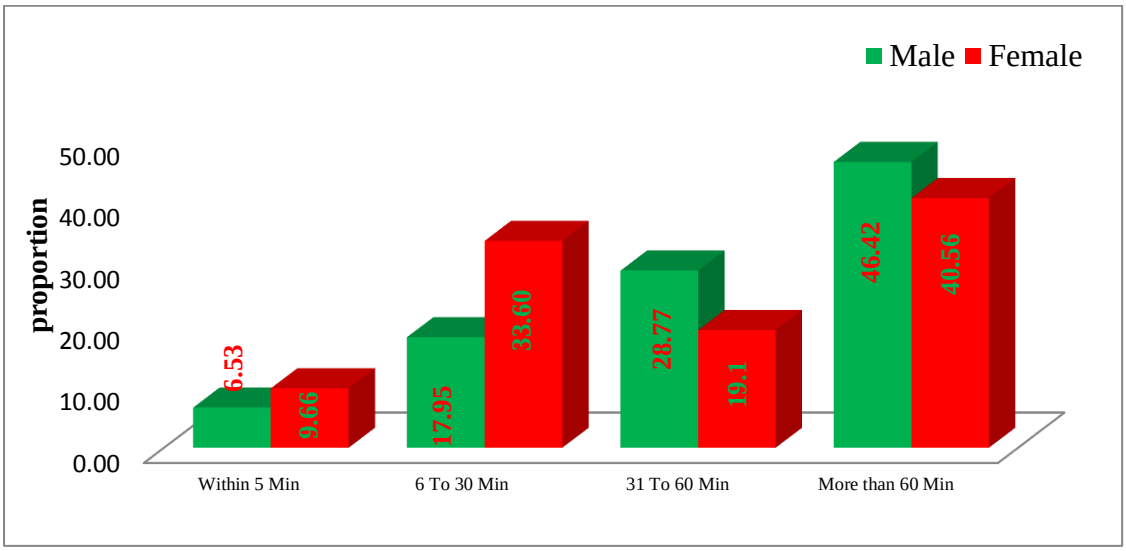


Figure 4.6.2: Comparison attitude of smokeless tobacco use to gender

4.7 **Comparing attitude of tobacco use to residence**

In this section comparison of tobacco user to residence has been discussed and the results have been summarized in Table 4.7.1.

Among the urban respondents on an average 8.15 cigarettes per day have been used with standard deviation (SD) 7.16 and for rural respondents on an average 3.91 cigarette per day have been used with SD 5.92. Again among the urban respondents on an average 3.47 other than cigarette per day have been used

with SD 7.66 and for rural respondents they have used on an average 9.29 other than cigarette per day with SD 9.68.

Table 4.7.1: Comparing number of tobacco use to residence

Characteristics	Smoking Total number=2038			Smokeless Total number=2336		
	Urban*	Rural*	P-value	Urban*	Rural*	P-value
Average number of tobacco use per day, Mean (SD)						
Manufactured cigarettes	8.15(7.16)	3.91(5.92)	--	--	--	--
Others#	3.47(7.66)	9.29(9.68)	--	--	--	--
Average number of Smokeless tobacco use per day, Mean (SD)						
Betel quid with tobacco	--	--	--	4.57(5.21)	3.91(5.18)	
Other##	--	--	--	3.81(7.16)	4.18(5.92)	
Time of first start after wake-up (%)						
Within 5 Minutes	10.68 (8.73,12.63)	12.19 (10.23,14.15)	0.001	8.28 (6.55,10.01)	8.39 (6.51,9.87)	0.213
6 To 30 Minutes	29.87 (26.98,32.76)	36.49 (33.61,39.38)		23.72 (21.05,26.39)	26.43 (24.08,28.78)	
31 To 60 Minute	26.03 (23.26,28.81)	24.76 (22.18,27.35)		20.24 (17.72,22.76)	25.25 (22.94,27.57)	
More than 60 Minutes	33.29 (30.32,36.27)	26.16 (23.53 28.79)		47.64 (44.51 50.78)	39.69 (37.08 42.29)	

Includes hand-rolled cigarette, pipes full of tobacco, cigars, cheroots, or cigarillos, water pipe, and any others.
##Includes snuff by mouth, snuff by nose, chewing tobacco, and any others.
-- Indicate not applicable.
* Proportional value with 95% confidence Interval has been reported

From Table 4.7.1 we have also found that among the urban respondents on an average 4.57 number of betel quid per day have been used with SD 5.21 and for rural respondents they have used on an average 3.91 betel quid with tobacco per day with SD 5.18. Again among the urban respondents they have used on an average 3.81 other than betel quid with SD 7.16 and for rural respondents they have used on an average 4.18 other than betel quid with SD 5.92.

Among the smokers 10.68% of urban and 12.19% of rural have smoked within 5 minutes after wake-up, 29.87% of urban and 36.49% of rural have smoked between 6 to 30 minutes, 26.03% of urban and 24.76% of rural have smoked between 31 to 60 minutes and 33.29% of urban and 26.16% of rural have smoked more than 60 minutes. The p value (p=0.001) refers that attitude on time of first smoked after wake-up is significantly different between urban and rural respondents.

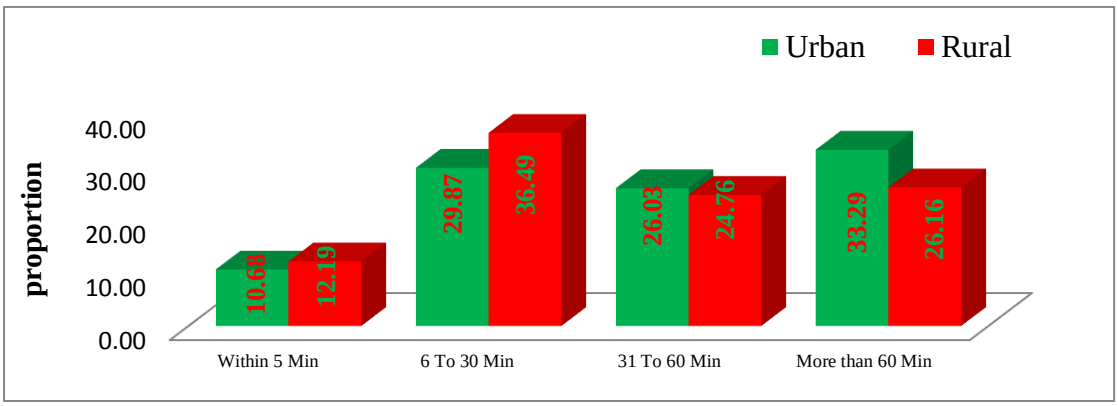


Figure 4.7.1: Comparison attitude of tobacco use to residence

Among the smokeless tobacco users 8.28% of urban and 8.39% of rural have used smokeless tobacco within 5 minutes after wake-up, 23.72% of urban and 26.43% of rural have used smokeless tobacco between 6 to 30 minutes, 20.24% of urban and 25.25% of rural used smokeless tobacco between 31 to 60 minutes and 47.64% of urban and 39.39% of rural have used smokeless tobacco more than 60 minutes. The p value (p=0. 213) refers that attitude on time of first used smokeless tobacco after wake-up is insignificantly different between urban and rural respondents.

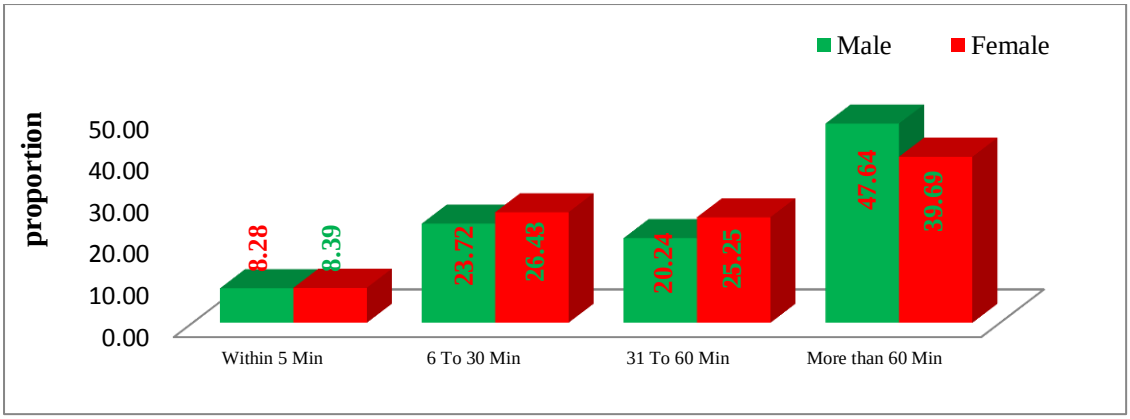


Figure 4.7.2: Comparison attitude of smokeless tobacco use to residence

4.8 Comparison various policies of tobacco use to gender

Regarding the smoking policy at home 22.24% of male and 22.82% of female reported that smoking was allowed at their home; 18.30% of male and 14.40% of female reported that smoking was not allowed at their home but exception, 32.51% of male and 30.52% of female reported that smoking was never allowed at their home, but 28.41% of male and 25.25% of female reported that they did not have any rules to smoke at their home. The p value ($p<0.001$) refers that smoking policy at home significantly differs to gender.

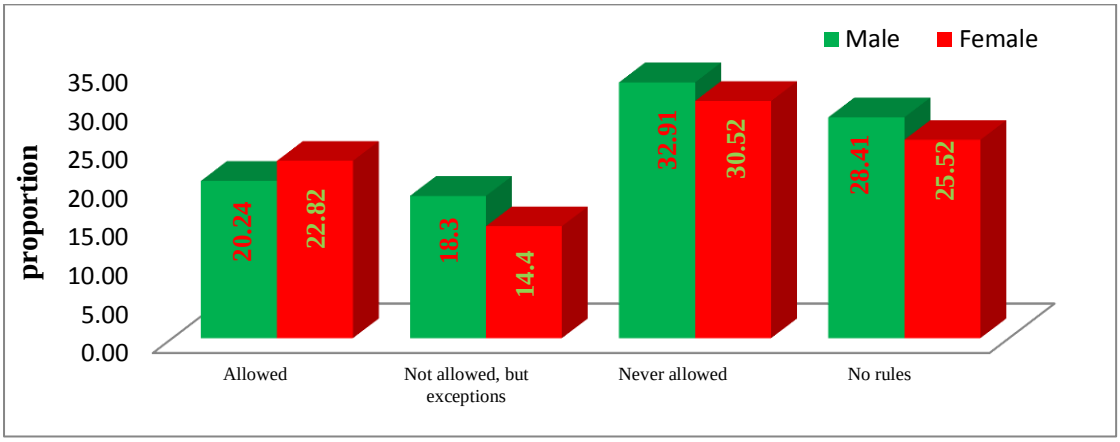


Figure 4.8.1: Comparison smoking policy at home to gender

Table 4.8.1: Comparing various polies of tobacco use to gender

Characteristics	Smoking			Smokeless			Secondhand smoking		
	Male*	Female*	p-value	Male*	Female*	p-value	Male*	Female*	p-value
Smoking policy at home (%)									
Allowed	--	--		--	--		20.24 (18.87,21.61)	22.82 (19.71,25.93)	<0.001
Not Allowed, But Exceptions	--	--		--	--		18.30 (16.98,19.62)	14.40 (11.80,17.01)	
Never Allowed	--	--		--	--		32.91 (31.31,34.52)	30.52 (27.11,33.94)	
No Rules	--	--		--	--		28.41 (26.87,29.94)	25.52 (26.14,32.90)	
Smoking policy at job place (%)									
Allowed Anywhere	--	--		--	--		26.48 (24.38,28.59)	16.56 (10.94,22.19)	0.014
Allowed Only In Some Indoor Areas	--	--		--	--		15.04 (13.34,16.74)	10.65 (5.98, 15.31)	
Not Allowed In Any Indoor Areas	--	--		--	--		30.08 (27.90,32.27)	37.27 (29.96,44.59)	
There Is No Policy	--	--		--	--		27.78 (24.67,28.89)	31.36 (24.34,38.38)	
Various promoting policy from tobacco industries and seller (%)									
Any advertisement (Cigarettes)	98.59 (97.93,99.25)	1.41 (0.75, 2.07)	<0.001						
In store	98.52 (97.78,99.27)	1.48 (0.73,2.22)	0.003						
Other than store	99.31 (98.71, 99.92)	0.68 (0.08,1.29)	<0.001						

Characteristics	Smoking			Smokeless			Secondhand smoking		
	Male*	**Female***	**p-value**	**Male***	**Female***	**p-value**	**Male***	**Female***	**p-value**
Sport or promotion event	96.55 (89.49,100.0)	3.45 (3.61,10.51)	0.412						
Other promotions	98.51 (57.53,99.74)	1.49 (0.21,2.46)	0.053						
Any advertisement (Bidi)	97.83 (96.75, 98.92)	2.16 (1.07,3.24)	0.067						
In store	97.33 (95.95,98.71)	2.66 (1.28,4.04)	0.788						
Other than store	99.12 (98.25,99.98)	0.88 (0.018,1.75)	0.002						
Sport or promotion event	88.89 (63.26,100.0)	11.11 (10.51,36.73)	0.022						
Other promotions	98.04 (96.32,99.75)	1.96 (0.24,3.67)	0.572						
Any advertisement (Smokeless)				55.15 (49.98,60.32)	44.85 (39.68,50.02)	<0.001			
In store				49.81 (43.87,55.76)	50.18 (44.23,56.12)	0.662			
Other than store				69.34 (62.88,75.80)	30.65 (24.19,37.11)	<0.001			
Sport or promotion event				66.67 (0.00,200.10)	33.33 (0.0, 100)	0.413			
Other promotions				67.85 (57.66,78.06)	32.14 (21.94, 2.34)	<0.001			

--Indicates statistics cannot be calculated because of there is no data available.

* Proportional value with 95% confidence Interval has been reported

Regarding the smoking policy at job place 26.48% of the male and 15.56% of female reported that smoking was allowed at their job place; 15.04% male and 10.65% female reported that smoking was allowed only in some indoor area; 30.08% male and 37.27% of female reported that smoking was not allowed in any indoor area; 27.78% male and 31.36% female reported that they did not have any policy to smoke at their job place. The p value (p=0.014) refers that smoking policy at home significantly differs to gender.

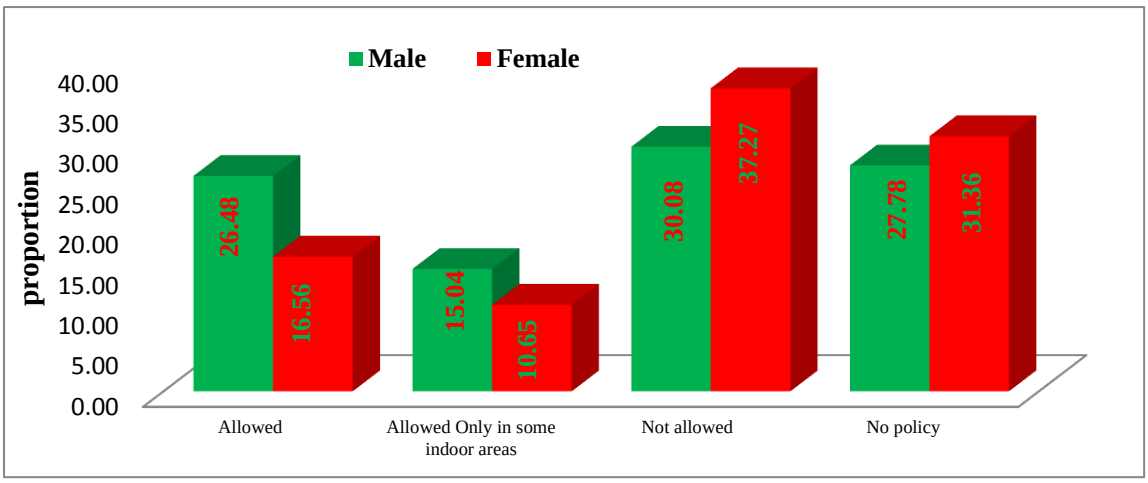


Figure 4.8.2: Comparison smoking policy at job place to gender

Various promoting policy from tobacco industries and seller to gender

We have observed that for awareness of cigarette marketing in anywhere cigarettes are sold. Smoking prevalence is varying greatly by gender. The percentage of male who noticed cigarette advertising where cigarettes are sold in anywhere is 98.59% and female is 1.41%, where as in store male is 98.53% and the female is 1.47%. And other than store male is 99.32% and female is 0.68%. And the percentage of male respondents who noticed any cigarette promotion by sport or promotional event is 96.55% but female respondents are

less promoted than male which is 3.45%. And the male respondents who noticed any cigarette promotion by other promotional event is 98.51% and the rural respondent is 1.49%. Again the percentage of male who noticed bidi advertising where bidi are sold anywhere is 97.83% female is 2.16%, where as in store male is 97.33% and female is 2.67%. And the other than store male respondents are 99.12% and the female respondents are 0.88%.

Again the percentage of smokeless tobacco marketing among male and females respondent who noticed advertising in anywhere, store, or other than store in the preceding 30 days are (55.15 % and 44.84%), (49.82 % and 50.18) and (69.34 % and 30.66%) respectively and they promoted by sport is (66.67% and 33.33%) and other than sport is (67.85%. and 32.14%) respectively. Awareness of smokeless tobacco marketing in Bangladesh is more common among males in rural area than in urban area.

4.9 Comparison various policies of secondhand smoke to residence

Regarding the smoking policy at home 18.52% of urban and 23.42% of rural reported that smoking was allowed at their home; 18.20% of urban and 16.89% of rural reported that smoking was not allowed at their home but exception, 36.99% of urban and 26.85% of rural reported that smoking was never allowed at their home, but 25.96% of urban and 31.92% of rural reported that they did not have any rules to smoke at their home. The p value ($p=0.001$) refers that smoking policy at home significantly differs to residence.

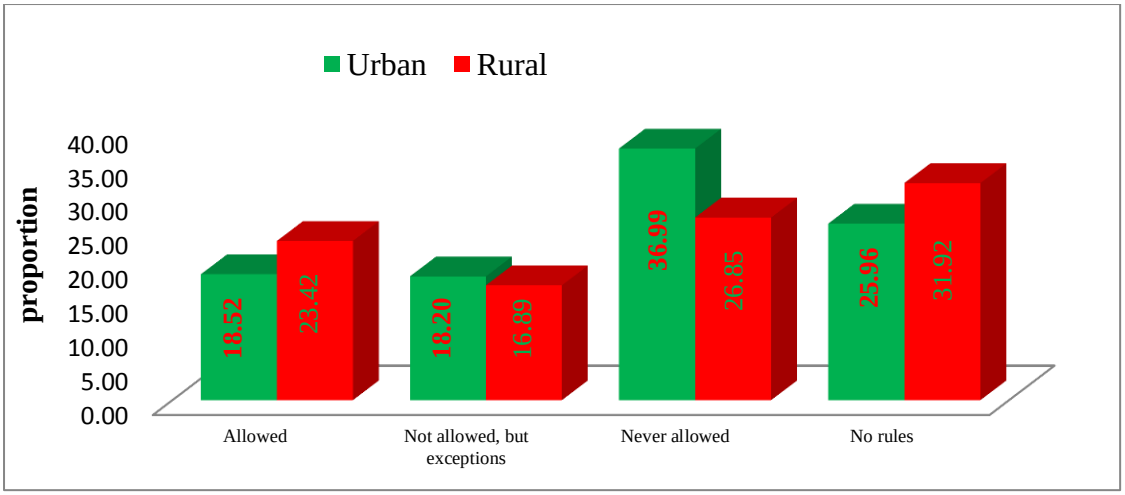


Figure 4.9.1: Comparison smoking policy at home to residence

Table 4.9.1: Comparing various polies of tobacco use to residence

Characteristics	Smoking			Smokeless			Secondhand smoking		
	Urban*	**Rural***	**p-value**	**Urban***	**Rural***	**p-value**	**Urban***	**Rural***	**p-value**
Smoking policy at home (%)									
Allowed	--	--		--	--		18.52 (16.90,20.13)	23.42 (21.45,25.39)	<0.001
Not allowed, but exceptions	--	--		--	--		18.20 (16.60,19.80)	16.89 (15.14,18.63)	
Never allowed	--	--		--	--		36.99 (34.99,39.00)	26.85 (24.79,28.92)	
No Rules	--	--		--	--		25.96 (24.14,27.78)	31.92 (29.75,34.09)	
Smoking policy at job place (%)									
Allowed anywhere	--	--		--	--		24.93 (22.50,27.37)	26.81 (23.39,30.22)	0.001
Allowed only in some indoor Areas	--	--		--	--		15.39 (13.35,17.42)	13.25 (10.63,15.86)	
Not allowed in any indoor areas	--	--		--	--		33.41 (30.76,36.07)	25.73 (22.36,29.09)	
No Policy	--	--		--	--		24.03 (21.62,26.43)	33.12 (29.50,36.75)	
Various promoting policy from tobacco industries and seller (%)									
Any advertisement (Cigarettes)	48.83 (46.00,51.66)	51.17 (48.33,53.99)	0.094						
In store	46.60 (43.53,49.67)	53.39 (50.32,56.46)	0.420						
Other than store	51.57 (47.94,55.20)	48.42 (44.79,52.05)	0.004						

Characteristics	Smoking			Smokeless			Secondhand smoking		
	Urban*	**Rural***	**p-value**	**Urban***	**Rural***	**p-value**	**Urban***	**Rural***	**p-value**
Sport or promotion event(cigarettes)	62.07 (43.28,80.85)	37.93 (19.15,56.72)	0.109						
Other promotions(cigarettes)	51.24 (47.24,55.24)	48.76 (44.75,52.75)	0.096						
Any advertisement (Bidi)	45.24 41.53,48.95)	54.75 (51.04,58.46)	0.182						
In store	41.33 (37.10,45.55)	58.66 (54.44,62.89)	0.001						
Other than store	45.71 (41.11,50.30)	54.28 (49.69,58.88)	0.001						
Sport or promotion event(bidi)	55.56 (15.04,96.06)	44.44 (3.93,84.95)	0.618						
Other promotions(bidi)	33.33 (27.50,39.15)	66.67 (60.84,72.49)	<0.001						
Any advertisement (Smokeless)				45.68 (40.50,50.85)	54.31 (49.14,59.49)	0.109			
In store				44.72 (38.81,50.64)	55.27 (49.35,61.18)	0.578			
Other than store				44.72 (37.75,51.69)	55.27 (48.30,62.24)	0.395			
Sport or promotion event				33.33 (0.00,100.76)	66.67 (0.00,200.10)	0.728			
Other promotions				36.91 (26.36,47.43)	60.09 (52.56,73.63)	0.227			

--Indicates statistics cannot be calculated because of there is no data available.

* Proportional value with 95% confidence Interval has been reported

Regarding the smoking policy at job place 24.93% of urban and 26.81% of rural reported that smoking was allowed at their job place; 25.39% of urban and 13.25% of rural reported that smoking was allowed only in some indoor area; 33.41% of urban and 25.73% of rural reported that smoking was not allowed in any indoor area; 24.03% of urban and 33.12% of rural reported that they did not have any policy to smoke at their job place. The p value ($p<0.001$) refers that smoking policy at home significantly differs to residence.

