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MASTER THESIS
POPULATION STUDIES

Population Research Center
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INDONESIAN SMOKING BEHAVIOUR and ITS EFFECT ON SMOKING-RELATED MORBIDITY

A Case-Study Based on IFLS Data Analysis in 2007

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ABSTRACT

Smoking is a growing public health problem in Indonesia. Cigarette consumption has been increasing in Indonesia, causing a rising burden of smoking-related morbidity. Using Indonesian Family Life and Survey 2007, this study is to obtain the factors that influence the smoking behaviour, and the impacts of smoking behaviour to the smoking-related morbidity of Indonesian population in 2007.

The used approach in this study is a quantitative approach based on the 2007 Indonesian Family and Life Survey 2007 (N=27,510). The cross table, chi-square, and logistic regression were used for the analysis. Measures included demographic characteristics (age, sex, area of residence, and marital status), socioeconomic status (educational level, and economic status), smoking behaviour (light smoking, moderate smoking, heavy smoking, and non-smoking), and smoking-related morbidity (the presence of either coughing, shortness of breath, high-blood pressure, or other heart and lung diseases in which these are the most common symptoms or diseases directly caused by smoking) for examining the research question.

Demographic variables and status of socioeconomic variables show a significant influence on smoking behaviour. Age has a positive correlation towards smoking behaviour. The proportion of smokers in the male group is much bigger than that in the female group, and there is a significant difference of smoking behaviour between them. The proportion of smokers in the rural areas is higher than the proportion of smokers in the urban areas. If it is viewed from marital status, the biggest proportion of smokers can be found in the separated group and the divorced group, while the smallest proportion of smokers can be found in the widowed group. The level of education is negatively correlated with the smoking behaviour. While if we see it from economic status, the population with low economic status has a bigger proportion of smokers compared to the population with higher economic status. But, most of the smokers from low economic group are light smoking, on the other hand, most of the smokers from high economic group are moderate smoking. The primary conclusion from the analysis of the logistic regression is the fact that smoking behaviour is associated with smoking-related morbidity. The logistic regression analyses suggest that an additive relationship between the impact of smoking behaviour on smoking-related morbidity, it does not reflect the social vulnerability hypothesis; people in low economic status are at great risk of smoking-related morbidity.

The seriousness of the tobacco epidemic among Indonesian population highlights the need for effective intervention prevention efforts targeting smoking. Early prevention programs and targeting efforts need to be culturally tailored, gender specific, multidimensional, and challenge the cultural perceptions of smokers among Indonesian population.

Keywords: demographic characteristics, socioeconomic status, smoking behaviour, smoking-related morbidity, Indonesia, IFLS.

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CHAPTER 1

INTRODUCTION

1.1 Background

Tobacco-use has been identified as an important dangerous factor of non-communicable diseases in developed countries as well as in developing countries (WHO, 2002). Indonesia is amongst five countries with most tobacco consumption in the world (Ng et al. 2006). Indonesia has become the main/primary target for tobacco trading because of its vast population.

The World Health Organization (WHO) has described tobacco smoking as an epidemic in which the global smoking epidemic is expected to remain as one of the greatest cause of premature death, disease and suffering for decades to come (WHO, 1979). The WHO has estimated that the number of deaths each year from smoking attributable disease will increase up to 10 million within the next 30 years or so, of which 70% will occur in developing countries. Indonesia ranks fifth among countries with highest cigarette consumption that consumed 173 billion sticks cigarettes in 2004. However, data show that cigarette consumption was decreasing between the years 2003-2004 by 930 sticks annual per capita (Indonesian Ministry of Health, 2004).

Cigarette consumption in Indonesia is higher than anywhere else in the world due to high proportion of smokers in the population. Indonesia is the main target for many tobacco companies in expanding their market share, yet smoking is stealing millions of years of healthy life from Indonesian population (Yurekli and De Beyer, 2000).

Smoking prevalence in Indonesia, from the trend, has shown escalation, and cigarette industry has become the main tax income for Indonesia (Aditama, 2002). This is mostly because the low cost of cigarette products and the lack of government efforts in controlling smoking-behavior in Indonesia (Yurekli and De Beyer, 2000). Besides, most Indonesian society considers cigarette as a normal thing from the social perspective (Aditama, 2002).

In Indonesia, most of smokers started smoking when their age was between 15 years old and 20 years old (Aditama, 2002). Minh et al. (2006) emphasized on the probability in becoming smoker that is higher on older birth cohorts and lower level of education. The existence of a myth which describes smoking as a symbol of masculinity causes at least sixty (60) percent of male population and less than five (5) percent of female population from various socioeconomic classes to become smokers (Aditama, 2002; Ng et al, 2006; Barclough, 1999).

Simultaneously, Indonesia is witnessing an epidemiologic transition in which the prevalence of non-communicable disease particularly cardiovascular disease, cancer diabetes, and