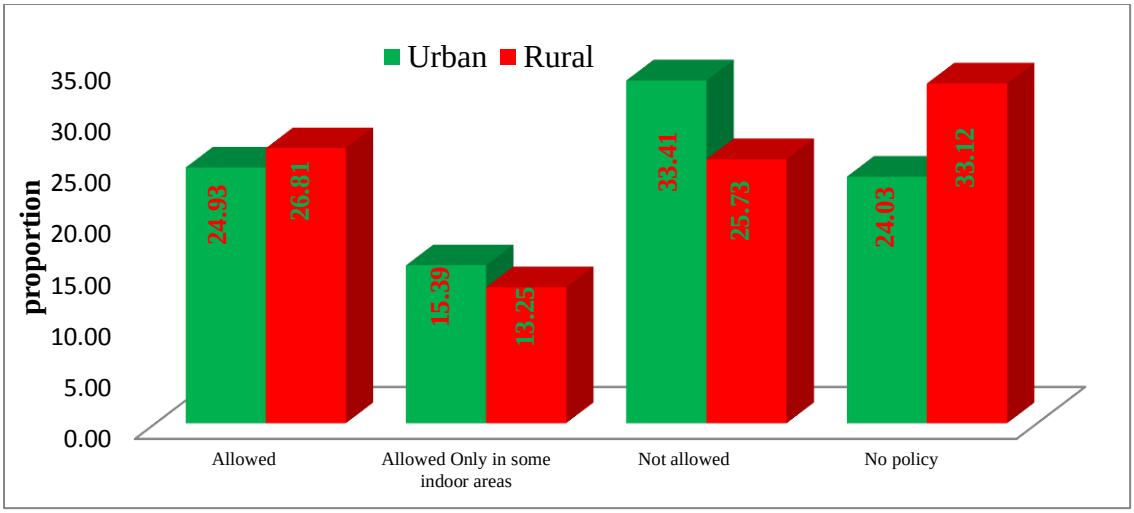


Figure 4.9.2: Comparison smoking policy at job place to residence

Various promoting policy from tobacco industries and seller to residence

From Table 4.9.1 we have observed that the percentage of urban respondents who noticed cigarette advertising anywhere in the preceding 30 days is 48.84% and the rural respondents are 51.16%. Among the urban respondents, awareness of cigarette marketing in stores is 46.61% whereas in rural it is 53.39%. The percentage of urban respondents who noticed cigarette advertising at other places than stores is 51.57% and the rural is 48.53%. And the

percentage of urban respondents who noticed any cigarette promotion by sport or promotional event is 62.07% but rural are less promoted than urban which is 37.93%. And the urban respondents who noticed any cigarette promotion by other is 51.24% and the rural is 48.76%. Again the percentage of urban respondents who noticed any bidi advertising in the preceding 30 days is 45.25% and the rural is 54.75%. Among the urban respondents, awareness of bidi marketing in stores where bidi are sold is 41.63% whereas rural is 58.67%. The percentage of urban who noticed bidi advertising other than in stores where bidi are sold is 45.71% and the rural is 54.29%. Again the percentage of urban respondents who noticed any bidi promotion by sport or promotional event is 55.56% and the rural is 44.44%. And the urban respondents who noticed any bidi promotion by other promotional event is 33.33% and rural is 66.67%.

Again the percentage of smokeless tobacco marketing among urban and rural respondent who noticed advertising in anywhere, store, or other than store in the preceding 30 days are (45.69 % and 54.31%), (44.73 % and 55.27) and (44.72 % and 55.28%) respectively and they promoted by sport is (33.33% and 66.67%) and other than sport is (36.91%. and 60.09%).

4.10 Conclusion

Table 4.2.1 shows the comparison of characteristic of study subjects to gender. Gender is one of the most important factors for the prevalence of tobacco use. The proportions of urban and rural male smokers are almost same. But in rural

female smokers use smoking tobacco twice than urban female smokers but female equally used smokeless tobacco in urban and rural area. And for secondhand smoke respondents are approximately same in urban and rural area for gender. The p value refers proportion value from gender to residence is significantly (p=0.021) associated smoking group but insignificant in smokeless and secondhand smoke group. We have also found that working status and residence are significantly associated with tobacco use (smoking, smokeless and secondhand smoke) (P<0.001).

From Table 4.4.1 and 4.5.1 we have found that knowledge on causing serious illness in urban male respondents have more knowledge than rural female smoker group. Same knowledge has been found among male and female by using smokeless tobacco. Knowledge on serious illness proportional values is not significantly different to residence for smoking and gender for smokeless. And on the other causes there is significantly difference between knowledge on tobacco use according to residence and gender.

Secondhand smoke comes from lit cigarettes and cigars. It also comes from smoke breathed out by smokers. When children breathe secondhand smoke, it is like they are smoking, too. Allowing people to smoke in only one room does not protect the other members who are near there. Smoke from halls and stairs gets inside, too. Among the secondhand smoker, 18.20% urban respondents and 16.89% rural respondents have reported that smoking tobacco was not allowed at their home.

CHEPTER FIVE

COMPARING VARIOUS FACTORS TO KNOWLEDGE AND AWARENESS POLICY OF TOBACCO USE

5.1 Introduction

In the previous chapter the comparison of socio-demographic characteristics of study subjects to tobacco smoker, smokeless tobacco user and secondhand smoker have been performed. Also chi-square test (Pearson Chi-square or Likelihood Ratio Chi-square) has been used for categorical variables, and t-test has been used for continuous variable to compare and prevalence with 95% confidence interval has been reported for individual variable. These tests have been performed at 5% level of significance.

In this chapter knowledge of adverse health effects and attitude towards tobacco use have been analysed. Awareness of the respondents has been analysed, too. Some promoting factors from which respondents had been encouraged to use tobacco in the last 30 days are analysed for awareness. In this chapter, percentage with 95% confidence interval has been reported for categorical data and mean with standard deviation (SD) has been reported for continuous data. Mean with IQR has been reported for discrete data. All these analysis has been carried out using computer programing SAS 9.4/ STATA version11.

5.2 Knowledge of tobacco use

The survey collects information on perception about the adverse health effects of tobacco smoking, smokeless tobacco use and secondhand smoking among the population aged 15 years and older and their knowledge in causing various diseases. Table 5.2.1 shows the proportion of respondents who believe that tobacco use causes serious illness, stroke, heart attack, lung cancer and long-term respiratory distress. Among the tobacco smoker respondents who believe that smoking causes serious illnesses 47.40% are from urban area and 52.60% are from rural area, respondents who believe that smoking causes stroke 48.22% are from urban area and 51.78% are from rural area, respondents who believe that smoking causes heart attack 48.24% are from urban area and 51.76% are from rural area and the respondents who believe that smoking causes lunch cancer 47.93% come from urban area and 52.07% come from rural area. Again among the tobacco smokers who believe that smoking causes serious illnesses 97.05% are male and 2.95% are female, respondents who believe that smoking causes stroke 98.01% are male and 1.99% are female, respondents who believe that smoking causes heart attack 97.90% are male and 2.10% are female and the respondents who believe that smoking causes lunch cancer 97.60% are male and 2.40% are female. The mean age of the respondents who believe that tobacco smoking causes serious illness is 40.37 years with SD =0.30, the mean age of the respondents who believe that tobacco smoking causes stroke is 40.21 years with SD =0.32, the mean age of the respondents who believe that tobacco smoking causes heart attack is 40.28

years with SD=0.32, the mean age of the respondents who believe that tobacco smoking causes lung cancer is 40.31 years with SD=0.30.

Education level is an impotent factor which influences the knowledge on tobacco use.

Among the tobacco smokers who believe that smoking causes serious illnesses 46.69% have no formal schooling, 18.19% are with less than primary school completed, 9.14% are with primary school completed, 15.65% are with less than secondary school completed, 4.31% are with secondary school completed, 2.59% are with high school completed and 3.40% are with college/university and /higher completed. The respondents who believe that smoking causes stroke 43.96% have no formal schooling, 18.30% are with less than primary school completed, 9.98% are with primary school completed, 17.31% are with less than secondary school completed, 4.72% are with secondary school completed, 2.19% are with high school completed and 3.79% are with college/university and /higher completed.

Again the respondents who believe that smoking causes heart attack 44.11% have no formal schooling, 18.28% are with less than primary school completed, 9.17% are with primary school completed, 17.15% are with less than secondary school completed, 4.69% are with secondary school completed, 2.89% are with high school completed and 3.68% are with college/university and /higher completed. Among the tobacco smoker respondents who believe that smoking causes lunch cancer 45.48% have no formal schooling, 18.59% are with less than primary school completed, 9.13%

are with primary school completed, 16.15% are with less than secondary school completed, 4.46% are with secondary school completed, 2.65% are with high school completed and 3.50% are with college/university and /higher completed.

Among the tobacco smokers who believe that smoking causes serious illness 10.97% have employers (Government, non-government), 22.00% are with business man (small, large), 2.17% are with farming (land owner and farmer), 34.29% are with agricultural / industrial worker/ daily laborer/other self-employed, 1.88% are with homemaker/housework, 3.96% are with retired and unemployed and 6.70% are student/other.

The tobacco smokers who believe that smoking causes stroke 11.77% are employers (Government, non-government), 23.67% are with business man (small, large), 20.87% are with farmer (land owner and farmer), 31.77% are with agricultural / industrial worker/ daily laborer/other self- employed, 1.16% are with homemaker/housework, 4.13% are with retired and unemployed and 6.58% are with student/other. Again the tobacco smokers who believe that smoking causes heart attack 11.72% are employers (Government, non-government), 23.38% are with business man (small, large), 20.61% are with farmer (land owner and farmer), 32.33% are with agricultural / industrial worker/ daily laborer/other self- employed, 1.30% are with homemaker/housework, 4.02% are with retired and unemployed and 6.62% are with student/other.

Again among the tobacco smoker respondents who believe that smoking causes lunch cancer 11.26% are employers (Government, non-government), 22.52% are with business man (small, large), 20.51% are with farmer (land owner and farmer), 33.79% are with agricultural / industrial worker/ daily laborer/other self- employed, 1.48% are with homemaker/housework, 3.98% are with retired and unemployed and 6.42% are with student/other. Among the tobacco smoker respondents who believe that smoking causes serious illness 23.98% are lowest wealth index, 25.60% are with low, 18.19% are with middle, 19.25% are with high, and 12.95% are with highest wealth index. And the respondents who believe that smoking causes stroke 22.04% are lowest wealth index, 24.60% are with low, 18.89% are with middle, 20.34% are with high, and 14.11% are with highest wealth index.

Again the tobacco smoker respondents who believe that smoking causes heart attack 21.97% are lowest wealth index, 24.97% are with low, 18.57% are with middle, 20.38% are with high, and 14.09% are with highest wealth index. And the respondents who believe that smoking causes lunch cancer 23.32% are lowest, 25.29% are low, 18.27% are with middle, 19.81% are with high, and 13.28% are with highest.

Among the smokeless tobacco users who believe that smokeless tobacco use causes serious illnesses 42.80% are from urban area and 57.20% are from rural area, respondents who believe that smokeless tobacco use causes stroke 44.08% are from urban area and 55.92% are from rural area, respondents who

believe that smokeless tobacco use causes heart attack 43.63% are from urban area and 56.37% are from rural area and the respondents who believe that smokeless tobacco use causes lunch cancer 44.05% come from urban area and 55.95% come from rural area.

Again among the smokeless tobacco users who believe that smokeless tobacco use causes serious illnesses 41.91% are male and 58.09% are female, respondents who believe that smokeless tobacco use causes stroke 47.76% are male and 52.24% are female, respondents who believe that smokeless tobacco use causes heart attack 47.11% are male and 52.89% are female and the respondents who believe that smokeless tobacco use causes lunch cancer 45.17% are male and 54.83% are female.

The mean age of the respondents who believe that smokeless tobacco use causes serious illness is 45.45 years with SD =0.31, the mean age of the respondents who believe that smokeless tobacco use causes stroke is 45.36 years with SD =0.35, the mean age of the respondents who believe that smokeless tobacco use causes heart attack is 45.32 years with SD=0.34, the mean age of the respondents who believe that smokeless tobacco use causes lung cancer is 45.15 years with SD=0.33.

Education level is an impotent factor which influences the knowledge on smokeless tobacco use. Among the smokeless tobacco users who believe that smokeless tobacco use causes serious illnesses 46.20% have no formal schooling, 16.07% are with less than primary school completed, 11.27% are with primary school completed, 10.66% are with less than secondary school

completed, 2.81% are with secondary school completed, 1.31% are with high school completed and 1.64% are with college/university and /higher completed. The respondents who believe that smokeless tobacco use causes stroke 53.48% have no formal schooling, 15.40% are with less than primary school completed, 12.31% are with primary school completed, 11.76% are with less than secondary school completed, 3.39% are with secondary school completed, 1.69% are with high school completed and 1.94% are with college/university and /higher completed. Again the respondents who believe that smokeless tobacco use causes heart attack 53.28% have no formal schooling, 15.55% are with less than primary school completed, 12.53% are with primary school completed, 11.76% are with less than secondary school completed, 3.37% are with secondary school completed, 1.65% are with high school completed and 1.83% are with college/university completed and /higher completed.

Among the smokeless tobacco user respondents who believe that smokeless tobacco use causes lunch cancer 54.68% have no formal schooling, 16.30% are with less than primary school completed, 11.57% are with primary school completed, 11.19% are with less than secondary school completed, 3.06% are with secondary school completed, 1.39% are with high school completed and 1.77% are with college/university and /higher completed.

Among the smokeless tobacco users who believe that smokeless tobacco use causes serious illness 6.20% have employers (Government, non-government), 9.09% are with business man (small, large), 10.02% are with farming (land owner and farmer), 17.29% are with agricultural/industrial worker/daily

laborer/other self- employed, 46.06% are with homemaker/housework, 5.22% are with retired and unemployed and 6.10% are with student/other.

The smokeless tobacco users who believe that smokeless tobacco use causes stroke 6.88% are employers (Government, non-government), 10.32% are with business man (small, large), 11.47% are with farmer (land owner and farmer), 18.11% are with agricultural/industrial worker/daily laborer/other self-employed, 42.02% are with homemaker/housework, 4.95% are with retired and unemployed and 6.21% are with student/other. Again the smokeless tobacco users who believe that smokeless tobacco use causes heart attack 6.66% are employer (Government, non-government), 10.20% are business man (small, large), 11.32% are with farmer (land owner and farmer), 17.98% are with agricultural / industrial worker/ daily laborer/other self- employed, 43.10% are with homemaker/housework, 5.07% are with retired and unemployed and 5.66% are with student/other. Again among the smokeless tobacco users who believe that smokeless tobacco use causes lunch cancer 6.75% are employers (Government, non-government), 9.87% are with business man (small, large), 10.67% are with farmer (land owner and farmer), 17.75% are with agricultural/industrial worker/daily laborer/other self- employed, 43.24% are with homemaker/housework, 5.09% are with retired and unemployed and 6.59% are with student/other.

Among the smokeless tobacco users who believe that smokeless tobacco use causes serious illness 26.71% are lowest wealth index, 24.33% are with low, 18.41% are with middle, 16.34% are with high, and 11.18% are with highest

wealth index. The smokeless tobacco users who believe that smokeless tobacco use causes stroke 25.24% are lowest wealth index, 24.81% are with low, 17.39% are with middle, 19.56% are with high, and 12.98% are with highest wealth index. Again the smokeless tobacco users who believe that smokeless tobacco use causes heart attack 25.82% are lowest wealth index, 23.99% are with low, 17.74% are with middle, 19.63% are with high, and 12.79% are with highest. Again among the smokeless tobacco users who believe that smokeless tobacco use causes lunch cancer 25.69% are lowest wealth index, 24.14% are with low, 18.34% are with middle, 19.68% are with high, and 12.12% are with highest wealth index.

Table 5.2.1: Comparing knowledge about effect of tobacco use

Socio-economic and demographic variables	Smoking Tobacco Total number=2038				Smokeless Tobacco Use Total Number=2336				Exposure to Secondhand smoking Total Number=4550
	Causing Serious illness (N=1968) % (95% CI)	Causing Stroke (N=1715) % (95% CI)	Causing heart attack (N=1766) % (95% CI)	Causing lung cancer (N=1882) % (95% CI)	Causing Serious illness (N=2117) % (95% CI)	Causing Stroke (N=1547) % (95% CI)	Causing heart attack (N=1622) % (95% CI)	Causing lung cancer (N=1855) % (95% CI)	Causing Serious illness (N=3455) % (95% CI)
Residence									
Urban	47.40 (45.20, 49.62)	48.22 (45.85,50.58)	48.24 (45.91,50.58)	47.93 (45.67,50.19)	42.80 (40.70,44.89)	44.08 (41.68,46.47)	43.63 (41.26,45.99)	44.05 (41.78,46.31)	53.18 (51.71,54.65)
Rural	52.60 (50.38, 54.80)	51.78 (49.42, 54.15)	51.76 (49.42,54.09)	52.07 (49.81,54.33)	57.20 (55.11,59.30)	55.92 (53.53,58.32)	56.37 (54.01,58.74)	55.95 (53.69,58.22)	46.81 (45.34,48.28)
Gender									
Male	97.05 (96.30, 97.80)	98.01 (97.35,98.68)	97.90 (97.23,98.58)	97.60 (96.92,98.30)	41.91 (39.82,44.01)	47.76 (45.35,50.17)	47.11 (44.73,49.49)	45.17 (42.91,47.43)	74.69 (73.41,75.97)
Female	2.95 (2.20,3.70)	1.99 (1.32,2.65)	2.10 (1.42, 2.77)	2.40 (1.70,3.08)	58.09 (55.99,60.18)	52.24 (49.83,54.65)	52.89 (50.51,55.27)	54.83 (52.57,57.09)	25.30 (24.02,26.58)
Age(yrs)*	40.37(0.30)	40.21(0.32)	40.28(0.32)	40.31(0.30)	45.45(0.31)	45.36(0.35)	45.37(0.34)	45.15(0.33)	36.48(0.22)
Educational level									
No formal schooling	46.69 (44.49, 48.90)	43.96 (41.61, 46.31)	44.11 (41.79,46.42)	45.48 (43.23,47.73)	46.20 (54.09,58.31)	53.48 (51.07,55.89)	53.28 (50.90,55.66)	54.68 (52.41,56.94)	30.54 (29.18, 31.89)
Less than primary school completed	18.19 (16.48, 19.90)	18.30 (16.47 ,20.14)	18.28 (16.48,20.09)	18.59 (16.83,20.35)	16.07 (14.50,17.63)	15.40 (17.65, 7.14)	15.55 (13.82,17.28)	16.30 (14.62,17.98)	15.66 (14.59,16.73)
Primary School Completed	9.14 (7.87,10.42)	9.98 (7.62,10.33)	9.17 (7.82,10.52)	9.13 (7.83,10.44)	11.27 (9.93,12.62)	12.31 (10.72,13.89)	12.53 (10.95,14.11)	11.57 (10.11,13.02)	11.10 (10.18, 12.03)
Less than secondary school completed	15.65 (14.04,17.25)	17.31 (15.52,19.11)	17.15 (15.39,18.91)	16.15 (14.48,17.81)	10.66 (9.35, 11.97)	11.76 (10.20,13.32)	11.76 (10.23,13.30)	11.19 (9.75, 12.62)	20.99 (19.79,22.19)
Secondary school completed	4.31 (3.42,5.21)	4.72 (3.71, 5.72)	4.69 (3.71,5.68)	4.46 (3.52,5.39)	2.81 (2.11, 3.52)	3.39 (2.52 , 4.27)	3.37 (2.50, 4.23)	3.06 (2.28, 3.85)	7.92 (7.12,8.71)

Socio-economic and demographic variables	Smoking Tobacco Total number=2038				Smokeless Tobacco Use Total Number=2336				Exposure to Secondhand smoking Total Number=4550
	Causing Serious illness (N=1968) % (95% CI)	Causing Stroke (N=1715) % (95% CI)	Causing heart attack (N=1766) % (95% CI)	Causing lung cancer (N=1882) % (95% CI)	Causing Serious illness (N=2117) % (95% CI)	Causing Stroke (N=1547) % (95% CI)	Causing heart attack (N=1622) % (95% CI)	Causing lung cancer (N=1855) % (95% CI)	Causing Serious illness (N=3455) % (95% CI)
High school completed	2.59 (1.88,3.29)	2.91 (2.11, 3.71)	2.89 (2.10, 3.66)	2.65 (1.92,3.38)	1.31 (0.83,1.80)	1.69 (1.07, 2.32)	1.65 (1.04,2.26)	1.39 (0.86, 1.93)	6.09 (5.39,6.79)
College/University Completed and /higher	3.40 (2.60,4.20)	3.79 (2.88, 4.69)	3.68 (2.80,4.55)	3.50 (2.67,4.33)	1.64 (1.10, 2.18)	1.94 (1.27, 2.60)	1.83 (1.19, 2.47)	1.77 (1.17, 2.37)	7.53 (6.76,8.31)
Occupation									
Employment (Government, Non-Government)	10.97 (9.59,12.35)	11.77 (10.25,13.30)	11.72 (10.21,13.22)	11.26 (9.83, 12.69)	6.20 (5.17, 7.22)	6.88 (5.66, 8.10)	6.66 (5.47, 7.85)	6.75 (5.61, 7.90)	14.96 (13.91,16.01)
Business (small, large)	22.00 (20.17,23.83)	23.67 (21.65,25.68)	23.38 (21.41,25.36)	22.52 (20.64, 4.41)	9.09 (7.87, 10.30)	10.32 (8.85,11.79)	10.20 (8.75,11.64)	9.87 (8.51, 11.22)	18.96 (17.80,20.11)
Farming (land owner & farmer)	2.17 (18.39,21.94)	20.87 (18.94,22.80)	20.61 (18.72,22.50)	20.51 (18.68,22.33)	10.02 (8.75, 11.29)	11.47 (9.93, 13.00)	11.32 (9.81, 12.83)	10.67 (9.27, 12.07)	15.10 (14.04,16.16)
Agricultural / Industrial worker/ daily laborer/Other self- employed	34.29 (32.19,36.39)	31.77 (29.57, 33.98)	32.33 (30.14,34.51)	33.79 (31.65,35.93)	17.29 (15.69,18.89)	18.11 (16.25,19.97)	17.98 (16.15,19.81)	17.75 (16.02,19.49)	23.21 (21.89,24.53)
Homemaker/House work	1.88 (1.27,2.48)	1.16 (0.65, 1.68)	1.30 (0.77, 1.83)	1.48 (0.94,2.03)	46.06 (43.94,48.17)	42.02 (39.64,44.40)	43.10 (40.74, 5.46)	43.24 (40.98,45.49)	11.00 (10.02,11.98)
Retired and unemployed (able to work/unable to work)	3.96 (3.10, 4.82)	4.13 (3.19,5.08)	4.02 (3.10, 4.93)	3.98 (3.10,4.86)	5.22 (4.27, 6.16)	4.95 (3.90, 5.99)	5.07 (4.02, 6.11)	5.09 (4.09, 6.09)	3.25 (2.69,3.80)

Socio-economic and demographic variables	Smoking Tobacco Total number=2038				Smokeless Tobacco Use Total Number=2336				Exposure to Secondhand smoking Total Number=4550
	Causing Serious illness (N=1968) % (95% CI)	Causing Stroke (N=1715) % (95% CI)	Causing heart attack (N=1766) % (95% CI)	Causing lung cancer (N=1882) % (95% CI)	Causing Serious illness (N=2117) % (95% CI)	Causing Stroke (N=1547) % (95% CI)	Causing heart attack (N=1622) % (95% CI)	Causing lung cancer (N=1855) % (95% CI)	Causing Serious illness (N=3455) % (95% CI)
Student/Other	6.70 (5.60,7.81)	6.58 (5.41 ,7.76)	6.62 (5.46 7.78)	6.42 (5.32,7.53)	6.10 (5.09, 7.12)	6.21 (5.05, 7.38)	5.66 (4.55, 6.76)	6.59 (5.47, 7.72)	10.62 (9.65, 11.58)
Wealth Index									
Lowest	23.98 (22.90,25.88)	22.04 (20.07,24.00)	21.97 (20.03,23.90)	23.32 (21.41,25.23)	26.71 (24.83,28.58)	25.24 (23.14,27.33)	25.82 (23.74,27.91)	25.69 (23.71,27.68)	15.21 (14.15,16.27)
Low	25.60 (23.67, 27.53)	24.60 (22.56,26.64)	24.97 (22.95,26.99)	25.29 (23.32, 7.25)	24.33 (22.51,26.15)	24.81 (22.73,25.90)	23.99 (21.96,26.03)	24.14 (22.19,26.08)	18.99 (17.76,20.22)
Middle	18.19 (16.48, 19.89)	18.89 (17.03 ,20.74)	18.57 (16.75,20.38)	18.27 (16.53,20.02)	18.41 (16.77,20.05)	17.39 (15.56,19.21)	17.74 (15.92, 9.56)	18.34 (16.58,20.10)	17.50 (16.31,18.69)
High	19.25 (17.51,21.00)	20.34 (18.44,22.25)	20.38 (18.50,22.26)	19.81 (18.01,21.62)	16.34 (17.67,21.02)	19.56 (17.65,21.47)	19.63 (17.74,21.52)	19.68 (17.88,21.49)	24.21 (22.86,25.55)
Highest	12.95 (11.47, 14.44)	14.11 (12.46, 15.76)	14.09 (12.47,15.72)	13.28 (11.74,14.81)	11.18 (9.85, 12.52)	12.98 (11.36,14.60)	12.79 (11.20,14.38)	12.12 (10.64,13.60)	24.85 (23.49,26.20)

*Mean with SD is reported.

Similarly among the secondhand smokers who believe that secondhand smoke causes serious illnesses 53.18% are from urban area and 46.81% are from rural area. The percentages of male and female who believed that secondhand smoke causes serious illnesses are 74.69% and 25.30% respectively.

The mean age of the respondents who believe that secondhand smoke causes serious illness is 36.48 years with SD =0.22.

Among the secondhand smokers who believe that secondhand smoke causes serious illnesses 30.54% are no formal schooling, 15.66% are with less than primary school completed, 11.10% are with primary school completed, 20.99% are with less than secondary school completed, 7.92% are with secondary school completed, 6.09% are with high school completed and 7.53% are with college/university and /higher completed.

Among the secondhand smokers who believe that secondhand smoke causes serious illness 14.96% have employers (Government, non-government), 18.96% are with business man (small, large), 15.10% are with farmer (land owner and farmer), 23.21% are with agricultural / industrial worker/ daily laborer/other self- employed, 11.00% are with homemaker/housework, 3.25% are with retired and unemployed and 10.62% are with student/other.

Among the secondhand smokers who believe that secondhand smoke causes serious illness 15.21% are lowest wealth index, 18.99% are with low, 17.50% are with middle, 24.21% are with high, and 24.85% are with highest wealth index.

5.3 Attitude towards tobacco use

In this section, descriptive summary of attitudes towards tobacco use on average per day by different selected socio-economic and demographic characteristics have been summarized in Table 5.3.1a.

Among the urban smoker they have used on an average 8.15 cigarettes per day with standard deviation (SD) is 7.16 and on an average 3.47 other products than cigarette per day with SD is 7.66 and among the rural smoker they have used on an average 3.91 cigarette per day with SD is 5.92 and they have used on average 9.29 other products than cigarette per day with SD is 9.68.

Among the male smoker they have used on an average 6.09 cigarettes per day with SD is 6.90 and on an average 6.49 other products than cigarettes per day with SD is 9.26 and among female smokers on an average 0.59 cigarette per day have been used with SD is 1.82 whereas on an average 7.98 other products than cigarette per day with SD is 8.74.

Smokers with age $\leq$ 40 years use on an average 6.63 cigarettes per day with SD is 6.89 and on an average 5 other products than cigarette per day with SD is 8.76 , smokers with age 41 to 60 years use on an 5.40 cigarettes per day with SD is 7.05 and on an average 7.85 other products than cigarette per day with SD is 10.14, smoker with age 60+ years use on an average 2.92 cigarettes per day with SD is 4.52 and on an average 6.70 other products than cigarette per day with SD is 7.92. By education level, among no formal schooling respondents on an average 4.79 cigarettes per day have been used with SD is 7.01 and they have used on an average 8.63 other products than cigarette per

day with SD is 9.59, less than primary school completed respondents on an average 6 cigarettes per day have been used with SD is 7.01, and they have used on an average 6.95 other products than cigarette per day with SD is 9.39, primary school completed respondents on an average 6.36 cigarettes per day have been used with SD is 6.28, and they have used on an average 5.06 other products than cigarette per day with SD is 8.32, less than secondary school completed respondents on an average 7.46 cigarettes per day have been used with SD is 6.26, and they have used on an average 3.62 other products than cigarette per day with SD is 7.97, secondary school completed respondents on an average 8.28 cigarettes per day have been used with SD is 6.32, and they have used on an average 2.87 other products than cigarette per day with SD is 9.26, high school completed respondents on an average 7.87 cigarettes per day have been used with SD is 7.09, and they have used on average 1.84 other products than cigarette per day with SD is 4.64 and college/university completed and higher respondents on an average 8.38 cigarettes per day have been used with SD is 5.78, and they have used on an average 0.71 other products than cigarette per day with SD is 2.61.

By occupation , the employer (Government, non-government) on an average 8.03 cigarettes per day have been used with SD is 6.27 and they have used on average 1.65 other products than cigarettes per day with SD is 6.37, business man (small, large) on an average 8.59 cigarettes per day have been used with SD is 7.26, and they have used on average 3.52 other products than cigarette per day with SD is 7.32, farmer (land owner & farmer) on an average 3.31

cigarettes per day have ben used with SD is 5.91 and they have used on an average 10.71 other products than cigarettes per day with SD is 10.16, agricultural / industrial worker/ daily on an average 5.11 cigarettes per day have been used with SD is 6.59, and they have used on average 8.07 other products than cigarettes per day with SD is 9.46, homemaker/housework on an average 1.19 cigarettes per day have been used with SD is 3.61 and they have used on an average 5.61 other products than cigarettes per day with SD is 8.04 , retired and unemployed (able to work/unable to work) on an average 5.75 cigarettes per day have been used with SD is 6.55 and they have used on an average 4.61 other products than cigarettes per day with SD is 7.19, student/other on an average 7.31 cigarettes per day have been used with SD is 7.10 and they have used on an average 5.25 other products than cigarettes per day with SD is 9.05.

According to wealth index, the lowest wealth index respondents on an average 3.56 cigarettes per day have been used with SD is 6.02 and they have used on an average 10.04 other products than cigarettes per day with SD is 9.71, low wealth index respondents on an average 5.34 cigarettes per day have been used with SD is 6.96 and they have used on an average 7.82 other products than cigarettes per day with SD is 9.52 , middle wealth index respondents on an average 5.82 cigarettes per day have been used with SD is 6.86 and they have used on an average 6.69 other products than cigarettes per day with SD is 9.29, high respondents on an average 7.63 cigarettes per day have been used with SD is 6.63 and they have used on average 3.81 other products than cigarettes

per day with SD is 7.70 and highest wealth index respondents on an average 9.01 cigarettes per day have been used with SD is 6.77 and they have used on average 1.30 other products than cigarettes per day with SD is 5.79

Table 5.3.1a: Comparing various cofactors to attitude towards tobacco use

Socio-economic and demographic variables	Smoking Tobacco Total number=2038		Smokeless Tobacco Total number=2336	
	Average number of tobacco use per day, Mean (SD)		Average number of tobacco use per day, Mean (SD)	
	Manufactured cigarettes	Others*	Betel quid with tobacco	Other**
Residence				
Urban	8.15(7.16)	3.47 (7.66)	4.57(5.21)	3.81 (7.16)
Rural	3.91(5.92)	9.29(9.68)	3.91(5.18)	4.18(5.92)
Gender				
Male	6.09(6.90)	6.49 (9.26)	5.05(5.60)	3.51(7.15)
Female	0.59(1.82)	7.98 (8.74)	3.56(4.79)	4.35(5.91)
Age(yrs)				
≤ 40	6.63(6.89)	5(8.76)	4.36(5.50)	3.58(7.20)
41 - 60	5.40(7.05)	7.85(10.14)	4.24(5.14)	4.21(5.92)
> 60	2.92(4.52)	6.70 (7.92)	3.58(4.45)	4.74(5.73)
Educational level				
No formal schooling	4.79(7.01)	8.63(9.59)	3.43(4.81)	4.52(7.08)
Less than primary school completed	6(7.01)	6.95 (9.39)	4.37(5.03)	3.84(5.49)
Primary School Completed	6.36(6.28)	5.06 (8.32)	5.22(7.58)	3.77(6.63)
Less than secondary school completed	7.46(6.26)	3.62 (7.97)	4.80(4.73)	2.68(4.92)
Secondary school completed	8.28(6.32)	2.87 (9.26)	4.62(3.76)	2.26(4.04)
High school completed	7.87(7.09)	1.84 (4.64)	5.20(4.67)	2.31(4.20)
College/University Completed and higher	8.38(5.78)	0.71 (2.61)	4.21(5.20)	2.39(3.80)
Occupation				
Employment (Government, Non-Government)	8.03(6.27)	1.65 (6.37)	5.57(6.21)	3.50(6.20)
Business (small, large)	8.59(7.26)	3.52(7.32)	6.13(5.81)	2.94(5.80)

Socio-economic and demographic variables	Smoking Tobacco Total number=2038		Smokeless Tobacco Total number=2336	
	Average number of tobacco use per day, Mean (SD)		Average number of tobacco use per day, Mean (SD)	
	Manufactured cigarettes	Others*	Betel quid with tobacco	Other**
Farming (land owner & farmer)	3.31(5.91)	10.71 (10.16)	4.98(5.41)	3.80(6.06)
Agricultural / Industrial worker/ daily laborer/Other self-employed	5.11(6.59)	8.07 (9.46)	4.17(4.73)	4.11(8.89)
Homemaker/Housework	1.19(3.61)	5.61 (8.04)	3.55(4.19)	4.15(5.52)
Retired and unemployed (able to work/unable to work)	5.75(6.55)	4.61 (7.19)	2.92(3.75)	4.54(5.43)
Student/Other	7.31(7.10)	5.25(9.05)	4.59(8.34)	4.96(7.41)
Wealth index				
Lowest	3.56(6.02)	10.04 (9.71)	3.51(4.41)	4.13(6.06)
Low	5.34(6.96)	7.82(9.52)	4.28(6.09)	4.27(3.83)
Middle	5.82(6.86)	6.69 (9.29)	4.13(4.59)	4.10(5.80)
High	7.63(6.63)	3.81 (7.70)	4.73(5.36)	3.86(8.61)
Highest	9.01(6.77)	1.30(5.79)	4.84(5.32)	2.93(5.46)

*Includes hand-rolled cigarette, pipes full of tobacco, cigars, cheroots, or cigarillos, water pipe, and any others.

**Includes snuff by mouth, snuff by nose, chewing tobacco, and any others.

From Table 5.3.1a we have also found that the urban respondents on an average 4.57 betel quid with tobacco per day have been used with standard deviation (SD) 5.21 and they have used on an average 3.81 other products than betel quid with tobacco per day with SD is 7.16 and the rural respondents on an average 3.91 betel quid with tobacco per day have been used with SD is 5.18 and they have used on average 4.18 other products than betel quid with tobacco per day with SD is 5.92. Among the male respondents on an average 5.05 betel quid with tobacco per day have been used with SD is 5.60 and they have used on an average 3.51 other products than betel quid with tobacco per day with SD

is 7.15 and for female respondents on an average 3.56 betel quid with tobacco per day have been used with SD is 4.79 and they have used on an average 4.35 other products than betel quid with tobacco per day with SD is 5.91.

Smokeless tobacco users with age $\leq$ 40 years use smokeless tobacco products on an average 4.36 betel quid with tobacco per day with SD is 5.50 and they have used on an average 3.58 other products than betel quid with tobacco per day with SD is 7.20 , Smokeless tobacco users with age 41 to 60 years use smokeless tobacco products on an average 4.24 betel quid with tobacco per day with SD is 5.14 and they have used on an average 4.21 other products than betel quid with tobacco per day with SD is 5.92, smokeless tobacco user with age 60+ years use smokeless tobacco products on an average 3.58 betel quid with tobacco per day with SD is 4.45 and they have used on average 4.74 other products than betel quid with tobacco per day with SD is 5.73.

By education level, among no formal schooling respondents on an average 3.43 betel quid with tobacco per day have been used with SD is 4.81 and they have used on average 4.52 other products than betel quid with tobacco per day with SD is 7.08, less than primary school completed respondents on an average 4.37 betel quid with tobacco per day have been used with SD is 5.03, and they have used on an average 3.84 other products than betel quid with tobacco per day with SD is 5.49, primary school completed respondents on an average 5.22 betel quid with tobacco per day have been used with SD is 7.58, and they have used on an average 3.77 other products than betel quid with tobacco per day with SD is 6.63, less than secondary school completed respondents on an

average 4.80 betel quid with tobacco per day have been used with SD is 4.73, and they have used on average 2.68 other products than betel quid with tobacco per day with SD is 4.92, secondary school completed respondents on an average 4.62 betel quid with tobacco per day have been used with SD is 3.76, and they have used on an average 2.26 other products than betel quid with tobacco per day with SD is 4.04, high school completed respondents on an average 5.20 betel quid with tobacco per day have been used with SD is 4.67, and they have used on average 2.31 other products than betel quid with tobacco per day with SD is 4.20 and college/university completed and higher respondents on an average 4.21 cigarettes per day have been used with SD is 5.20, and they have used on an average 2.39 other products than cigarette per day with SD is 3.80.

By occupation, among employer (Government, non-government) on an average 5.77 betel quid with tobacco per day have been used with SD is 6.21 and they have used on average 3.50 other products than betel quid with tobacco per day with SD is 6.20, business man (small, large) on an average 6.13 betel quid with tobacco per day have been used with SD is 5.81 and they have used on an average 2.94 other products than betel quid with tobacco per day with SD is 5.80, farmer (land owner & farmer) on an average 4.98 betel quid with tobacco per day have been used with SD is 5.41 and they have used on an average 3.80 other products than betel quid with tobacco per day with SD is 6.06, agricultural / industrial worker/ daily on an average 4.17 betel quid with tobacco per day have been used with SD is 4.73 and they have used on average

4.11 other products than betel quid with tobacco per day with SD is 8.89, homemaker/housework on an average 3.55 betel quid with tobacco per day have been used with SD is 4.19 and they have used on average 4.15 other products than betel quid with tobacco per day with SD is 5.52, retired and unemployed (able to work/unable to work) on an average 2.92 betel quid with tobacco per day have been used with SD is 3.75 and they have used on average 4.54 other products than betel quid with tobacco per day with SD is 5.43, student/other respondents on an average 4.59 betel quid with tobacco per day have been used with SD is 8.34 and they have used on average 4.96 other products than betel quid with SD is 7.41

According to wealth index , among the lowest wealth index respondents on an average 3.51 betel quid with tobacco per day have been used with SD is 4.41 and they have used on an average 4.96 other products than betel quid with tobacco per day with SD is 7.41, low wealth index respondents on an average 3.51 betel quid with tobacco per day have been used with SD is 4.41 and they have used on an average 4.13 other products than betel quid with tobacco per day with SD is 6.06, middle wealth index respondents on an average 4.13 betel quid with tobacco per day have been used with SD is 4.59 and they have used on an average 4.10 other products than betel quid with tobacco per day with SD is 5.80, high wealth index respondents on an average 4.73 betel quid with tobacco per day have been used with SD is 5.36, and they have used on an average 3.86 other products than betel quid with tobacco per day with SD is 8.61 and highest wealth index respondents on an average 4.84 betel quid with

tobacco per day have been used with SD is 5.32 and they have used on an average 2.93 other products than betel quid with tobacco per day with SD is 5.46.

One measure of evaluating nicotine dependence is the time taken to tobacco use the first tobacco of the day after waking. We have summarized the time to the first tobacco use of the day in Table 5.3.1b. Among the smokers 44.02% of urban and 55.98% of rural have smoked within 5 minutes after wake up, 42.35% of urban and 57.65% of rural have smoked between 6 to 30 minutes, 48.55% of urban and 51.45% of rural have smoked between 31 to 60 minutes, 53.32% of urban 46.48% of rural respondents have smoked more than 60 minutes. Among the smokers 94.87% of male and 5.13% of female have smoked within 5 minutes after wake up, 96.91% of male 3.09% of female have smoked between 6 to 30 minutes, 98.45% of male and 1.55% of female have smoked between 31 to 60 minutes after wake up, 96.35% of male and 3.65% of female have smoked more than 60 minutes. The average age is 41.90 with SD=0.83 for the respondents who smoked within 5 minutes after wake up, the average age is 41.19 with SD=0.49 who smoked between 6 to 30 minutes, the average age is 40.59 with SD=0.61 who smoked between 31 to 60 minutes and the average age is 39.14 with SD=0.58 who smoked within more than 60 minutes after wake up. Among the tobacco smokers 66.23% of no formal schooling, 14.52% of less than primary, 6.41% of primary, 6.83% of less than secondary, 3.84% of secondary, 1.28% of high school and 0.85% of college/university/higher respondents have smoked within 5 minutes after

wakeup. And the tobacco smokers 52.50% of no formal schooling, 17.94% of less than primary, 7.50% of primary, 14.26% of less than secondary, 3.82% of secondary, 1.91% of high school and 2.05% of college/university/higher completed respondents have smoked between 6 to 30 minutes after waking up. Again the tobacco smokers 43.52% of no formal schooling, 20.11% of less than primary, 9.86% of primary, 15.47% of less than secondary, 3.67% of secondary, 2.32% high school and 5.02% of college/university/higher respondents have smoked within 31 to 60 minutes after waking up. And again the tobacco smokers 36.21% of no formal schooling, 16.80% of less than primary, 10.96% of primary, 20.09% of less than secondary, 5.64% of secondary, 3.82% of high school and 4.65% of college/university/higher respondents have smoked more than 60 minutes. Attitude among tobacco smokers 5.12% of employer (Government, non-government), 17.09% of business man, 20.94% of farmer (land owner & farmer), 42.30% of agricultural/Industrial worker/ daily laborer/other self- employed, 2.13% of homemaker/housework, 2.99% of retired and unemployed (able to work/unable to work) and 9.04% of student/other respondents have smoked within 5 minutes. And among tobacco smokers 7.79% of employer (Government, non-government), 21.32% of business man, 22.05% of farmer (land owner & farmer), 27.32% of agricultural/Industrial worker/daily laborer/other self-employed, 1.91% of homemaker/housework, 4.11% of retired and unemployed (able to work/unable to work) and 5.44% of student/other respondents have smoked between 6 to 30 minutes. And among tobacco smokers 11.79% of

employer (Government, non-government), 22.63% of business man, 18.76% of farmer (land owner & farmer), 36.36% of agricultural / Industrial worker/ daily laborer/other self- employed, 1.16% of homemaker/housework, 3.48% of retired and unemployed (able to work/unable to work) and 5.80% of student/other respondents have smoked between 31 to 60 minutes. And again among tobacco smokers 16.44% of employer (Government, non-government), 22.75% of business man, 18.93% of farmer (land owner & farmer), 26.41% of agricultural / Industrial worker/ daily laborer/other self- employed, 2.82% of homemaker/housework, 4.98% of retired and unemployed (able to work/unable to work) and 7.64% of student/other respondents have smoked more than 60 minutes. Among the tobacco smokers 37.60% are of lowest wealth index, 26.92% are of low wealth index, 18.80% are of middle wealth index, 10.25% are of high wealth index and 6.41% are of highest wealth index have smoked within 5 minutes. And among the tobacco smokers 28.67% are of lowest wealth index, 26.47% are of low wealth index, 17.64% are of middle, 18.08% are of high wealth index and 9.11% are of highest wealth index have smoked between 6 to 30 minutes. And the tobacco smokers 19.92% are of lowest wealth index, 25.72% are of low wealth index, 18.56% are of middle wealth index, and 20.30% are of high and 15.47% are of highest wealth index have smoked between 31 to 60 minutes. And again among the tobacco smokers 16.94% are of lowest wealth index, 23.25% are of low wealth index, 19.10% are of middle wealth index, 23.25% are of high and 17.44% are of highest wealth index have smoked more than 60 minutes.

Table 5.3.1b: Comparing attitude towards tobacco use

Socio-economic and demographic variables	Smoking Tobacco				Smokeless Tobacco			
	Time of first start after wake-up (%)				Time of first start after wake-up (%)			
	Within 5 Minutes (N=234) %(95% CI)	6 To 30 Minutes (N=680) %(95%CI)	31 To 60 Minute (N=517) %(95% CI)	More than 60 Minutes (N=602) %(95% CI)	Within 5 Minutes (N=195) %(95% CI)	6 To 30 Minutes (N=591) %(95% CI)	31 To 60 Minute (N=541) %(95% CI)	More than 60 Minutes (N=1005) %(95% CI)
Residence								
Urban	44.02 (37.64,50.39)	42.35 (38.64,46.07)	48.55 (44.24,52.86)	53.32 (49.33,57.31)	41.53 (34.60,48.47)	39.25 (35.31,43.19)	36.59 (32.53,40.66)	46.37 (43.28,49.45)
Rural	55.98 (49.61,62.36)	57.65 (53.93,61.36)	51.45 (47.14,55.76)	46.68 (42.69,50.67)	58.47 (51.53,65.40)	60.75 (56.81,64.69)	63.41 (59.34,67.47)	53.63 (50.55,56.72)
Gender								
Male	94.87 (92.04,97.71)	96.91 (95.60,98.21)	98.45 (97.38,99.51)	96.35 (0.95,0.98)	32.82 (26.21,39.44)	29.78 (26.08,33.47)	52.13 (47.91,56.35)	45.27 (42.19,48.35)
Female	5.13 (2.29,7.96)	3.09 (1.79,4.39)	1.55 (0.4, 2.61)	3.65 (2.15,5.15)	67.18 (60.56,73.79)	70.22 (66.53,73.92)	47.87 (43.65,52.09)	54.73 (51.65,57.81)
Age(yrs)	41.90 (0 .83)	41.19 (0.49)	40.59 (0 .61)	39.14 (0.58)	41.96(0.93)	47.50(0.60)	46.39(0.61)	45.03(0.47)
Educational level								
No formal schooling	66.23 (60.16,72.31)	52.50 (48.74,56.25)	43.52 (39.24,47.80)	36.21 (32.36,40.05)	64.10 (57.34,70.85)	61.94 (58.00,65.88)	59.13 (54.94,63.32)	52.05 (48.95,55.15)
Less than primary school completed	14.52 (10.00,19.05)	17.94 (15.05,20.82)	20.11 (16.65,23.57)	18.60 (15.49,21.71)	12.82 (8.11,17.52)	16.21 (13.22,19.19)	16.57 (13.40,19.73)	15.71 (13.45,17.97)
Primary School Completed	6.41 (3.26,9.55)	7.50 (5.51,9.48)	9.86 (7.29,12.43)	10.96 (8.46,13.46)	11.79 (7.25,16.33)	9.89 (7.47,12.31)	10.92 (8.26,13.57)	11.51 (9.53, 13.49)
Less than secondary school completed	6.83 (3.59,10.08)	14.26 (11.63,16.89)	15.47 (12.35,18.59)	20.09 (16.89,23.30)	7.17 (3.54,10.81)	8.36 (6.11,10.60)	9.22 (6.76,11.69)	13.01 (10.92,15.10)
Secondary school completed	3.84 (1.37,6.31)	3.82 (2.38,5.26)	3.67 (2.05,5.29)	5.64 (3.80,7.49)	1.53 (0.19,3.27)	1.53 (0.53,2.53)	2.07 (0.85,3.28)	3.80 (2.61,4.99)
High school completed	1.28 (0.16,2.72)	1.91 (0.88,2.94)	2.32 (1.02,3.62)	3.82 (2.28,5.35)	1.53 (0.19,3.27)	0.68 (0.01,1.35)	0.75 (0.01,1.48)	1.80 (0.97,2.62)
College/University Completed and	0.85	2.05	5.02	4.65	10.25	1.36	1.31	2.10

Socio-economic and demographic variables	Smoking Tobacco				Smokeless Tobacco			
	Time of first start after wake-up (%)				Time of first start after wake-up (%)			
	Within 5 Minutes (N=234) %(95% CI)	6 To 30 Minutes (N=680) %(95%CI)	31 To 60 Minute (N=517) %(95% CI)	More than 60 Minutes (N=602) %(95% CI)	Within 5 Minutes (N=195) %(95% CI)	6 To 30 Minutes (N=591) %(95% CI)	31 To 60 Minute (N=541) %(95% CI)	More than 60 Minutes (N=1005) %(95% CI)
/higher	(0.32,2.03)	(0.99,3.12)	(3.14,6.91)	(2.96,6.33)	(0.39,2.44)	(0.42,2.30)	(0.34,2.28)	(1.21, 2.99)
Occupation								
Employment (Government, Non-Government)	5.12 (2.29,7.96)	7.79 (5.77,9.81)	11.79 (9.01,14.58)	16.44 (13.47,19.41)	5.64 (2.39,8.88)	4.23 (2.60,8.85)	5.54 (3.61,7.47)	7.46 (5.83,9.08)
Business (small, large)	17.09 (12.25,21.93)	21.32 (18.24,24.40)	22.63 (19.01,26.24)	22.75 (19.40,26.11)	6.66 (3.15,10.17)	5.92 (4.01,7.82)	9.79 (7.28,12.30)	11.04 (9.10,12.98)
Farming (land owner & farmer)	20.94 (15.71,26.16)	22.05 (18.93,25.17)	18.76 (15.39,22.13)	18.93 (15.80,22.07)	6.15 (2.77,9.53)	8.46 (6.21,10.70)	16.63 (13.49,19.77)	8.55 (6.82,10.28)
Agricultural / Industrial worker/ daily laborer/Other self- employed	42.30 (35.96,48.65)	37.35 (33.71,40.99)	36.36 (32.21,40.51)	26.41 (22.88,29.93)	22.05 (16.21,27.88)	14.38 (11.54,17.21)	18.29 (15.03,21.56)	17.91 (15.53,20.28)
Homemaker/Housework	2.13 (0.27,3.99)	1.91 (0.88,2.94)	1.16 (0.23,2.08)	2.82 (1.49,4.14)	53.33 (46.30,60.35)	53.29 (49.27,57.32)	38.07 (33.97,42.17)	43.98 (40.90,47.05)
Retired and unemployed (able to work/unable to work)	2.99 (0.80,5.18)	4.11 (2.62,5.61)	3.48 (1.89,5.06)	4.98 (3.24,6.72)	1.53 (0.19,3.27)	6.59 (4.59,8.60)	5.54 (3.61,7.47)	5.77 (4.32,7.21)
Student/Other	9.40 (5.65,13.15)	5.44 (3.73,7.14)	5.80 (3.78,7.82)	7.64 (5.51,9.76)	4.61 (1.66,7.56)	7.10 (5.03,9.18)	6.09 (4.08,8.11)	5.27 (3.89,6.65)
Wealth index								
Lowest	37.60 (31.38,43.83)	28.67 (25.27,32.08)	19.92 (16.47,23.37)	16.94 (13.94,19.94)	34.87 (28.16,41.58)	30.28 (26.57,33.99)	26.06 (22.35,29.76)	24.77 (22.10,27.44)
Low	26.92 (21.22,32.62)	26.47 (23.15,29.79)	25.72 (21.95,29.49)	23.25 (19.87,26.63)	23.58 (17.61,29.56)	28.08 (24.45,31.71)	25.50 (21.82,29.18)	23.08 (20.47,25.69)
Middle	18.80 (13.78,23.82)	17.64 (14.77,20.51)	18.56 (15.21,21.92)	19.10 (15.95,22.24)	17.43 (12.09,22.77)	17.25 (14.20,20.30)	18.85 (15.55,22.15)	18.40 (16.00,20.80)
High	10.25 (6.35,14.15)	18.08 (15.19,20.98)	20.30 (16.83,23.78)	23.25 (19.87,26.63)	15.89 (10.74,21.04)	16.41 (13.42,19.40)	19.96 (16.58,23.33)	20.00 (17.52,22.47)
Highest	6.41 (3.26,9.55)	9.11 (6.95,11.28)	15.47 (12.35,18.59)	17.44 (14.40,20.47)	8.20 (4.34 12.06)	7.95 (5.76,10.13)	9.61 (7.12,12.09)	13.73 (11.60,15.86)

*Mean with SD is reported.

Similarly from the Table 5.3.1b we have observed that among the smokeless tobacco users 41.53% of urban and 58.47% of rural have used smokeless tobacco within 5 minutes after wake up, 39.25% of urban and 60.75% of rural have used smokeless tobacco between 6 to 30 minutes, 36.69% of urban and 63.41% of rural have used smokeless tobacco between 31 to 60 minutes, 46.37% of urban 53.63% of rural respondents have used smokeless tobacco more than 60 minutes. Among the smokeless tobacco users 32.82% of male and 67.18% of female have used smokeless tobacco within 5 minutes after wake up, 29.78% of male 70.22% of female have used smokeless tobacco between 6 to 30 minutes, 52.13% of male and 47.87% of female have used smokeless tobacco between 31 to 60 minutes after wake up, 45.27% of male and 54.73% of female have used smokeless tobacco more than 60 minutes. The average age is 41.96 with SD=0.93 for the respondents who used smokeless tobacco within 5 minutes after wake up, the average age is 47.50 with SD=0.60 for the respondents who used smokeless tobacco within 6 to 30 minutes, the average age is 46.39 with SD=0.61 for the respondents who used smokeless tobacco within 31 to 60 minutes and the average age is 45.03 with SD=0.47 for the respondents who used smokeless tobacco within more than 60 minutes after wake up. Among the smokeless tobacco users 64.10% of no formal schooling, 12.82% of less than primary, 11.79% of primary, 7.17% of less than secondary, 1.53% of secondary, 1.53% of high school and 10.25% of college/university/higher completed respondents have used smokeless tobacco within 5 minutes after wake up. And the smokeless tobacco users 61.94% of no

formal schooling, 16.21% of less than primary, 9.89% of primary, 8.36% of less than secondary, 1.53% of secondary, 0.68% of high school and 1.36% of college/university/higher respondents have used smokeless tobacco between 6 to 30 minutes after waking up. Again the smokeless tobacco users 59.13% of no formal schooling, 16.57% of less than primary, 10.92% of primary, 09.22% of less than secondary, 2.07% of secondary, 0.75% high school and 1.31% of college/university/higher completed respondents have used smokeless tobacco between 31 to 60 minutes after waking up. And again the smokeless tobacco users 52.05% of no formal schooling, 15.71% of less than primary, 11.51% of primary, 13.01% of less than secondary, 3.80% of secondary, 1.80% of high school and 2.10% of college/university/higher respondents have used smokeless tobacco more than 60 minutes. Attitude among smokeless tobacco users 5.64% are of employer (Government, non-government), 6.66% are of business man, 6.15% are of farmer (land owner & farmer), 22.05% are of agricultural / industrial worker/ daily laborer/other self- employed, 53.33% are of homemaker/housework, 1.53% are of retired and unemployed (able to work/unable to work) and 4.61% are of student/other respondents have used smokeless tobacco within 5 minutes. And among smokeless tobacco users 4.23% are of employer (Government, non-government), 5.92% are of business man, 8.46% are of farmer (land owner & farmer), 14.38% are of agricultural/industrial worker/ daily laborer/other self- employed, 53.29% are of homemaker/housework, 6.59% are of retired and unemployed (able to work/unable to work) and 7.10% are of student/other respondents have used

smokeless tobacco between 6 to 30 minutes. And among smokeless tobacco users 5.54% are of employment (Government, non-government), 9.79% are of business man, 16.63% are of farmer (land owner & farmer), 18.29% are of agricultural/Industrial worker/daily laborer/other self- employed, 38.07% are of homemaker/housework, 5.54% are of retired and unemployed (able to work/unable to work) and 6.09% are of student/other respondents have used smokeless tobacco between 31 to 60 minutes. And again among the smokeless tobacco users 7.46% are of employers (Government, non-government), 11.04% are of business man, 8.55% are of farmer (land owner & farmer), 17.91% are of agricultural / Industrial worker/ daily laborer/other self- employed, 43.98% are of homemaker/housework, 5.77% are of retired and unemployed (able to work/unable to work) and 5.27% are of student/other respondents have used smokeless tobacco more than 60 minutes after wake up. Among the smokeless tobacco users 34.87% are of lowest wealth index, 23.58% are of low, 17.43% are of middle, 15.89% are of high and 8.20% are of highest wealth index respondents have used smokeless tobacco products within 5 minutes. And among the smokeless tobacco users 30.28% are of lowest wealth index, 28.08% are of low, 17.25% are of middle, 16.41% are of high and 7.95% are of highest wealth index respondents have used smokeless tobacco between 6 to 30 minutes. And the smokeless tobacco users 26.06% are of lowest wealth index, 25.50% are of low, 18.85% are of middle, 19.96% of high and 09.61% are of highest wealth index respondents have used smokeless tobacco products between 31 to 60 minutes. And again among the smokeless tobacco users

24.77% are of lowest wealth index, 23.08% are of low, 18.40% are of middle, 20.00% are of high and 13.73% are of highest wealth index respondents have used smokeless tobacco products more than 60 minutes.

5.4 Awareness policy towards tobacco use

Tobacco smoking in the workplace has become an important public health issue as evidenced by the many local and national initiatives plus the implementation of new policies by many places. There is considerable evidence that tobacco smoke is harmful not only to smokers but also to secondhand smokers.

From Table 5.4.1a, we have found that 49.82% of the urban and 50.18% of the rural respondents reported that smoking was allowed at their home. Among the respondents 57.51% come from urban area and 42.49% come from rural area have reported that smoking was not allowed at their home, but exceptions, 63.36% come from urban area and 36.64% come from rural area have reported that smoking was never allowed at their home, 50.50% comes from urban area and 49.48% comes from rural area reported that they did not have any rules to smoke at their home. Among the adult respondents we have found that 80.70% males and 19.30% females reported that smoking was allowed at their home, 85.79% male and 14.31% female reported that smoking was not allowed at their home but exceptions, 83.56% male and 16.44% female reported that smoking was never allowed at their home and 81.93% male and 18.07% female reported they did not have any rules to smoke at their home.

According to the educational level, 44.75% are of no formal schooling, 16.76% are of less than primary school completed, 8.68% are of primary school completed, 17.61% are of less than secondary school completed, 5.18% are of secondary school completed, 3.86% are of high school completed and 3.13% are of higher degree completed respondents reported that smoking was allowed at their home; 25.49% are of no formal schooling, 16.57% are of less than primary school completed, 9.63% are of primary school completed, 21.67% are of less than secondary school completed, 8.64% are of secondary school completed, 8.07% are of high school completed and 9.91% are of higher degree completed respondents reported that smoking was not allowed at their home, but exceptions; 18.04% are of no formal schooling, 13.51% are of less than primary school completed, 10.59% are of primary school completed, 21.88% are of less than secondary school completed, 11.36% are of secondary school completed, 9.37% are of high school completed and 15.20% are of higher degree completed respondents reported that smoking was never allowed at their home; 32.95% are of no formal schooling, 17.65% are of less than primary school completed, 12.32% are of primary school completed, 20.45% are of less than secondary school completed, 7.08% are of secondary school completed, 4.37% are of high school completed and 5.15% are of higher degree completed respondents reported that they did not have any smoking policy at their home.

By the occupational level, 11.94% are of employer (Government, non-government), 20.50% are of business man, 14.95% are of farmer (land owner & farmer), 28.70% are of agricultural / Industrial worker/ daily laborer/other self-

employed, 12.30% are of homemaker/housework, 3.13% are of retired and unemployed (able to work/unable to work) and 8.44% are of student/other reported that smoking was allowed at their home; 17.42% are of employer (Government, non-government), 22.52% are of business man, 14.73% are of farmer (land owner & farmer), 24.36% are of agricultural / Industrial worker/ daily laborer/other self- employed, 8.07% are of homemaker/housework, 2.69% are of retired and unemployed (able to work/unable to work) and 10.19% are of student/other reported that smoking was not allowed at their home, but exceptions; 24.73% are of employer (Government, non-government), 21.88% are of business man, 10.90% are of farmer (land owner & farmer), 15.89% are of agricultural / Industrial worker/ daily laborer/other self- employed, 10.21% are of homemaker/housework, 3.99% are of retired and unemployed (able to work/unable to work) and 12.36% are of student/other reported that smoking was never allowed at their home; 12.91% are of employer (Government, non-government), 20.41% are of business man, 13.43% are of farmer (land owner & farmer), 27.57% are of agricultural / Industrial worker/ daily laborer/other self-employed, 11.95% are of homemaker/housework, 3.05% are of retired and unemployed (able to work/unable to work) and 10.64% are of student/other reported that they did not have any rules at their home. According to the wealth index, 20.98% are of lowest wealth index, 24.12% are of low, 18.09% are of middle, 37.76% are of high and 13.02% are of highest wealth index respondents reported that smoking was allowed at their home; 12.03% are of lowest wealth index, 17.70% are of low, 17.70% are of middle, 24.36% are of high and 28.18%

are of highest wealth index respondents reported that smoking was not allowed at their home, but exceptions; 7.75% are of lowest wealth index, 14.66% are of low, 16.51% are of middle, 25.42% are of high and 35.63% are of highest wealth index respondents reported that smoking was never allowed at their home; 20.06% are of lowest wealth index, 21.29% are of low, 18.41% are of middle, 22.16% are of high and 18.06% are of highest wealth index respondents reported they did not have any rules at their home.

Table 5.4.1a: Comparing various cofactors to smoking policy

Socio-economic and demographic variables	Secondhand Smoke							
	Smoking policy at home				Smoking policy at job place			
	Allowed (N=743) %(95% CI)	Not Allowed, But Exceptions (N=636) %(95% CI)	Never Allowed (N=1085) %(95% CI)	No Rules (N=1013) %(95% CI)	Allowed anywhere (N=475) %(95% CI)	Allowed Only In Some Indoor Areas (N=268) %(95% CI)	Not Allowed In Any Indoor Areas (N=473) %(95% CI)	There Is No Policy (N=481) %(95% CI)
Residence								
Urban	49.82 (46.41,53.22)	57.51 (52.67,61.16)	63.36 (60.74, 5.98)	50.52 (47.63,53.42)	63.52 (59.19,67.84)	68.49 (62.97,74.022)	70.85 (67.12,74.58)	57.59 (53.28,61.90)
Rural	50.18 (46.77,53.58)	42.49 (38.84,47.33)	36.64 (34.01,39.25)	49.48 (46.57,52.37)	36.48 (32.15,40.80)	31.51 (25.97,27.02)	29.15 (25.41,32.87)	42.41 (38.09,46.71)
Gender								
Male	80.70 (78.01,83.38)	85.69 (83.10, 8.27)	83.56 (81.54,85.57)	81.93 (79.70,84.16)	94.12 (92.01,96.24)	93.41 (90.45,96.35)	89.01 (86.43,91.57)	89.55 (86.87,92.21)
Female	19.30 (16.61,21.98)	14.31 (11.72,16.89)	16.44 (14.42,18.45)	18.07 (15.83,20.29)	5.88 (3.75,7.98)	6.59 (3.64,9.54)	10.99 (8.42,13.56)	10.45 (7.78,13.12)
Age(yrs)*	37.90(0.49)	36.08(0.51)	36.08(0.41)	36.49(0.43)	36.15(0.56)	37.70(0.76)	35.56(0.55)	38.08(0.61)
Educational level								
No formal schooling	44.75 (41.36,48.14)	25.49 (22.27, 8.71)	18.04 (15.95, 0.13)	32.95 (30.22,35.68)	31.44 (27.27,35.62)	19.41 (14.71,24.11)	12.56 (9.84,1528)	26.48 (22.63,30.33)
Less than primary school completed	16.76 (14.22,19.31)	16.57 (13.82, 9.31)	13.51 (11.65,15.37)	17.65 (15.44,19.86)	17.81 (14.37,21.25)	13.18 (9.16,17.21)	12.21 (9.53,14.90)	16.79 (13.53,20.06)
Primary School Completed	8.68 (6.76, 10.60)	9.63 (7.45,11.81)	10.59 (8.92 12.27)	12.32 (10.4, 14.23)	12.36 (9.40,15.32)	10.25 (6.64,13.86)	9.07 (6.71,11.43)	11.06 (8.32,13.80)
Less than secondary school completed	17.61 (15.01,20.20)	21.67 (18.62,24.71)	21.88 (19.64,24.13)	20.45 (18.11,22.79)	20.75 (17.10,24.40)	15.38 (11.09,19.67)	21.29 (17.93,24.64)	23.71 (20.00,27.42)
Secondary school completed	5.18 (3.67, 6.69)	8.64 (5.56,10.71)	11.36 (9.64, 13.09)	7.08 (5.59, 8.56)	7.96 (5.53,10.40)	12.08 (8.21,15.96)	11.34 (8.74,13.94)	7.70 (5.37,10.03)
High school completed	3.86	8.07	9.37	4.37	5.03	8.05	9.94	6.32

Socio-economic and demographic variables	Secondhand Smoke							
	Smoking policy at home				Smoking policy at job place			
	Allowed (N=743) %(95% CI)	**Not Allowed, But Exceptions (N=636) %(95% CI)**	**Never Allowed (N=1085) %(95% CI)**	**No Rules (N=1013) %(95% CI)**	**Allowed anywhere (N=475) %(95% CI)**	**Allowed Only In Some Indoor Areas (N=268) %(95% CI)**	**Not Allowed In Any Indoor Areas (N=473) %(95% CI)**	**There Is No Policy (N=481) %(95% CI)**
	(2.54, 5.17)	(6.06 , 10.08)	(7.78, 10.95)	(3.18 , 5.55)	(3.06,6.99)	(4.82,11.29)	(7.49,12.40)	(4.19,8.44)
College/University Completed and /higher	3.13 (1.94 4.32)	9.91 (7.70, 12.12)	15.20 (13.25,17.15)	5.15 (3.87, 6.43)	4.61 (2.72,6.49)	21.61 (16.71,26.50)	23.56 (20.08, 27.04)	7.90 (5.55,10.25)
Occupation								
Employment (Government, Non-Government)	11.94 (9.73, 14.15)	17.42 (14.62,20.22)	24.73 (22.38,27.07)	12.91 (10.97, 4.85)	15.93 (12.64,19.22)	39.56 (33.74,45.37)	55.84 (51.77,59.91)	14.99 (11.87,18.10)
Business (small, large)	20.50 (17.75,23.25)	22.52 (19.43,25.60)	21.88 (19.64,24.13)	20.41 (18.08,22.75)	39.41 (35.02,43.80)	22.34 (17.39,27.29)	17.97 (14.82,21.12)	38.46 (34.21,42.70)
Farming (land owner & farmer)	14.95 (12.52,17.38)	14.73 (12.11,17.34)	10.90 (9.21, 12.60)	13.43 (11.46,15.41)	7.96 (5.53,10.40)	8.42 (5.12,11.72)	6.80 (4.74,8.87)	7.10 (4.86,9.33)
Agricultural / Industrial worker/ daily laborer/Other self-employed	28.70 (25.62,31.79)	24.36 (21.19, 7.53)	15.89 (13.91,17.88)	27.57 (24.98,30.16)	29.97 (25.86,34.09)	25.27 (20.10,30.44)	10.12 (7.64,12.69)	27.81 (23.90,31.71)
Homemaker/Housework	12.30 (10.06,14.54)	8.07 (6.06, 10.08)	10.21 (8.56, 11.86)	11.95 (10.07,13.83)	1.04 (0.13,1.96)	0.36 (0.35,1.08)	0.69 (0.01,1.38)	1.97 (0.76,3.18)
Retired and unemployed (able to work/unable to work)	3.13 (1.94 , 4.32)	2.69 (1.49,3.88)	3.99 (2.92,5.05)	3.05 (2.05, 4.05)	No observation	0.36 (0.35,1.08)	0.52 (0.06,1.11)	1.57 (0.49,2.66)
Student/Other	8.44 (6.54,10.33)	10.19 (7.96,12.43)	12.36 (10.57,14.15)	10.64 (8.85, 12.43)	5.66 (3.58,7.73)	3.66 (1.42,5.89)	8.02 (5.79,10.25)	8.08 (5.70,10.46)
Wealth index								
Lowest	20.98 (18.21,23.76)	12.03 (9.63, 14.44)	7.75 (6.30, 9.21)	20.06 (17.74,22.39)	13.20 (10.16,16.25)	10.25 (6.64,13.86)	3.66 (2.12,5.20)	13.01 (10.08,15.95)

Socio-economic and demographic variables	Secondhand Smoke							
	Smoking policy at home				Smoking policy at job place			
	Allowed (N=743) %(95% CI)	**Not Allowed, But Exceptions (N=636) %(95% CI)**	**Never Allowed (N=1085) %(95% CI)**	**No Rules (N=1013) %(95% CI)**	**Allowed anywhere (N=475) %(95% CI)**	**Allowed Only In Some Indoor Areas (N=268) %(95% CI)**	**Not Allowed In Any Indoor Areas (N=473) %(95% CI)**	**There Is No Policy (N=481) %(95% CI)**
Low	24.12 (21.21,27..04)	17.70 (14.88,22.52)	14.66 (12.74,16.59)	21.29 (28.91,23.66)	17.61 (14.18,21.03)	19.04 (14.37,23.71)	13.08 (10.32,15.85)	17.75 (14.41,2108)
Middle	18.09 (15.47, 20.71)	17.70 (14.88,20.52)	16.51 (14.49, 8.53)	18.41 (16.16,20.65)	20.54 (16.91,24.17)	11.35 (7.58,15.12)	15.88 (12.88,18.87)	17.15 (13.87,20.44)
High	37.76 (20.86,26.66)	24.36 (21.19,27.53)	25.42 (23.05,27.78)	22.16 (19.75,24.57)	28.30 (24.25,32.35)	20.51 (15.71,25.31)	27.22 (23.57,30.87)	26.23 (22.39,30.06)
Highest	13.02 (10.73, 15.32)	28.18 (24.86,31.50)	35.63 (33.03,38.24)	18.06 (15.83,20.29)	20.33 (16.71,23.95)	38.82 (33.03,44.62)	40.13 (36.11,44.15)	25.83 (22.02,29.65)

*Mean with SD is reported

Regarding the smoking policy at job place, 63.52% of the urban and 36.48% of the rural reported that smoking was allowed anywhere at their job place; 68.49% urban and 31.51% rural respondents reported that smoking was allowed only in some indoor area; 70.85% urban and 29.15% rural reported that smoking was not allowed any indoor area; 57.59% urban and 42.41% rural reported that they did not have any smoking policy at their job place. Again 94.12% males and 5.88% females reported that smoking was allowed anywhere at their job place; 93.41% male and 6.59% female reported that smoking was allowed in some indoor area; 89.01% male and 10.99% female reported that smoking was not allowed in any indoor area and 89.55% male and 10.45% female reported that they did not have any smoking policy at their job place.

According to the educational level, 31.44% are of no formal schooling, 17.81% are of less than primary school completed, 12.36% are of primary school completed, 20.75% are of less than secondary school completed, 7.96% are of secondary school completed, 5.03% are of high school completed and 4.61% are of higher degree completed respondents reported that smoking was allowed anywhere at their job place; 19.41% are of no formal schooling, 13.18% are of less than primary school completed, 10.25% are of primary school completed, 15.38% are of less than secondary school completed, 12.08% are of secondary school completed, 8.05% are of high school completed and 21.61% are of higher degree completed respondents reported that smoking was allowed only in some indoor area at their job place; 12.56% are of no formal schooling, 12.21% are of less than primary school completed, 9.07% are of primary school completed,

21.29% are of less than secondary school completed, 11.34% are of secondary school completed, 9.94% are of high school completed and 23.56% are of higher degree completed respondents reported that smoking was not allowed in any indoor area at their job place; 26.48% are of no formal schooling, 16.79% are of less than primary school completed, 11.06% are of primary school completed, 23.71% are of less than secondary school completed, 7.70% are of secondary school completed, 6.32% are of high school completed and 7.90% are of higher degree completed respondents reported that they did not have any smoking policy at their job place.

By the occupational level, 15.93% are of employer (Government, non-government), 39.41% are of business man, 7.96% are of farmer (land owner & farmer), 29.97% are of agricultural / Industrial worker/ daily laborer/other self-employed, 1.04% are of homemaker/housework and 5.66% are of student/other reported that smoking was allowed anywhere at their job place; 39.56% are of employer (Government, non-government), 22.34% are of business man, 8.42% are of farmer (land owner & farmer), 25.27% are of agricultural/Industrial worker/daily laborer/other self- employed, 0.36% are of homemaker/housework, 0.36% are of retired and unemployed (able to work/unable to work) and 3.66% are of student/other reported that smoking was allowed only in some indoor area at their job place; 55.84% are of employer (Government, non-government), 17.57% are of business man, 6.80% are of farmer (land owner & farmer), 10.12% are of agricultural/Industrial worker/daily laborer/other self- employed, 0.79% are of homemaker/housework, 0.52% are of retired and unemployed (able

to work/unable to work) and 8.02% are of student/other reported that smoking was not allowed in any indoor area at their job place; 14.99% are of employer (Government, non-government), 38.46% are of business man, 7.10% are of farmer (land owner & farmer), 27.81% are of agricultural/Industrial worker/daily laborer/other self- employed, 1.97% are of homemaker/housework, 1.57% are of retired and unemployed (able to work/unable to work) and 8.08% are of student/other reported that they did not have any policy at their job place. According to the wealth index, 13.20% are of lowest wealth index, 17.61% are of low, 20.54% are of middle, 28.30% are of high and 20.33% are of highest wealth index respondents reported that smoking was allowed anywhere at their job place; 10.25% are of lowest wealth index, 19.04% are of low, 11.35% are of middle, 20.51% are of high and 38.82% are of highest wealth index respondents reported that smoking was allowed in some indoor area; 3.66% are of lowest wealth index, 13.08% are of low, 15.88% are of middle, 27.22% are of high and 40.13% are of highest wealth index respondents reported that smoking was not allowed in any indoor area at their job place; 13.01% are of lowest wealth index, 17.75% are of low, 17.15% are of middle, 26.23% are of high and 25.83% are of highest wealth index respondents reported they did not have any policy at their job place.

To examine differences in tobacco marketing awareness policy by socio-economic and demographic factors, “yes” responses have been analyzed to questions regarding whether participants had notice advertising, promotion, or sponsorship of cigarettes or bidi in the preceding 30 days. Noticing of cigarette

or bidi marketing includes (i) advertisements (ii) signs promotion of cigarette or bidi and (iii) sponsorship of cigarette or bidi company in sports or sporting events in the preceding 30days. Noticing of cigarette or bidi marketing in stores (where cigarettes or bidi are sold) includes (i) cigarettes or bidi at sale prices, (ii) free gifts, or (iii) discount offers on other products while buying cigarettes or bidi, (iv) any advertisements or signs promoting cigarettes or bidi in the preceding 30 days. Noticing of cigarette or bidi marketing in places other than stores (where cigarettes or bidi are sold) includes (i) advertisements or signs promoting cigarettes or bidi and (ii) sponsorship of cigarette or bidi company in sporting events in the preceding 30. From Table 5.4.1b we have observed that the percentage of urban respondents who noticed cigarette advertising anywhere in the preceding 30 days is 48.84% and the rural respondents are 51.16%. Among the urban respondents, awareness of cigarette marketing in stores is 46.61% whereas in rural it is 53.39%. The percentage of urban respondents who noticed cigarette advertising at other places than stores is 51.57% and the rural respondents are 48.53%. And the percentage of urban respondents who noticed any cigarette promotion by sport or promotional event is 62.07% but rural respondents are less promoted than urban which is 37.93%. And the urban respondents who noticed any cigarette promotion by other is 51.24% and the rural respondent is 48.76%. Again the percentage of urban respondents who noticed any bidi advertising in the preceding 30 days is 45.25% and the rural respondents are 54.75%. Among the urban respondents, awareness of bidi marketing in stores where bidi are sold is 41.63% where as in rural is 58.67%.

The percentage of urban who noticed bidi advertising other than in stores where bidi are sold is 45.71% and the rural respondents are 54.29%. Again the percentage of urban respondents who noticed any bidi promotion by sport or promotional event is 55.56% and the rural respondent is 44.44%. And the urban respondents who noticed any bidi promotion by other promotional event is 33.33% and rural is 66.67%. Similar patterns by gender have been observed that for awareness of cigarette marketing in anywhere cigarettes are sold. Smoking prevalence is varying greatly by gender. The percentage of male who noticed cigarette advertising where cigarettes are sold in anywhere is 98.59% and female is 1.41%, where as in store male is 98.53% and the female is 1.47%. And other than store male is 99.32% and female is 0.68%. And the percentage of male respondents who noticed any cigarette promotion by sport or promotional event is 96.55% but female respondents are less promoted than male which is 3.45%. And the male respondents who noticed any cigarette promotion by other promotional event is 98.51% and the rural respondent is 1.49%. Again the percentage of male who noticed bidi advertising where bidi are sold anywhere is 97.83% female is 2.16%, where as in store male is 97.33% and female is 2.67%. And the other than store male respondents are 99.12% and the female respondents are 0.88%. The average age of the respondents who noticed cigarette advertising anywhere is 35.63 with standard deviation (SD) =0.22, the average age of the respondents is 35.84 with SD=0.25 who noticed cigarette advertising from store, the average age of the respondents is 35.08 with SD=0.28 who noticed cigarette advertising from other than store. The average age of the

respondents is 33.25 with SD=1.30 who noticed cigarette promotion by sport, the average age is 34.49 with SD=0.33 cigarette promotion by other promotional sport event. The average age of the respondents who noticed bidi advertising anywhere is 35.97 with standard deviation (SD) =0.29, the average age 36.30(0.33) who noticed bidi advertising from store and 36.03(0.37) other than store. The respondents age 34.59(2.07) who noticed bidi promotion by sport and the average age is 35.07(0.52) who noticed bidi promotion by other than sport.

The percentage of respondents with "no formal education" who noticed cigarette advertising anywhere in the preceding 30 days is 42.85%, noticed from store is 44.93% and other than store is 38.57%. The percentage of respondents with no formal education who noticed cigarette promotion by sport or promotional event is 31.03% and who noticed cigarette promotion by other promotional event is 42.45%. And again for bidi, the percentage of no formal educated respondents who noticed anywhere bidi advertising in the preceding 30 days is 47.98%, noticed from store is 51.42% and other than store is 43.51%. The percentage of no formal educated respondents bidi promotion by sport or promotional event is 33.33% and other promotional event is 45.88%. And for the percentage of " less than primary school completed" respondents who noticed anywhere cigarette advertising in the preceding 30 days is 18.52%, noticed from store is 16.81% and other than store is 19.42%. The less than primary school completed respondent's cigarette promotion by sport or promotional event is 17.24% and other promotional event is 17.91%. And for bidi, the percentage of less than primary school completed respondents who noticed anywhere bidi advertising in the

preceding 30 days is 17.43%, noticed from store is 16.19% and other than store is 19.34%. The less than primary school completed respondents bidi promotion by sport or promotional event is 22.22% and other promotional event is 15.68%. The percentage of "Primary School Completed" respondents who noticed cigarette advertising in anywhere, store, or other than store in the preceding 30 days is 8.97%, 9.34% and 8.75% respectively and the respondent cigarette promotion by sport is 17.24% and other than sport is 10.94%. And for bidi, the percentage of Primary School Completed respondents who noticed bidi advertising in anywhere, store, or other than store in the preceding 30 days is 8.78%, 8.76% and 8.57% respectively and the respondent bidi promotion by sport is 11.11% and other than sport is 12.15%. The percentage of "less than secondary school completed" respondents who noticed cigarette advertising in anywhere, store, or other than store in the preceding 30 days is 17.10 %, 16.91% and 18.60% respectively and the respondent cigarette promotion by sport is 10.34% and other than sport is 17.74%. And for bidi, the percentage of less than secondary school completed respondents who noticed bidi advertising in anywhere, store, or other than store in the preceding 30 days is 15.56%, 13.90% and 17.80% respectively and the respondent bidi promotion by other than sport is 17.64%. Among the percentage of "secondary school completed" respondents who noticed cigarette advertising in anywhere, store, or other than store in the preceding 30 days is 5.89 %, 5.50% and 6.83% respectively and the respondent cigarette promotion by sport is 3.44% and other than sport is 5.63%. And for bidi, the percentage of secondary school completed respondents who noticed bidi advertising in

anywhere, store, or other than store in the preceding 30 days is 3.89%, 3.23% and 4.39% respectively and the respondent bidi promotion by other than sport is 5.09% . The percentage of "high school completed" respondent noticed cigarette advertising in anywhere, store, or other than store in the preceding 30 days is 2.49 %, 2.26% and 2.87% respectively and the respondent cigarette promotion by sport is 3.44% and other than sport is 1.82%. And for bidi, the percentage of high school completed respondents who noticed bidi advertising in anywhere, store, or other than store in the preceding 30 days is 2.44%, 2.47% and 1.97% respectively and the respondent bidi promotion by other than sport is 1.56%. The percentage of "college/University and /higher" respondents who noticed cigarette advertising in anywhere, store, or other than store in the preceding 30 days is 4.15 %, 4.22% and 4.92% respectively and the respondent cigarette promotion by sport is 17.24% and other than sport is 3.48%. And for bidi, the college/University completed and /higher respondents who noticed bidi advertising in anywhere, store, or other than store in the preceding 30 days is 4.89%, 4.00% and 4.39% respectively and the respondent bidi promotion by sport is 33.33% and other than sport is 1.96% and the respondents bidi promotion by sport or promotional event is 22.22% and other promotional event is 15.68%. The percentage of the employment (Government Non-Government) who noticed cigarette advertising in anywhere, store, or other than store in the preceding 30 days is 12.04%, 11.30 % and 13.95 % respectively and the respondent cigarette promotion by sport is 17.24% and other than sport is 10.44%. And for bidi, the employment (Government Non-Government) who noticed bidi advertising in

anywhere, store, or other than store in the preceding 30 days is 10.08%, 9.33% and 11.20% respectively and the respondent bidi promotion by sport is 11.11% and other than sport is 6.27% . And for the percentage of the business (small, large) who noticed cigarette advertising in anywhere, store, or other than store in the preceding 30 days is 23.17 %, 23.20 % and 23.80 % respectively and the respondent cigarette promotion by sport is 13.79% and other than sport is 25.37%. And for bidi, the business (small, large) who noticed bidi advertising in anywhere, store, or other than store in the preceding 30 days is 21.46%, 21.14% and 21.31% respectively and the respondent bidi promotion by sport is 11.11% and other than sport is 26.27%.

Among the percentage of the Farming (land owner & farmer) who noticed cigarette advertising in anywhere, store, or other than store in the preceding 30 days is 18.18 %, 18.87 % and 17.51 % respectively and the respondent cigarette promotion by sport is 31.03% and other than sport is 18.24%. And for bidi, the Farming (land owner & farmer) who noticed bidi advertising in anywhere, store, or other than store in the preceding 30 days is 19.45%, 20.95% and 20.00% respectively and the respondent bidi promotion by sport is 33.33% and other than sport is 23.52% . And for the percentage of the Agricultural / Industrial worker/ daily laborer/other self- employed who noticed cigarette advertising in anywhere, store, or other than store in the preceding 30 days is 35.04 %, 35.49 % and 34.47 % respectively and the respondent cigarette promotion by sport is 20.68% and other than sport is 33.00%. And for bidi, the Agricultural / Industrial worker/ daily laborer/Other self- employed who

noticed bidi advertising in anywhere, store, or other than store in the preceding 30 days is 37.89%, 38.85% and 37.36% respectively and the respondent bidi promotion by sport is 22.22% and other than sport is 32.15%. Again the percentage of the Homemaker/Housework who noticed cigarette advertising in anywhere, store, or other than store in the preceding 30 days is 0.91 %, 0.98 % and 0.27 % respectively and the respondent cigarette promotion by other than sport is 0.82%. And for bidi, the homemaker/housework who noticed bidi advertising in anywhere, store, or other than store in the preceding 30 days is 1.29%, 1.71% and 0.22% respectively and the respondent bidi promotion by other than sport is 1.17%. The percentage of retired and unemployed (able to work/unable to work) who noticed cigarette advertising in anywhere, store, or other than store in the preceding 30 days is 3.32 %, 2.55 % and 3.55 % respectively and the respondent cigarette promotion by sport 6.89% other than sport is 3.31%. And for bidi, the Retired and unemployed (able to work/unable to work) who noticed bidi advertising in anywhere, store, or other than store in the preceding 30 days is 2.73%, 1.52% and 3.07% respectively and the respondent bidi promotion by sport 11.11% and other than sport is 2.35%. And the percentage of Student/Other who noticed cigarette advertising in anywhere, store, or other than store in the preceding 30 days is 7.30 %, 7.57 % and 6.42 % respectively and the respondent cigarette promotion by sport 10.34% and other than sport is 8.78%. And for bidi, the student/other who noticed bidi advertising in anywhere, store, or other than store in the preceding 30 days is

7.06%, 6.47% and 6.81% respectively and the respondent bidi promotion by sport 11.11% and other than sport is 6.23% (Table 5.4.1b).

For the wealth index, the percentage of lowest respondents who noticed cigarette advertising in anywhere, store, or other than store in the preceding 30 days are 20.51 %, 20.84 % and 19.15 % respectively and the respondent cigarette promotion by sport is 10.34% and other than sport is 20.89%. And for bidi, the lowest respondents who noticed bidi advertising in anywhere, store, or other than store in the preceding 30 days are 21.61%, 21.33% and 21.31% respectively and the respondent bidi promotion by sport is 11.11% and other than sport is 20.78%. And the percentage of low respondents who noticed cigarette advertising in anywhere, store, or other than store in the preceding 30 days are 26.91 %, 26.84 % and 25.58 % respectively and the respondent cigarette promotion by sport is 31.03% and other than sport is 24.87%. And for bidi, respondents of low wealth index who noticed bidi advertising in anywhere, store, or other than store in the preceding 30 days are 28.38%, 28.95% and 26.15% respectively and the respondent bidi promotion by sport is 11.11% and other than sport is 25.49%. And for the percentage of middle wealth index respondents who noticed cigarette advertising in anywhere, store, or other than store in the preceding 30 days are 18.43 %, 19.17 % and 18.60 % respectively and the respondent cigarette promotion by sport is 13.79% and other than sport is 19.73%. And for bidi, the middle index respondents who noticed bidi advertising in anywhere, store, or other than store in the preceding 30 days are 18.01%, 18.47% and 19.34% respectively and the respondent bidi promotion

by sport is 22.22% and other than sport is 24.31%. And for the percentage of rich respondents who noticed cigarette advertising in anywhere, store, or other than store in the preceding 30 days are 20.34 %, 19.56 % and 20.79 % respectively and the respondent cigarette promotion by sport is 20.68% and other than sport is 21.22%. And for bidi, the respondents of high who noticed bidi advertising in anywhere, store, or other than store in the preceding 30 days are 19.74%, 20.19% and 19.78% respectively and the respondent bidi promotion by sport is 11.11% and other than sport is 21.17%. And finally the percentage of highest wealth index respondents who noticed cigarette advertising in anywhere, store, or other than store in the preceding 30 days are 13.78 %, 13.56 % and 15.86 % respectively and the respondent cigarette promotion by sport is 24.13% and other than sport is 17.26%. And for bidi, the respondents of highest who noticed bidi advertising in anywhere, store, or other than store in the preceding 30 days are 22.24%, 11.04% and 13.40% respectively and the respondent bidi promotion by sport is 44.44% and other than sport is 8.23%.

Table 5.4.1b: Comparing various cofactors to marketing policy

Socio-economic and demographic variables	Marketing policy **									
	Cigarettes					Bidi				
	Advertisement			Sport or promotion event	Other promotions	Advertisement			Sport or promoting events % (95% CI)	Other promotion % (95%CI)
	Anywhere % (95% CI)	In store % (95% CI)	Other than store % (95% CI)			Anywhere % (95% CI)	In store % (95% CI)	Other than store % (95% CI)		
Residence										
Urban	48.84 (46.01,51.66)	46.61 (43.53,49.67)	51.57 (47.94,55.20)	62.07 (43.28,80.85)	51.24 (47.24,55.24)	45.25 (41.53,48.95)	41.33 (37.10 45.55)	45.71 (41.11,50.31)	55.56 (15.04,96.06)	33.33 (27.50,39.15)
Rural	51.16 (48.34 53.99)	53.39 (50.32 56.46)	48.43 (44.79, 52.05)	37.93 (19.15,56.72)	48.76 (44.75,52.75)	54.75 (51.04,58.46)	58.67 (54.44, 62.89)	54.29 (49.69, 58.89)	44.44 (3.93,84.95)	66.67 (60.84,72.49)
Gender										
Male	98.59 (97.92, 99.26)	98.53 (97.78, 99.26)	99.32 (98.72, 99.91)	96.55 (89.49,100.0)	98.51 (57.53,99.74)	97.83 (96.75 98.92)	97.33 (95.95 98.71)	99.12 (98.26 99.98)	88.89 (63.26,100.0)	98.04 (96.32,99.75)
Female	1.41 (0.74, 2.07)	1.47 (0.73, 2.21)	0.68 (0.09,1.28)	3.45 (3.61,10.51)	1.49 (0.21,2.46)	2.16 (1.07 3.24)	2.67 (1.29 4.05)	0.88 (0.081 1.74)	11.11 (10.51,36.73)	1.96 (0.24,3.67)
Age(yrs)*	35.63(0.22)	35.84(0.25)	35.08(0.28)	33.25(1.30)	34.49(0.33)	35.97(0.29)	36.30(0.33)	36.03(0.37)	34.59(2.07)	35.07(0.52)
Educational level										
No formal schooling	42.85 (40.05,45.65)	44.93 (41.87,47.99)	38.57 (35.04,42.11)	31.03 (13.12,48.94)	42.45 (38.49,46.41)	47.98 (44.25,51.70)	51.42 (47.13,55.71)	43.51(38.94,48 .08)	33.33 (5.10,71.76)	45.88 (39.72,52.03)
Less than primary school completed	18.52 (16.32, 20.71)	16.81 (14.51,19.11)	19.42 (16.55,22.30)	17.24 (2.61,31.86)	17.91 (14.84, 20.97)	17.43 (14.60,20.26)	16.19 (13.02,19.35)	19.34 (1569,22.98)	22.22 (11.67, 56.11)	15.68 (11.19,20.18)
Primary School Completed	8.97 (7.35 10.58)	9.34 (7.54,11.13)	8.75 (6.70,10.80)	17.24 (2.61, 31.86)	10.94 (8.44,13.44)	8.78 (6.67,10.90)	8.76 (6.33,11.18)	8.57 (5.98,11.15)	11.11 (10.11,36.73)	12.15 (8.11,16.19)
Less than secondary school completed	17.10 (14.97,19.23)	16.91 (14.60,19.22)	18.60 (15.77,21.43)	10.34 (1.44, 22.13)	17.74 (14.68,20.80)	15.56 (12.85,18.26)	13.90 (10.93,16.87)	17.80 (14.27,21.33)	--	17.64 (12.93, 22.35)
Secondary school completed	5.89 (4.56, 7.22)	5.50 (4.10,6.91)	6.83 (5.00,8.67)	3.44 (3.61,10.51)	5.63 (3.79,7.48)	3.89 (2.44,5.33)	3.23 (1.71,4.75)	4.39 (2.50,6.28)	--	5.09 (2.38,7.81)
High school completed	2.49 (1.60, 3.37)	2.26 (1.34,3.17)	2.87 (1.65,4.08)	3.44 (3.61,10.51)	1.82 (.75,2.89)	2.44 (1.29,3.60)	2.47 (1.14,3.80)	1.97 (0.69,3.26)	--	1.56 (0.03,3.10)
College/University Completed	4.15 (3.02, 5.28)	4.22 (2.98,5.46)	4.92 (3.35,6.49)	17.24 (2.61,31.86)	3.48 (2.01,4.95)	3.89 (2.44,5.33)	4.00 (2.31,5.68)	4.39 (2.50,6.28)	33.33 (5.10,71.76)	1.96 (0.24,3.67)

Socio-economic and demographic variables	Marketing policy **									
	Cigarettes					Bidi				
	Advertisement			Sport or promotion event	Other promotions	Advertisement			Sport or promoting events % (95% CI)	Other promotion % (95%CI)
	Anywhere % (95% CI)	In store % (95% CI)	Other than store % (95% CI)			Anywhere % (95% CI)	In store % (95% CI)	Other than store % (95% CI)		
and /higher										
Occupation										
Employment (Government, Non-Government)	12.04 (10.20 13.88)	11.30 (9.35,13.25)	13.95 (11.43,16.47)	17.24 (2.61,31.86)	10.44 (7.99,12.89)	10.08 (7.84,12.33)	9.33 (6.83,11.82)	11.20 (8.29,14.11)	11.11 (10.51, 36.73)	6.27 (3.27,9.27)
Business (small, large)	23.17 (20.78 25.55)	23.20 (20.60,25.80)	23.80 (20.70,26.89)	13.79 (0.44, 27.14)	25.37 (21.89,28.85)	21.46 (18.40,24.53)	21.14 (17.63,24.64)	21.31 (17.54,25.09)	11.11 (10.51, 36.73)	26.27 (20.83,31.71)
Farming (land owner & farmer)	18.18 (16.00 20.37)	18.87 (16.46,21.28)	17.51 (14.74,20.27)	31.03 (13.12, 48.94)	18.24 (15.15,21.33)	19.45 (16.50,22.40)	20.95 (17.45,24.44)	20.00 (16.31,23.68)	33.33 (5.10,71.76)	23.52 (18.28,28.77)
Agricultural / Industrial worker/ daily laborer/Other self- employed	35.04 (32.35 37.74)	35.49 (32.55,38.44)	34.47 (30.01,37.92)	20.68 (5.00,36.37)	33.00 (29.23,36.76)	37.89 (34.27,41.51)	38.85 (34.67,43.04)	37.36 (32.90,41.82)	22.22 (11.67,56.11)	32.15 (26.38,37.92)
Homemaker/Housework	0.91 (0.37, 1.45)	0.98 (0.37,1.59)	0.27 (0.10,0.65)	--	0.82 (0.10,1,55)	1.29 (0.45,2.14)	1.71 (0.60,2.82)	0.22 (0.21,0.65,)	--	1.17 (0.15,2.50)
Retired and unemployed (able to work/unable to work)	3.32 (2.30 4.33)	2.55 (1.58,3.52)	3,55 (2,21,4.90)	6.89 (2.91,16.70)	3.31 (1.88,4.75)	2.73 (1.52,3.95)	1.52 (0.47,2.57)	3.07 (1.48,4.66)	11.11 (10.51, 36.73)	2.35 (4.79,4.22)
Student/Other	7.30 (5.83 8.78)	7.57 (5.94,9.19)	6.42 (4.64,8.21)	10.34 (1.44, 22.13)	8.78 (6.52,11.05)	7.06 (5.14,8.97)	6.47 (4.36,8.58)	6.81 (4.48, 9.13)	11.11 (10.51, 36.73)	8.23 (4.83,11.63)
Wealth index										
Lowest	20.51 (18.23, 22.79)	20.84 (18.34,23.34)	19.15 (16.29,22.01)	10.34 (1.44,22.13)	20.89 (17.64,24.14)	21.61 (18.54,24.68)	21.33 (17.81,24.84)	21.31 (17.54,25.09)	11.11 (10.51, 36.73)	20.78 (15.77, 25.89)
Low	26.91 (24.40, 29.41)	26.84 (24.11,29.57)	25.58 (22.41,28.75)	31.03 (13.12,48.94)	24.87 (21.41,28.33)	28.38 (25.02,31.74)	28.95 (25.05,32.84)	26.15 (22.10,3020)	11.11 (10.51, 36.73)	25.49 (20.10,30.87)
Middle	18.43 (16.24 20.63)	19.17 (16.75,21.59)	18.60 (15.77,21.43)	13.79 (0.44,27.14)	19.73 (16.54,22.92)	18.01 (15.14,20.87)	18.47 (15.14, 21.80)	19.34 (15.69,22.98)	22.22 (11.67,56.11)	24.31 (19.01,29.61)

Socio-economic and demographic variables	Marketing policy **									
	Cigarettes					Bidi				
	Advertisement			Sport or promotion event	Other promotions	Advertisement			Sport or promoting events	Other promotion
	Anywhere % (95% CI)	In store % (95% CI)	Other than store % (95% CI)			Anywhere % (95% CI)	In store % (95% CI)	Other than store % (95% CI)	% (95% CI)	% (95%CI)
High	20.34 (18.07, 22.62)	19.56 (17.12,22.00)	20.79 (17.84,23.74)	20.68 (5.00,36.37)	21.22 (17.95,24.50)	19.74 (16.77,22.70)	20.19 (16.74,23.63)	19.78 (16.10, 34.54)	11.11 (10.51, 36.73)	21.17 (16.12,26.22)
Highest	13.78 (11.83,15.73)	13.56 (11.46,15.67)	15.86 (13.21,18.52)	24.13 (7.57,40.70)	17.26 (10.55,15.98)	22.24 (9.80,14.69)	11.04 (8.35,13.73)	13.40 (10.64, 16.54)	44.44 (3.93,84.95)	8.23 (4.83,11.63)

*Mean with SD is reported.

-- No observation found

** In the last 30 days, have been noticed any advertisements or signs promoting tobacco products that encouraged respondent to tobacco use.

Table 5.4.1c reports the percentage of awareness policy towards smokeless tobacco use. The percentage of smokeless tobacco marketing among urban and rural respondent who noticed advertising in anywhere, store, or other than store in the preceding 30 days which encouraged them in tobacco using are (45.69 % and 54.31%), (44.73 % and 55.27) and (44.72 % and 55.28%) respectively and they promoted by sport is (33.33% and 66.67%) and other than sport is (36.91%. and 60.09%). Again the percentage of smokeless tobacco marketing policy among male and females respondent who noticed advertising in anywhere, store, or other than store in the preceding 30 days which encouraged them in tobacco using are (55.15 % and 44.84%), (49.82 % and 50.18) and (69.34 % and 30.66%) respectively and they promoted by sport is (66.67% and 33.33%) and other than sport is (67.85%. and 32.14%) respectively. Awareness of smokeless tobacco marketing policy in Bangladesh is more common among males in rural area than in urban area. The awareness of smokeless tobacco product marketing policy advertisement depends on education level. The awareness of smokeless tobacco use decreased with increasing level of education. The percentage of no formal schooling, less than primary, primary completed, less than secondary, secondary, high school and higher degree completed respondents who noticed smokeless tobacco product advertising in anywhere are (52.64 % , 16.71%, 10.58%, 11.97%, 3.34%, 3.06% and 1.67%), store (54.91 %, 16.00%, 9.45%, 10.54%,4.00% , 3.63% and 1.45) or other than store (46.73%, 17.08%, 12.56 %, 13.56%, 5.52%, 2.51% and 2.01%) respectively in the preceding 30 days, they promoted by sport are (66.67% , 0.00%, 33.33%, 0.00%, 0.00%, 0.00%

and 0.00%) and other than sport is (46.42%, 16.67%, 13.09%, 13.09%, 4.76%, 3.57% and 2.38%) respectively.

Table 5.4.1c: Comparing various cofactors to marketing policy

Socio-economic and demographic variables	Marketing policy**				
	Advertisement			Sport or promoting event % (95% CI)	Other promotion % (95% CI)
	Anywhere % (95% CI)	In store % (95% CI)	Other than store % (95% CI)		
Residence					
Urban	45.69 (40.50, 50.85)	44.73 (38.81 50.64)	44.72 (37.75, 51.69)	33.33 (0.00, 100.76)	36.91 (26.36,47.43)
Rural	54.31 (49.14, 59.49)	55.27 (49.35,61.18)	55.28 (48.31,62.24)	66.67 (0.00,200.10)	60.09 (52.56, 73.63)
Gender					
Male	55.15 (49.98 60.32)	49.82 (43.87,55.76)	69.34 (62.88,75.80)	66.67 (0.00,200.10)	67.85 (57.66,78.06)
Female	44.84 (39.67, 50.01)	50.18 (44.23,56.12)	30.65 (24.19, 37.11)	33.33 (0.00, 100.76)	32.14 (21.94, 42.34)
Age(yrs)*	36.41(0.38)	36.57(0.45)	36.77(0.52)	30.80(2.19)	35.85(0.81)
Educational level					
No formal schooling	52.64 (47.45,57.83)	54.91 (48.99,60.83)	46.73 (39.74,53.72)	66.67 (0.00,200.10)	46.42 (35.54,57.31)
Less than primary school completed	16.71 (12.83,20.59)	16.00 (11.63,20.36)	17.08 (11.81,22.36)	--	16.67 (8.53,24.80)
Primary School Completed	10.58 (7.38,13.78)	9.45 (5.97,12.93)	12.56 (7.91,12.20)	33.33 (0.00, 100.76)	13.09 (5.73,20.46)
Less than secondary school completed	11.97 (8.60,15.35)	10.54 (6.89. 14.19)	13.56 (8.76,18.36)	--	13.09 (5.73,20.46)
Secondary school completed	3.34 (1.47,5.21)	4.00 (1.66,6.33)	5.52 (2.32, 8.73)	--	4.76 (0.11,9.411)
High school completed	3.06 (1.27,4.85)	3.63 (1.41,5.86)	2.51 (0.31,4.70)	--	3.57 (0.00,7,62)
College/University Completed and /higher	1.67 (0.33,3.00)	1.45 (0.03,2.87)	2.01 (0.04,3.97)	--	2.38 (0.00,5.70)
Occupation					
Employment (Government, Non-Government)	8.35 (5.48,11.23)	6.18 (3.31,9.04)	11.55 (7.07,16.03)	33.33 (0.00,100.76)	5.95 (7.86,11.11)
Business (small, large)	12.53 (9.09,15.97)	10.90 (7.20,14.61)	15.07 (10.06,20.08)	--	10.71 (3.96, 17.46)
Farming (land owner & farmer)	12.53 (9.09,15.97)	12.36 (8.44,16.27)	14.57 (9.62,19.51)	--	21.42 (12.47, 30.38)
Agricultural / Industrial worker/ daily laborer/Other self- employed	25.06 (20.56,29.57)	24.36 (19.25,29.46)	28.14 (21.83,34.44)	33.33 (0.00,100.76)	23.80 (14.51,33.10)
Homemaker/Housework	32.59 (27.71,37.46)	37.45 (31.69,43.21)	21.60 (15.84, 27.37)	33.33 (0.00,100.76)	23.80 (14.51,33.10)
Retired and unemployed (able to work/unable to work)	3.89 (1.88,5.91)	3.63 (1.41,5.86)	5.02 (1.96,8.08)	--	35.71 (0.00,7.62)
Student/Other	5.01 (2.74,7.28)	5.09 (2.47,7.70)	4.02 (1.26,6.77)	--	10.71 (3.96,17.46)
Wealth index					
Lowest	26.18 (21.61,30.75)	25.81 (20.61,31.02)	21.10 (15.38, 25.62)	33.33 (0.00,100.76)	16.67 (8.53,24.80)

Socio-economic and demographic variables	Marketing policy**				
	Advertisement			Sport or promoting event % (95% CI)	Other promotion % (95% CI)
	Anywhere % (95% CI)	In store % (95% CI)	Other than store % (95% CI)		
Low	25.62 (21.08,30.16)	25.09 (19.93,30.24)	24.12 (18.12, 30.11)	33.33 (0.00,100.76)	21.42 (12.47,30.38)
Middle	20.05 (15.89,24.21)	20.72 (15.90, 25.54)	23.11 (17.20,29.02)	--	32.14 (21.94, 42.33)
High	18.10 (14.10,22.10)	18.18 (13.59,22.76)	20.60 (14.93,26.27)	33.33 (0.00.10,100.76)	15.47 (7.58, 23.37)
Highest	10.02 (6.90,13.14)	10.18 (6.58, 13.77)	11.05 (6.66,15.44)	--	14.28 (6.64,21.92)

*Mean with SD is reported.
-- No observation found
**In the last 30 days, have been noticed any advertisements or signs promoting tobacco products that encouraged respondent to tobacco use.

By the occupations, the percentage of Employer (Government, Non-Government) who noticed smokeless tobacco product advertising in anywhere, store, or other than store in the preceding 30 days are 8.35%, 6.18% and 11.55% respectively and they promotion by sport is 33.33% and other than sport is 5.95%. And the percentage of business man (small, large) who noticed smokeless tobacco product advertising in anywhere, store, or other than store in the preceding 30 days are 12.53 %, 10.90% and 15.07% respectively and they promoted by other than sport is 10.71% (Table 5.4.1c). Again the percentage of farmer (land owner & farmer) who noticed smokeless tobacco product advertising in anywhere, store, or other than store in the preceding 30 days are 12.53 %, 12.36% and 14.57% respectively and they promoted by other than sport is 21.42%. And the percentage of agricultural / industrial worker/ daily laborer/other self- employed who noticed smokeless tobacco product advertising in anywhere, store, or other than store in the preceding 30 days are 25.06 %, 24.36% and 28.14% respectively and they promoted by sport is 33.33% and other than sport is 33.80% (Table 5.4.1c). And for the percentage of

homemaker/housework who noticed smokeless tobacco product advertising in anywhere, store, or other than store in the preceding 30 days are 32.59 %, 37.45% and 10.60% respectively and they promoted by sport is 33.33% and other than sport is 23.80%. And the percentage of retired and unemployed (able to work/unable to work) who noticed smokeless tobacco product advertising in anywhere, store, or other than store in the preceding 30 days are 3.89 %, 3.63% and 5.02% respectively and they promoted by other than sport is 35.71% .

And lastly for the percentage of student/other who noticed smokeless tobacco product advertising in anywhere, store, or other than store in the preceding 30 days are 5.01 %, 5.09% and 4.02% respectively and they promoted by other than sport is 10.71%. So persons who were homemaker/housework or agricultural / industrial worker/ daily laborer/other self- employed have been taken highest awareness of smokeless tobacco product marketing advertising in anywhere, store, and other than store followed by other employed.

The awareness of daily smokeless tobacco product use, the percentage of low wealth index respondents who noticed smokeless tobacco product advertising in anywhere, store, or other than store in the preceding 30 days are 26.18 %, 25.81% and 21.10% respectively and they promoted by sport is 33.33% and the other than sport is 16.67%. And the percentage of low wealth index respondents who noticed smokeless tobacco product advertising in anywhere, store, or other than store in the preceding 30 days are 25.62 %, 25.09% and 24.12% respectively and they promoted by sport is 33.33% and other than sport is 21.42%. The percentage of middle wealth index respondents who noticed

smokeless tobacco product advertising in anywhere, store, or other than store in the preceding 30 days are 20.05 %, 20.72% and 23.11% respectively and they promoted only by other than sport is 32.14%. And the percentage of high wealth index respondents who noticed smokeless tobacco product advertising in anywhere, store, or other than store in the preceding 30 days are 18.10 %, 18.18% and 20.60% respectively and they promoted by sport is 33.33% and other than sport is 15.47% (Table 5.4.1c).

And finally the percentage of highest wealth index respondents who noticed smokeless tobacco product advertising in anywhere, store, or other than store in the preceding 30 days are 10.02 %, 10.18% and 11.05% respectively and they promoted only by other than sport is 14.22%.

5.5 Conclusion

Knowledge of health consequences of tobacco smoking, smokeless tobacco user and exposure to secondhand smoke (SHS) has been analyzed in this chapter. According to their knowledge, the most common health consequences of tobacco smoking are serious illness (96.61%), lung cancer (94.24%), strokes (85.88%) and heart attacks (88.43%). On the other hand, among the smokeless tobacco user 91.05% belief that smokeless tobacco use causes serious illness, 81.68% causes lunch cancer, 97.60% causes stroke, and71.42% causes heart attack. Among the secondhand smoker 97.60% belief that it causes serious illness. For all kind of smokers it has been found that educated respondents are more knowledgeable than less educated people. Respondent's occupation also has

been significantly associated with tobacco use. The odds ratios imply that respondent of low wealth index are more likely to be knowledgeable than the respondent of lowest wealth. It may be necessary to implement the program more to understand the adverse effect of tobacco smoking targeting specific subgroups including non-smokers with low education, who are agricultural / Industrial worker/ daily laborer/other self- employed, farming or retired and unemployed and their wealth index is middle, high and highest.

CHAPTER SIX

CORRELATES OF KNOWLEDGE AND AWARENESS POLICY OF TOBACCO USE BY LOGISTIC REGRESSION MODEL

6.1 Introduction

In the previous chapter knowledge about adverse health effects of tobacco use and attitude towards tobacco use have been analysed. Awareness policy has been analysed, too. In that chapter, percentage with 95% confidence interval has been reported for categorical data and mean with standard deviation (SD) has been reported for continuous data.

In this chapter we have identified correlates of knowledge and awareness policy of tobacco use. For that we have used binary logistic regression model. Logistic regression is very useful for situation in which we want to be able to predict the presence or absence of a characteristic or out come to bare on values of a set of predictor variables. It is similar to linear regression but is suitable to mode where the variable is dichotomous and the independent variable may be either dummy or categorical. After modeling Odds Ratio (OR) with 95% confidence interval has been reported. We have performed ROC analysis to check the prediction accuracy of the model.

6.2 Correlates of knowledge about effect of tobacco use in Bangladesh using binary logistic regression

In this analysis we have considered residence, gender, age, education level, occupation, wealth index and current tobacco use as independent variables. Results have been summarized in Table 6.2.1.

Table: 6.2.1 Identifying predictors of knowledge about effect of tobacco use in Bangladesh using binary logistic regression.

Socio- demographic and economic variables	Knowledge about effect of Tobacco Smoking* OR (95% CI)	Knowledge about effect of Smokeless tobacco use* OR (95% CI)	Knowledge about effect of SHS* OR (95% CI)
Tobacco use	0.57(0.35, 0.94)	1.00(0.68,1.47)	1.57(0.95,2.61)
Residence			
Urban(RC)	1.00	1.00	1.00
Rural	1.17(0.77 , 1.79)	0.68(0.47, 0.99)	0.75(0.45,0.98)
Gender			
Male (RC)	1.00	1.00	1.00
Female	0.89(0.44, 1.79)	0.62(0.33,1.13)	0.59(0.28, 0.89)
Age	0.99(0.97, 1.00)	0.99(0.98,1.00)	0.98(0.96,1.00)
Education			
No formal schooling(RC)	1.00	1.00	1.00
Less than primary school completed	1.20(0.69, 2.08)	1.29(0.80,2.05)	0.76(0.40,1.46)
Primary School Completed	2.17(0.95, 4.89)	1.57(0.87, 2.82)	0.79(0.37,1.69)
Less than secondary school completed	1.76(0.92 3.36)	2.04(1.13,3.68)	1.11(0.51,2.43)
Secondary school completed	1.33(0.54 3.26)	3.09(0.92,10.45)	1.41(0.38,5.14)
High school completed	1.11(0.41, 2.98)	5.43(0.70,41.79)	--
College/University Completed and /higher	0.88(0.36 , 2.18)	5.18(0.64,41.91)	0.33(0.10,1.06)
Occupation			
Employment (Government, Non-Government) (RC)	1.00	1.00	1.00
Business (small, large)	1.13(0.51 2.52)	0.55(0.18,1.61)	1.01(0.32,2.58)
Farming (land owner & farmer)	0.78(0.33, 1.84)	0.86(0.27,2.79)	1.57(0.44,5.57)
Agricultural / Industrial worker/ daily laborer/Other self-employed	0.98(0.44, 2.15)	0.73(0.26,2.01)	1.49(0.52,4.28)

Socio- demographic and economic variables	**Knowledge about effect of Tobacco Smoking* OR (95% CI)**	**Knowledge about effect of Smokeless tobacco use* OR (95% CI)**	**Knowledge about effect of SHS* OR (95% CI)**
Homemaker/Housework	1.13(0.48, 2.62))	0.83(0.30,2.30)	1.01(0.37,2.63)
Retired and unemployed (able to work/unable to work)	0.79(0.31, 2.02)	0.42(0.13,1.34)	1.61(0.30,8.42)
Student/Other	1.88(0.65, 5.47)	2.32(0.54,9.96)	0.41(0.15,1.08)
Wealth index			
Lowest (RC)	1.00	1.00	1.00
Low	1.10(0.60, 2.00)	1.10(0.72,1.69)	1.94(1.00,3.87)
Middle	0.81(0.44, 1.48)	1.73(1.01,2.97)	1.34(0.71,2.53)
High	0.96(0.51, 1.83)	1.39(0.82,2.35)	4.09(1.72,9.70)
Highest	0.69(0.33, 1.43)	2.05(0.93,4.50)	3.87(1.43,10.44)
P-value from Hosmer-Lemeshow goodness of fit test	0.7053	0.6762	0.8706
AUC	0.6555	0.7074	0.7326

RC: Reference category.

*Any kind of adverse effect.

-- Data not available.

AUC: Area under the ROC curve

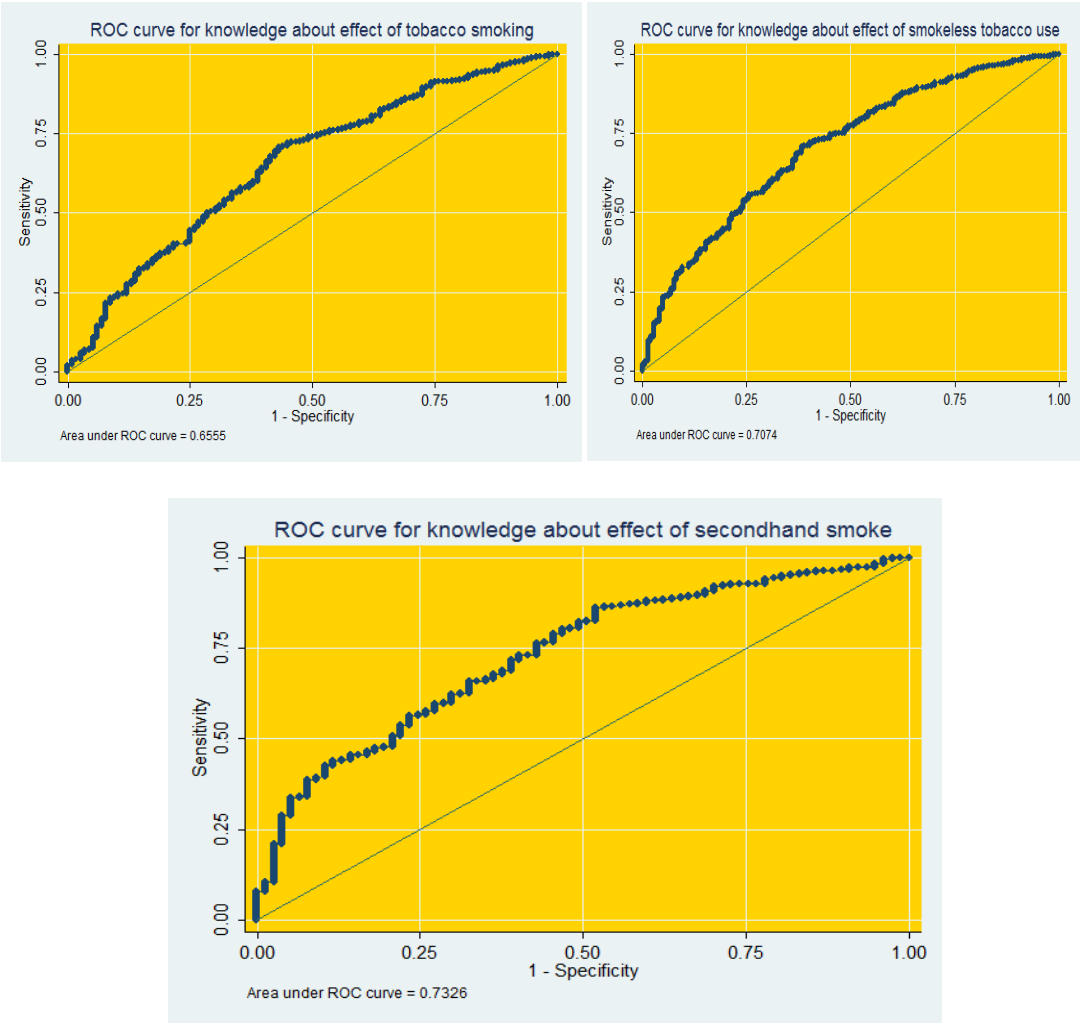


Figure 6.2.1: AUC for prediction accuracy

From Table 6.2.1 for current tobacco smoking, it has been found that tobacco smokers are 0.57 times less likely knowledgeable about the adverse effect of tobacco smoking than non-smokers (OR=0.57, 95% CI=0.35, 0.94) and they are statistically significant. Rural respondents are 1.17 times more likely knowledgeable about the health consequences of tobacco smoking than urban respondents (OR=1.17, 95% CI=0.77, 1.79) and they are statistically insignificant. Female respondents are 0.89 times less likely knowledgeable about the health consequences of tobacco smoking than male respondents

(OR=0.89, 95% CI=0.44, 1.79). Education has been found to have effect on the knowledge in specific pattern smoking tobacco. The odds ratio for less than primary school completed, primary school completed, less than secondary school completed, secondary school completed and high school completed are OR=1.20, 95% CI= 0.69, 2.08; OR=2.17, 95% CI=0.95, 4.89; OR=1.76, 95% CI= 0.92, 3.36; OR=1.33, 95% CI= 0.54, 3.26 ; and OR=1.11, 95% CI= 0.41, 2.98 respectively implying that they are 1.20 times, 2.17 times, 1.76 times, 1.33 times and 1.11 times more likely to knowledgeable about the adverse effect of tobacco smoking than those respondents having no formal schooling. And the odds ratio for college/university completed and /higher is OR=0.88, 95% CI= 0.36, 2.18 implying that they are 0.88 times less likely to be knowledgeable about the adverse effect of tobacco smoking than those respondents having no formal schooling. The odds ratio for business man (small, large), homemaker/housework and student/other are OR=1.13, 95% CI= 0.51, 2.52; OR=1.13, 95% CI= 0.48, 2.62; and OR=1.88, 95% CI= 0.65, 5.47 respectively implying that they are 1.13 times, 1.13 times and 1.88 times more likely to be knowledgeable about the adverse effect of tobacco smoking than those respondents are employers (Government, Non-Government). Again the odds ratio for farmer (land owner & farmer), agricultural / Industrial worker/ daily laborer/other self- employed and retired and unemployed (able to work/unable to work) are OR=0.78, 95% CI= 0.33, 1.84; OR=0.98, 95% CI= 0.44, 2.15 and OR=0.79 95% CI= 0.31, 2.02 respectively implying that 0.78

times, 0.98 times and 0.79 times less likely to be knowledgeable than those respondents are employers (Government, Non-Government).

From Table 6.2.1, it has been also found that respondents of low wealth index are 1.10 times more likely knowledgeable about the health consequences of tobacco smoking than respondents of lowest wealth index (OR=1.10, 95% CI= 0.60, 2.00) and they are statistically insignificant. The odds ratio for respondents of middle wealth index, high wealth index and highest wealth index are OR=0.81, 95% CI= 0.44, 1.48; OR=0.96, 95% CI=0.51, 1.83 and OR=0.69, 95% CI=0.33, 1.43 respectively implying that 0.78 times, 0.98 times and 0.79 times less likely to be knowledgeable about the health consequences of tobacco smoking than respondents of lowest wealth index.

We have performed the ROC analysis to check the prediction accuracy and computed value of AUC. The p-value of Hosmer-Lemeshow goodness of fit is 0.7053 which is greater than 0.05 implying that the model's estimates fit the data at an acceptable level. And AUC = 0.6555 indicates that the prediction accuracy of model is well.

From Table 6.2.1we have found that smokeless tobacco users are equally knowledgeable about the adverse effect of smokeless tobacco use (OR=1.00, 95% CI=0.68, 1.47) to non-users. Rural respondents are 0.68 times less knowledgeable about the health consequences of smokeless tobacco use than urban respondents (OR=0.68, 95% CI=0.47, 0.99) and they are statistically significant. Female respondents are 0.62 times less knowledgeable about the

health consequences of smokeless tobacco use than male respondents (OR=0.62, 95% CI=0.33, 1.13) and they are statistically insignificant. Education has been found to have effect on the knowledge in specific pattern smokeless tobacco use. The odds ratio for less than primary school completed, primary school completed, secondary school completed, high school completed and college/university completed and /higher are OR=1.29, 95% CI= 0.80, 2.05; OR=1.57, 95% CI=0.87, 2.82; OR=3.09, 95% CI= 0.92, 10.45; OR=5.43, 95% CI= 0.70, 41.79 ; and OR=5.18, 95% CI= 0.64, 41.91 respectively implying that they are 1.29 times, 1.57 times, 3.09 times, 5.43 times and 5.18 times more likely to be knowledgeable about the adverse effect of smokeless tobacco use than those respondents having no formal schooling. And the odds ratio for secondary school completed is OR=2.04, 95% CI= 1.13, 3.68 implying that they are 2.04 times more likely to knowledgeable about the adverse effect of smokeless tobacco use than those respondents having no formal schooling and they are statistically significant. The odds ratio for business man (small, large), farmer (land owner & farmer), agricultural/Industrial worker/daily laborer/other self-employed and homemaker /housework are OR=0.55, 95% CI= 0.18, 1.61; OR=0.86, 95% CI= 0.27, 2.79; OR=0.73, 95% CI= 0.26, 2.01; OR=0.83, 95% CI= 0.30, 2.0; and OR=0.42, 95% CI= 0.13, 1.34 respectively implying that they are 0.55 times, 0.86 times , 0.73 times, 0.83 times and 0.42 times less likely to be knowledgeable about the adverse effect of smokeless tobacco use than those respondents are employers (Government, Non-Government) and they are not

statistically significant. And the odds ratio for student/other is OR=2.32, 95% CI= 0.54, 9.96 implying that they are 2.32 times more likely to be knowledgeable about the adverse effect of smokeless tobacco use than those respondents are employers (Government, Non-Government). It has been also found that respondents of middle wealth index are 1.73 times more knowledgeable about the health consequences of smokeless tobacco use than respondents of lowest wealth index (OR=1.73, 95% CI= 1.01, 2.97) and they are statistically significant. The odds ratio for respondents of low, high and highest wealth index are OR=1.10, 95% CI= 0.72, 1.69; OR=1.39, 95% CI=0.82, 2.35 and OR=2.05, 95% CI=0.93, 4.50 respectively implying that 1.10 times, 1.39 times and 2.05 times more likely to be knowledgeable about the health consequences of smokeless tobacco use than respondents of lowest wealth index.

We have performed the ROC analysis to check the prediction accuracy and computed value of AUC. The p-value of Hosmer-Lemeshow goodness of fit is 0.6762 which is greater than 0.05 implying that the model's estimates fit the data at an acceptable level. And AUC = 0.7074 indicates that the prediction accuracy of model is well.

For secondhand smoking, it has been found that secondhand smokers are 1.57 times more likely to be knowledgeable about the adverse effect of secondhand smoking than their counter parts (OR=1.57, 95% CI= 0.95, 2.61) and they are statistically significant. Rural respondents are 0.75 times less likely to be knowledgeable about the adverse effect of secondhand smoking than urban

respondents (OR=0.75, 95% CI=0.45, 0.98) and they are statistically significant. Female respondents are 0.59 times less to be knowledgeable about the health consequences of secondhand smoking (OR=0.59, 95% CI=0.28, 0.89) than male respondents and they are statistically significant. The odds ratio for less than primary school completed, primary school completed, and college/university completed and /higher are OR=0.76, 95% CI= 0.40, 1.46; OR=0.79, 95% CI=0.37, 1.69; and OR=0.33, 95% CI= 0.10, 1.06; respectively implying that they are 0.76 times, 0.79 times and 0.33 times less likely to be knowledgeable about the adverse effect of secondhand tobacco use than those respondents having no formal schooling and they are statistically insignificant. And again the odds ratio for less than secondary school completed and secondary school completed are OR=1.11, 95% CI= 0.51, 2.43; and OR=1.41, 95% CI=0.38, 5.14; respectively implying that they are 1.11 times and 1.41 times more likely to be knowledgeable about the adverse effect of secondhand tobacco use than those respondents having no formal schooling and they are statistically insignificant.

The odds ratio for business man (small, large), farmer (land owner & farmer), agricultural/Industrial worker/ daily laborer/other self- employed homemaker/housework and Retired and unemployed (able to work/unable to work) are OR=1.01, 95% CI= 0.32, 2.58; OR=1.57, 95% CI= 0.44, 5.57; OR=1.49, 95% CI= 0.52, 4.28; OR=1.01, 95% CI= 0.37, 2.63; and OR=1.61, 95% CI= 0.30, 8.42 respectively implying that they are 1.01 times, 1.57 times, 1.49 times, 1.01 times and 1.61 times more likely to be knowledgeable about

the adverse effect of secondhand tobacco use than those respondents are employers (Government, Non-Government) and they are not statistically significant. And the odds ratio for student/other is OR=0.41, 95% CI= 0.15, 1.08 implying that they are 0.41 times less likely to be knowledgeable about the adverse effect of secondhand tobacco use than those respondents are employers (Government, Non-Government) and they are not statistically significant. It has been also found that respondents of low, high and highest wealth index are 1.94 times, 4.09 times and 3.87 times more likely to knowledgeable about the health consequences of secondhand tobacco use than respondents of lowest wealth index (OR=1.94, 95% CI= 1.01, 3.87; OR=4.09, 95% CI= 1.72, 9.70 and OR=3.87, 95% CI= 1.43, 10.44) and they are statistically significant. The odds ratio for respondents of middle wealth index is OR=1.34 , 95% CI= 0.71, 2.53 implying that 1.34 times more likely to knowledgeable about the health consequences of secondhand tobacco use than respondents of lowest wealth index, but they are not statistically significant.

The p value of Hosmer-Lemeshow goodness of fit is 0.8606 which is greater than 0.05 implying that the model's estimates fit the data at an acceptable level. And AUC = 0.7326 indicates that the prediction accuracy of model is well.

6.3 Awareness policy of tobacco use in Bangladesh

From a large set of variables (responses to the core questions of GATS as well as country-specific questions), we have selected the relevant variables where information have been consistently collected across the country for this study.

In this section outcome variable is awareness. But, actually model is fitted to opposite of awareness. Therefore, the resulted OR will reflect the opposite of awareness policy. For example, in case of tobacco smoking, the response variable is marketing policy which is coded as 1 if the respondent observed (i) advertisements or signs promoting cigarettes or bidi and (ii) sponsorship of cigarette or bidi company in sporting events in the preceding 30 days which inspired them to use smoking tobacco and "0" otherwise.

Again marketing policy for smokeless tobacco use is coded as "1" if the respondent observed (i) advertisements or signs promoting smokeless tobacco and (ii) sponsorship of smokeless tobacco company in sporting events in the preceding 30 days which inspired them to use smokeless tobacco and "0" otherwise.

Furthermore, in case of secondhand smokers, smoking policy at home referred as 1, if smoking is allowed at home and 0 otherwise.

Similarly, smoking policy at job place referred as 1, if smoking is allowed at job place and 0 otherwise.

From Table 6.3.1a for tobacco smoking, it has been found that tobacco smokers are 1.25 times more likely to be inspired by the marketing policy in preceding 30 days to smoke than their counter parts (OR=1.25, 95% CI=1.10, 1.42) and they are statistically significant. Rural respondents are 1.17 times more inspired to smoke (OR=1.17, 95% CI=1.06, 1.30) than urban respondents and they are statistically significant. Female respondents are 0.24 times less inspired to smoke (OR=0.24, 95% CI=0.20, 0.28) than male respondents and they are

statistically significant. The odds ratio for primary school completed, less than secondary school completed, high school completed and college/university completed and /higher are OR=1.25, 95% CI=1.07, 1.46; OR=1.24, 95% CI=1.08, 1.43; OR=1.42, 95% CI=1.15, 1.74; OR=1.49 , 95% CI=1.17,1.90; and OR=1.65 , 95% CI=1.28, 2.11; respectively implying that they are 1.25 times, 1.24 times, 1.42 times, 1.49 times and 1.65 times more likely to be inspired by the marketing policy in preceding 30 days to smoke than those respondent having no formal schooling. Again the odds ratio for less than primary school completed is OR=0.97, 95% CI=0.85, 1.12 implying that there is 0.97 times less likely to be inspired by the marketing policy in preceding 30 days to smoke than those respondent having no formal schooling.

The odds ratio for business man (small, large), agricultural /industrial worker/ daily laborer/other self- employed and student/other are OR=1.55, 95% CI= 1.27, 1.90; OR=1.44, 95% CI= 1.19, 1.76; and OR=1.61, 95% CI= 1.30, 2.00 respectively implying that they are 1.55 times, 1.44 times and 1.61 times more likely to be inspired by the marketing policy to smoke than employers (Government, Non-Government) and they are statistically significant. And the odds ratio for Farmer (land owner & farmer) and homemaker/housework are OR=1.15, 95% CI=0.93, 1.44, OR=1.04, 95% CI=0.85,1.27 implying that there are 1.15 and 1.04 times more likely to be inspired by the marketing policy to smoke than employers(Government, Non-Government). Again the odds ratio for retired and unemployed (able to work/unable to work) is OR=0.89, 95% CI=0.68, 1.15 implying that there is 0.89 times less likely to be inspired by the

marketing policy to smoke than employers (Government, Non-Government). It has been also found that respondents of low and middle wealth index are 1.09 times and 1.12 times more likely to be inspired by the marketing policy to smoke than respondents of lowest wealth index (OR=1.09, 95% CI= 0.94, 1.26 and OR=1.12, 95% CI= 0.96, 1.31) and they are statistically insignificant. The odds ratio for respondents of high wealth index is OR=1.18, 95% CI= 1.02, 1.38 implying that respondents of high wealth index are 1.18 times more likely to be inspired by the marketing policy to smoke than respondents of lowest wealth index. On the other hand the odds ratio for respondents of highest wealth index is OR=0.99, 95% CI= 0.83, 1.19 implying that respondents of highest wealth index are 0.99 times less likely to be inspired by the marketing policy to smoke than respondents of lowest wealth index. The p-value of Hosmer-Lemeshow goodness of fit is 0.8394 which is greater than 0.05 implying that the model's estimates fit the data at an acceptable level. And AUC = 0.7342 indicates that the prediction accuracy of model is well.

Table: 6.3.1a Identifying correlates of smoking policy of tobacco use in Bangladesh using binary logistic regression.

Socio- demographic and economic variables	Marketing policy for Tobacco Smoking OR (95% CI)	Marketing policy for Smokeless Tobacco Use OR (95% CI)
Tobacco use	1.25(1.10,1.42)	1.31(1.14, 1.51)
Residence		
Urban(RC)	1.00	1.00
Rural	1.17(1.06, 1.30)	1.15 (1.02, 1.31)
Gender		
Male(RC)	1.00	1.00
Female	0.24(0.20,0.28)	0.63(0.51, 0.77)
Age	0.984(0.980,0.99)	0.993(988, 997)
Education		
No formal	1.00	1.00

Socio- demographic and economic variables	**Marketing policy for Tobacco Smoking OR (95% CI)**	**Marketing policy for Smokeless Tobacco Use OR (95% CI)**
schooling(RC)		
Less than primary school completed	0.97(0.85,1.12)	0.83(0.69,1.00)
Primary School Completed	1.25(1.07, 1.46)	1.08(0.89, 1.32)
Less than secondary school completed	1.24(1.08,1.43)	1.06(0.89,1.28)
Secondary school completed	1.42(1.15,1.74)	1.21(0.93,1.57)
High school completed	1.49(1.17,1.90)	1.53(1.14,2.05)
College/University Completed and /higher	1.65(1.28, 2.11)	1.47(1.07,2.00)
Occupation		
Employment (Government, Non-Government) (RC)	1.00	1.00
Business (small, large)	1.55(1.27,1.90)	1.21(0.95, 1.55)
Farming (land owner & farmer)	1.15(0.93, 1.44)	1.29(0.98, 1.69)
Agricultural / Industrial worker/ daily laborer/Other self-employed	1.44(1.19, 1.76)	1.21(0.95,1.55)
Homemaker/Housework	1.04(0.85,1.27)	1.01(0.77,1.32)
Retired and unemployed (able to work/unable to work)	0.89(0.68,1.15)	0.96(0.68,1.37)
Student/Other	1.61(1.30,2.00)	1.16(0.89,1.52)
Wealth index		
Lowest(RC)	1.00	1.00
Low	1.09(0.94,1.26)	1.07(0.89,1.29)
Middle	1.12(0.96,1.31)	1.21(1.00,1.46)
High	1.18(1.02, 1.38)	1.13(0.93,1.38)
Highest	0.99(0.83, 1.19)	0.89(0.70,1.13)
P-value from Hosmer-Lemeshow goodness of fit test	0.8394	0.6662
AUC	0.7342	0.6031

RC: Reference category.

AUC: Area under the ROC curve

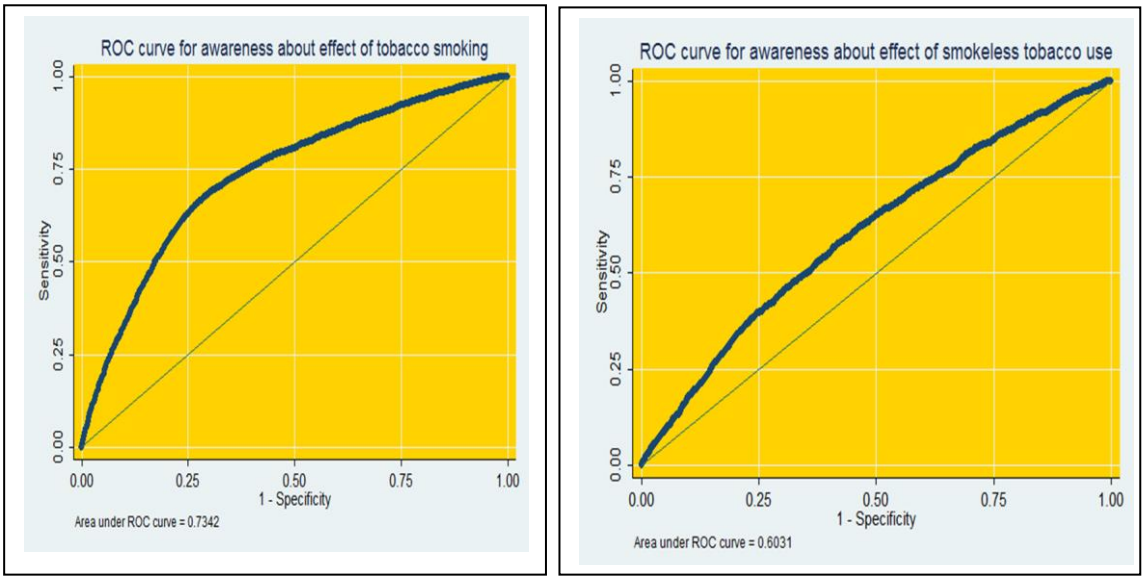


Figure 6.3.1a: AUC for prediction accuracy.

Again from Table 6.3.1a for smokeless tobacco use, it has been found that smokeless tobacco users are 1.31 times more likely to be inspired by the marketing policy in preceding 30 days to use smokeless tobacco product than their counter parts (OR=1.31, 95% CI=1.14, 1.51) and they are statistically significant. Rural respondents are 1.15 times more inspired to use smokeless product than urban respondents (OR=1.15, 95% CI=1.02, 1.31) and they are statistically significant. Female respondents are 0.63 times less inspired to use smokeless tobacco product than male respondents (OR=0.63, 95% CI=0.51, 0.77) and they are statistically significant. The odds ratio for primary school completed, less than secondary school completed, and secondary school completed are OR=1.08, 95% CI=0.89, 1.32; OR=1.06, 95% CI=0.89, 1.28; and OR=1.21, 95% CI=0.93, 1.57 respectively implying that they are 1.08 times, 1.06 times and 1.21 times more likely to be encouraged by the marketing

policy in preceding 30 days to use smokeless tobacco product than those respondent having no formal schooling and they are statistically insignificant. Again the odds ratio for high school completed and college/university completed and /higher are OR=1.53, 95% CI=1.14, 2.05and OR=1.47, 95% CI=1.07, 2.00 respectively implying that they are 1.53 times and 1.47 times more likely to be encouraged by the marketing policy to use smokeless tobacco product than those respondent having no formal schooling and they are statistically insignificant. On the other hand the odds ratio for less than primary school completed respondents is OR=0.83, 95% CI= 0.69, 1.00 implying that 0.83 times less likely to be inspired by the marketing policy to use smokeless tobacco than those respondent having no formal schooling and they are statistically insignificant. The odds ratio for business man (small, large), farmer (land owner & farmer), agricultural /industrial worker/ daily laborer/other self- employed, homemaker/housework and student/other are OR=1.21, 95% CI= 0.95, 1.55; OR=1.29, 95% CI= 0.98, 1.69; OR=1.21, 95% CI= 0.95, 1.55 and OR=1.16, 95% CI= 0.89, 1.52 respectively implying that they are 1.21 times, 1.29 times, 1.21 times and 1.16 times more likely to be inspired by the marketing policy to use smokeless tobacco product than those respondents are employers (Government, Non-Government) and they are statistically insignificant. And the odds ratio for retired and unemployed (able to work/unable to work) is OR=0.96, 95% CI= 0.68, 1.37 implying that they is 0.96 times less likely to be inspired by the marketing policy to use smokeless tobacco product than those respondents are employers (Government, Non-

Government) and they are statistically insignificant. It has been also found that respondents of low and high wealth index are 1.07 times and 1.13 times more likely to be inspired by the marketing policy to use smokeless tobacco product than respondents of lowest wealth index (OR=1.07, 95% CI= 0.89, 1.29; OR=1.13, 95% CI= 0.93, 1.38) and they are statistically insignificant. And the odds ratio for respondents of middle wealth index is OR=1.21, 95% CI= 1.01, 1.46 implying that 1.21 times more likely to be inspired by the marketing policy to use smokeless tobacco product than respondents of lowest wealth index. On the other hand the odds ratio for respondents of highest wealth index is OR=0.89, 95% CI= 0.70, 1.13 implying that 0.89 times less likely to be inspired by the marketing policy to use smokeless tobacco product than respondents of lowest wealth index. The p-value of Hosmer-Lemeshow goodness of fit is 0.6662 which is greater than 0.05 implying that the model's estimates fit the data at an acceptable level. And AUC=0.6031 indicates that the prediction accuracy of model is well.

From Table 6.3.1b we have found that, smoking is 4.85 times more likely to be allowed at home for secondhand smokers than their counter part (OR=4.85, 95% CI=4.13, 5.71) and they are statistically significant. Smoking is 1.18 times more likely to be allowed to smoke at home for rural secondhand smokers than urban secondhand smokers (OR=1.18, 95% CI=1.06, 1.32) and they are statistically significant. Again smoking is 2.74 times more likely to be allowed to smoke at home for female respondents than male respondents (OR=2.74,

95% CI=2.26, 3.32) and they are statistically significant. Based on educational level of the respondents, smoking are 0.78 times, 0.71 times, 0.64 times, 0.56 times, 0.58 times and 0.35 times less likely to be allowed to smoke at home for less than primary school completed, primary school completed, less than secondary school completed, secondary school completed, high school completed and college/university completed and /higher respondents than no formal schooling respondents (OR=0.78, 95% CI= 0.67, 0.90; OR=0.71, 95% CI=0.60, 0.82; OR=0.64, 95% CI= 0.55, 0.75; OR=0.56, 95% CI= 0.44, 0.72; OR=0.58, 95% CI= 0.43, 0.80 and OR=0.35, 95% CI= 0.24, 0.52 respectively) and they are statistically significant. Based on occupations of the respondents, we have found that smoking are 1.12 times, 1.01 times, 1.09 times and 1.03 times more likely to be allowed to smoke at home for business man (small, large), farmer (land owner & farmer), agricultural /industrial worker/ daily laborer/other self- employed and retired and unemployed (able to work/unable to work) than those respondents are employers (Government, Non-Government) (OR=1.12, 95% CI= 0.86, 1.14; OR=1.01, 95% CI= 0.78, 1.37; OR=1.09, 95% CI= 0.85, 1.39 and OR=1.03, 95% CI= 0.73, 1.45 respectively)and they are statistically insignificant. Again the odds ratio for homemaker/housework and student/other are OR=1.36, 95% CI= 1.06, 1.74; and OR=1.57, 95% CI= 1.20, 2.05 respectively implying that smoking are 1.36 times and 1.57 times more likely to be allowed to smoke at home than those respondents are employers (Government, Non-Government) and they are statistically significant.

From Table 6.3.1b, it has been also found that respondents of low, middle and higher wealth index are 0.94 times, 0.92 times and 0.90 times less likely to be allowed to smoke at home than respondents of lowest wealth index (OR=0.94, 95% CI= 0.82, 1.09; OR=0.92, 95% CI= 0.78, 1.07 and OR=0.90, 95% CI= 0.89, 1.07 respectively) and they are statistically insignificant. Again the odds for respondents of highest wealth index is 0.60 implying that 0.60 times less likely to be allowed to smoke at home than respondents of lowest wealth (OR=0.60, 95%CI=0.49, 0.74)and they are statistically significant.

The p-value of Hosmer-Lemeshow goodness of fit is 0.7216 which is greater than 0.05 implying that the model's estimates fit the data at an acceptable level. And AUC=0.6648 indicates that the prediction accuracy of model is well.

Table: 6.3.1b Identifying correlated of awareness policy of tobacco use in Bangladesh using binary logistic regression.

Socio- demographic and economic variables	**Awareness policy for Secondhand Smoking OR (95% CI)**	
	Smoking policy at home	Smoking policy at job place
Tobacco use	4.85(4.13,5.71)	1.70(1.36,2.14)
Residence		
Urban(RC)	1.00	1.00
Rural	1.18(1.06,1.32)	0.80(0.63, 1.01)
Gender		
Male(RC)	1.00	1.00
Female	2.74(2.26,3.32)	0.34(0.22,0.53)
Age	0.99(0.99,1.00)	0.98(0.97, 1.00)
Education		
No formal schooling(RC)	1.00	1.00
Less than primary school completed	0.78(0.67,0.90)	0.70(0.50,0.98)
Primary School Completed	0.71(0.60,0.82)	0.73(0.50, 0.99)
Less than secondary school completed	0.64(0.55,0.75)	0.58(0.41,0.83)
Secondary school completed	0.56(0.44,0.72)	0.56(0.35,0.89)
High school completed	0.58(0.43,0.80)	0.45(0.26,0.78)

Socio- demographic and economic variables	**Awareness policy for Secondhand Smoking OR (95% CI)**	
	Smoking policy at home	Smoking policy at job place
College/University Completed and /higher	0.35(0.24,0.52)	0.26(0.14,0.45)
Occupation		
Employment (Government, Non-Government) (RC)	1.00	1.00
Business (small, large)	1.12(0.86,1.147)	2.96(2.17,4.03)
Farming (land owner & farmer)	1.01(0.78,1.37)	1.97(1.20,3.20)
Agricultural / Industrial worker/ daily laborer/Other self-employed	1.09(0.85,1.39)	2.33(1.67,3.28)
Homemaker/Housework	1.36(1.06,1.74)	2.25(0.79,6.39)
Retired and unemployed (able to work/unable to work)	1.03(0.73,1.45)	--
Student/Other	1.57(1.20,2.05)	1.47(0.90,2.41)
Wealth index		
Lowest(RC)	1.00	1.00
Low	0.94(0.82, 1.09)	0.79(0.53,1.17)
Middle	0.92(0.78,1.07)	1.05(0.70,1.57)
High	0.90(0.89,1.07)	1.03(0.69, 1.55)
Highest	0.60(0.49,0.74)	0.84(0.52,1.33)
P-value from Hosmer-Lemeshow goodness of fit test	0.7216	0.6893
AUC	0.6648	0.6141

RC: Reference category.

-- Data not available.

AUC: Area under the ROC curve

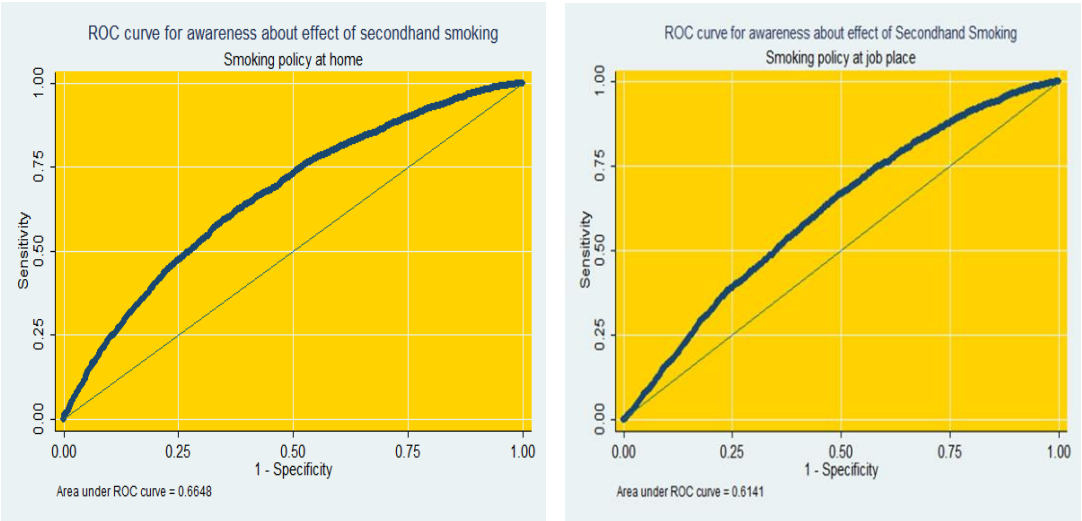


Figure 6.3.1b: AUC for prediction accuracy.

Again from Table 6.3.1b we have found that, smoking is 1.70 times more likely to be allowed at job place for secondhand smokers than their counter part (OR=1.70, 95% CI=1.36, 2.14) and they are statistically significant. Smoking is 0.80 times less likely to be allowed to smoke at job place for rural secondhand smokers than urban secondhand smokers (OR=0.80, 95% CI=0.63, 1.01) and they are statistically insignificant. Again smoking is 0.34 times less likely to be allowed to smoke at job place for female respondents than male respondents (OR=2.74, 95% CI=2.26, 3.32) and they are statistically significant. The odds ratio for less than primary school completed, primary school completed, less than secondary school completed, secondary school completed, high school completed and college/university completed and /higher are OR=0.70, 95% CI= 0.50, 0.98; OR=0.73, 95% CI=0.50, 0.99; OR=0.58, 95% CI= 0.41, 0.83; OR=0.56, 95% CI= 0.35, 0.89 ; OR=0.45, 95% CI= 0.26, 0.78 and OR=0.26, 95% CI= 0.14, 0.45 respectively implying that smoking are 0.70 times, 0.73 times, 0.58 times, 0.56 times, 0.45 times and 0.26 times less likely to be allowed to smoke at job place than those respondents having no formal schooling and they are statistically significant. The odds ratio for business man(small, large), farmer (land owner & farmer) and agricultural/ industrial worker/ daily laborer/other self- employed are OR=2.96, 95% CI= 2.17, 4.03; OR=1.97, 95% CI= 1.20, 3.20; and OR=2.33, 95% CI= 1.67, 3.28 respectively implying that smoking are 2.96 times, 1.97 times and 2.33 times more likely to be allowed to smoke at job place than those respondents are employers (Government, Non-Government) and they are statistically significant. Again

the odds ratio for homemaker/housework and student/other are OR=2.25, 95% CI= 0.79, 6.39; and OR=1.47, 95% CI= 0.90, 2.41 respectively implying that smoking are 2.25 times and 1.14 times more likely to be allowed to smoke at job place than those respondents are employers (Government, Non-Government) and they are statistically insignificant. It has been also found that respondents of middle and higher wealth index are 1.05 and 1.03 times more likely to be allowed to smoke at job place than respondents of lowest wealth index (OR=1.05, 95% CI= 0.70, 1.57; and OR=1.03, 95% CI= 0.69, 1.55 respectively) and which is statistically insignificant. Again the odds for respondents of low and highest wealth index are 0.79 and 0.84 implying that 0.79 times and 0.84 times less likely to be allowed to smoke at job place than respondents of lowest wealth index (OR=0.79, 95% CI= 0.53, 1.17 and OR=0.84, 95% CI= 0.52, 1.33) and they are statistically insignificant.

The p-value of Hosmer-Lemeshow goodness of fit is 0.6893 which is greater than 0.05 implying that the model's estimates fit the data at an acceptable level. And AUC = 0.6141 indicates that the prediction accuracy of model is well.

6.4 Conclusion

Knowledge of health consequences of tobacco smoking, smokeless tobacco use and exposure to secondhand smoke (SHS) has been analyzed using binary logistic regression analysis. According to the respondents knowledge, the most common health consequences of tobacco uses are serious illness, strokes, heart attacks and lung cancer.

From logistic regression analysis to knowledge about the adverse effect of tobacco use (Table 6.2.1), it has been found that respondents from rural area are less knowledgeable about the health consequences of smokeless tobacco use (OR=0.68, 95% CI=0.47, 0.99) and secondhand smoking (OR=0.75, 95% CI=0.45, 0.98) than respondents of urban area and they are statistically significant. But, respondents from urban area and rural area are about equally knowledgeable about the effect of tobacco smoking (OR=1.17, 95% CI=0.77, 1.79). Female respondents are less knowledgeable than males about the effect of secondhand smoking (OR=0.47, 95% CI=0.28, 0.79) which is statistically significant. Females are also less knowledgeable about the effect of tobacco smoking (OR=0.59, 95% CI= 0.28, 0.89) and smokeless tobacco use (OR=0.62, 95% CI= 0.33, 1.13), but not statistically significant. Education and profession have not been found to have effect on the knowledge in specific pattern smoking tobacco. Also, wealth index have no effect on the knowledge about the effect of tobacco smoking, but contributes greatly to knowledge about the effect of smokeless tobacco use and secondhand smoking, For second hand smoking, it has been found that respondents of high and highest wealth index are 4 times more knowledgeable than respondents of lowest wealth index (OR=4.09, 95% CI= 1.72, 9.70 and OR=3.87, 95% CI= 1.43, 10.44) about the effect of secondhand smoking which is statistically significant. Respondent of other wealth index are also more knowledgeable than respondents of lowest wealth index. Similar pattern has been found for smokeless tobacco use. But, No specific pattern has been found for tobacco smoking group.

From Table 6.3.1a for tobacco smoking and smokeless tobacco use, it has been found that tobacco smokers are 1.25 times and smokeless tobacco product users are 1.31 times more likely to be inspired by the marketing policy in preceding 30 days to smoke than their counter parts and they are statistically significant. Rural respondents are 1.17 times more inspired to smoke than urban respondents. On the other hand for smokeless tobacco user it has been found that rural respondents are 1.15 times more inspired to use smokeless tobacco products than urban respondents. Female respondents are 0.24 times and 0.63 times less inspired to smoke and smokeless tobacco products use than male respondents. From Table 6.3.1b we have also found that, smoking is 4.85 times more likely to be allowed at home and 1.70 times more likely to be allowed at job place for secondhand smokers than their counter part.

CHAPTER SEVEN

DISCUSSION AND CONCLUSION

7.1 Introduction

Tobacco use is the leading cause of preventable death and disease worldwide and is estimated to kill more than 5 million people each year [Wu F. et al. 2013]. According to the World Health Organization (WHO), if current trends continue, by 2030 tobacco use could cause 8 million deaths annually, with more than 80% of these deaths in low- and middle-income countries [Wu F. et al. 2013]. The shift of the tobacco epidemic to the developing world will lead to unprecedented levels of disease and early death in countries where population growth and the potential for increased tobacco smoking are highest and where health-care services are least available [Wu F. et al. 2013].

The world health organization (WHO) has reported smoking as a major Public health problem [WHO, 1997, 2008]. Smoking is a behavior which causes chronic diseases, such as ischemic heart disease, cerebrovascular disease, pulmonary obstructive disease and cancers [WHO, 2008]. One-third to one-half of tobacco users die from the effects of smoking. Smoking causes 1 out of 10 deaths among adult's worldwide [Peto et al, 1996; Mathers and Loncar, 2006]. Many socio-economic factors, such as education, occupation and monthly income, have been associated with smoking [Jarvis and Wardle, 1999; Siahpush and Borland, 2001; Barbeau et al, 2004; Laaksonen et al, 2005]. The

rate of smoking is higher in subjects with a lower education level [Cavelaars et al, 2000; Giskes et al, 2005]. Manual laborers, blue- collar workers and people with high stress jobs are more frequently exposed to cigarette smoke than other employees or managers [CDC, 2000; Howard, 2004]. Cigarette smoking is the most well-known form of tobacco use. Most studies of cigarette smoking and mortality were conducted in Western populations and data are limited in Asian and South Asian. South Asia, where more than half of the world's poor population lives, is also the single largest area on the globe for production and consumption of tobacco products. However, large prospective epidemiologic studies assessing the extent to which smoking characters are related to total and cause-specific mortality, especially cardiovascular disease (CVD) mortality, are lacking. Detailed estimates of smoking-disease association and smoking-attributable mortality may also help target interventions. In the present study, we examined the association of tobacco smoking with most of the cause, Stroke, Heart attack, Lung cancer, and Bladder cancer.

This study, based on data from Global Adult Tobacco Survey (GATS) 2010, attempts to identify level of knowledge, attitude and awareness to tobacco use. Factors considered are socioeconomic and demographic characteristics such as residence, gender, age, educational level, occupation and wealth index. Outcome variables are knowledge, awareness and attitude. The purpose of this study is to determine the level of knowledge and awareness towards the adverse health effect of tobacco use (Smoking, smokeless and secondhand smoke).

7.2 Summary of findings

From logistic regression analysis to knowledge about the adverse effect of smoking tobacco, it has been found that current tobacco smokers are less knowledgeable than non-tobacco user about the health risk. But, respondents from urban area and rural area are about equally knowledgeable about the effect of tobacco smoking. Female respondents are less knowledgeable than males about the health consequences of tobacco smoking. For all kind of tobacco smokers it has been found that educated respondents are more knowledgeable than less educated people. Like other public health concerns, less educated people are less likely to be knowledgeable as they are less aware about health hazards and more likely to have higher degree of fatalism and overall risk taking behavior [WHO, 2004]. Profession has not been found to have significant effect on the knowledge in specific pattern of smoking tobacco. Respondent of low wealth index are more likely to be knowledgeable than the respondent of lowest wealth index.

From logistic regression analysis to knowledge about the adverse effect of smokeless tobacco use, it has been found that smokeless tobacco users and non-users are equally knowledgeable about the effect of smokeless tobacco use. But, respondents from rural are less knowledgeable about the effect of smokeless tobacco use than respondents from urban area which is statistically significant. Female respondents are less knowledgeable than males about the health consequences of smokeless tobacco use. For smokeless tobacco users it has been found that educated respondents are more knowledgeable than less

educated people. Higher degree respondents have the more knowledge about health hazards than less educated respondent. Profession has not been found to have significant effect on the knowledge in specific pattern of smokeless tobacco use. Respondents with lowest wealth index are least likely to be knowledgeable and with low, middle, high and highest wealth index are gradually more likely.

From logistic regression analysis to knowledge about the adverse effect of secondhand smoke, it has been found that secondhand smokers are more knowledgeable than their counter parts. But, respondents from rural are less knowledgeable about the effect of secondhand than urban respondents. Female respondents are less knowledgeable than males about the health consequences of secondhand smoke. Education and profession have not been found to have significant effect on the knowledge in specific pattern secondhand smoking. For second hand smoking, it has been found that respondents of high and highest wealth index are more knowledgeable than respondents of lowest wealth index. Respondent of other wealth index groups are also more knowledgeable than respondents of lowest wealth index.

For awareness policy, tobacco industry and traders have been continuing the direct and indirect advertising that includes one on one promotion, gift, image and logo advertising, merchandising, manipulating pack designs, sticker and flyer, emphasizing on point of sale advertisement and different types of sponsorship. Advertising increases tobacco consumption by attracting new tobacco users, increasing the amount of consumption among current smokers,

reducing a smoker's willingness to quit and encouraging former smokers to start smoking again (WHO,2015). Some promoting factors from which respondents had been encouraged to use tobacco in the last 30 days are analysed for marketing policy. From logistic regression analysis for tobacco smoking, it has been found that tobacco smokers are more inspired by the marketing policy to smoke than their counter parts. Rural respondents are more inspired to smoke than urban respondents. Female respondents are less inspired to smoke than male respondents and they are statistically significant. The odds ratio for primary school completed, less than secondary school completed, high school completed and college/university completed and /higher are more inspired by the marketing policy to smoke than those respondent having no formal schooling. Again the odds ratio for less than primary school completed is less inspired by the marketing policy to smoke than those respondents having no formal schooling.

The odds ratio for business man (small, large), agricultural /industrial worker/ daily laborer/other self- employed and student/other are more inspired by the marketing policy to smoke than those respondents are employers (Government, Non-Government). And the odds ratio for Farmer (land owner & farmer) and homemaker/housework are more inspired by the marketing policy to smoke than those respondents are employers (Government, Non-Government). Again the odds ratio for retired and unemployed (able to work/unable to work) is less inspired by the marketing policy to smoke than those respondents are employers (Government, Non-Government).

Again for smokeless tobacco use, it has been found that smokeless tobacco users are more inspired by the marketing policy to use smokeless tobacco products than their counter parts. Rural respondents are more inspired to use smokeless product than urban respondents. Female respondents are less inspired to use smokeless tobacco products than male respondents and they are statistically significant. The odds ratio for primary school completed, less than secondary school completed, and secondary school completed are more encouraged by the marketing policy to use smokeless tobacco products than those respondents having no formal schooling. Again the odds ratio for high school completed and college/university completed and /higher are more encouraged by the marketing policy to use smokeless tobacco product than those respondent having no formal schooling and they are statistically insignificant. On the other hand the odds ratio for less than primary school completed respondents is less inspired by the marketing policy to use smokeless tobacco than those respondents having no formal schooling. The odds ratio for business man (small, large), farmer (land owner & farmer), agricultural /industrial worker/ daily laborer/other self- employed, homemaker/housework and student/other are more inspired by the marketing policy to use smokeless tobacco product than those respondents are employers (Government, Non-Government). And the odds ratio for retired and unemployed (able to work/unable to work) is less inspired by the marketing policy to use smokeless tobacco product than those respondents are employers (Government, Non-Government) and they are statistically insignificant. We

have also found that low and high wealth index respondents are more inspired by the marketing policy to use smokeless tobacco product than those are lowest wealth index respondents. And the odds ratio for middle wealth index is more inspired by the marketing policy to use smokeless tobacco product than those are lowest wealth index respondents. On the other hand the odds ratio for highest wealth index respondents is less inspired by the marketing policy to use smokeless tobacco product than those are lowest wealth index respondents.

For secondhand smoke, we have found that smoking is more allowed at home for secondhand smokers than their counter part and they are statistically significant. Smoking is more allowed at home for rural secondhand smokers than urban secondhand smokers and they are statistically significant. Again smoking is more allowed at home for female respondents than male respondents and they are statistically significant. Based on educational level it has been found that smoking is less allowed at home than higher educated people and they are statistically significant. Occupations of the respondents, we have found that smoking are more allowed at home for business man (small, large), farmer (land owner & farmer), agricultural /industrial worker/ daily laborer/other self- employed and retired and unemployed (able to work/unable to work) than those respondents are employers (Government, Non-Government). Again the odds ratio for homemaker/housework and student/other are more allowed to smoking at home than those respondents are employers (Government, Non-Government) and they are statistically

significant. It has been also found that respondents of low, middle and higher wealth index are less allowed to smoke at home than respondents of lowest wealth index. Again the odd ratio for respondents of highest wealth index is less allowed to smoke at home than respondents of lowest wealth and they are statistically significant.

Again we have found that, smoking is more allowed at job place for secondhand smokers than their counter part and they are statistically significant. Smoking is less allowed at job place for rural secondhand smokers than urban secondhand smokers and they are statistically insignificant. Again smoking is less allowed at job place for female respondents than male respondents and they are statistically significant. The odds ratio for educational level it has been found that smoking is less allowed at job place than higher educated people and they are statistically significant. The odds ratio for business man(small, large), farmer (land owner & farmer) and agricultural/industrial worker/ daily laborer/other self- employed are more allowed to smoke at job place than those respondents are employers (Government, Non-Government) and they are statistically significant. Again the odds ratio for homemaker/housework and student/other are more allowed to smoking at job place than those respondents are employers (Government, Non-Government). It has been also found that respondents of middle and higher wealth index are more allowed to smoke at job place than respondents of lowest wealth index respondents. Again the odds for respondents of low and

highest wealth index are less likely to be allowed to smoke at job place than respondents of lowest wealth index.

7.3 Strength and limitation

The major strengths of our study include large sample size, the coverage of men and women tobacco user, the coverage of both rural and urban areas, and the nationally representative population. However, there are several limitations that need to be addressed. The findings in this report are based on self- reports [GATS, 2010]. Furthermore, education categories were combined into broad groupings, which could have contributed to biased estimates in terms of the gradients observed. Nonetheless, these groupings provided greater precision than those used in earlier tobacco use research in Bangladesh. The data used in constructing wealth index is based on limited number of asset variables, which might result in incomplete or under representing socioeconomic status. Some other variables like psychological variables could provide more predicting accuracy, but no such variable is available.

7.4 Further research

Multi-level analysis could be done in future.

7.5 Policy Implication and Recommendation

Tobacco products are sold and consumed everywhere in Bangladesh. It is a drug of easy availability and social acceptability. At the same time it is also well known amongst most of the people in the country that tobacco

consumption is the main factor behind several behavioral diseases. By not making measures to control it – to greatly reduce the number of places in which it can be consumed, to stop the promotion of it – the government of Bangladesh is considered to condone it.

1. There is a need to formulate a 100% smoke-free policy for all public places and workplaces
2. A nationwide campaign is needed to educate people in rural area about the health risks of tobacco use.
3. It is necessary to implement the program more to understand the adverse effect of tobacco smoking targeting specific subgroups including non-smokers with low education, who are agricultural / Industrial worker/ daily laborer/other self- employed, farming or retired and unemployed and their wealth index is middle, high and highest
4. Modification of the national Tobacco Control Act to include a ban on advertisement of all kinds of tobacco products, including smokeless tobacco.
5. Raising social awareness regarding tobacco's harm and exposing the selfishness of the tobacco industry's through promotion of tobacco.

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Appendix: Achievements from this study

1. **Published paper:**
   Rahman T, Roy DC and Sultana P (2016). Knowledge and attitude towards tobacco use in Bangladesh, *Journal of the Institute of Bangladesh Studies (JIBS), University of Rajshahi, Vol-38(2015)*.

2. **Submitted paper:**
   Rahman T, Roy DC and Sultana P (2016). Pattern of promoting the knowledgeable adults to use tobacco in Bangladesh, *International Journal of Health Science and Research (IJHSR), Vol- 6.*

3. **Conference paper**:
   Rahman T, Sultana P and Roy DC (2015). Measuring the Level of Knowledge of Tobacco Use in Bangladesh. *The second international conference on statistics for population and development, 27-29 December 2015, Dhaka, Bangladesh. Organized by: Dhaka University Statistics Department Alumni Association(DUSDAA)*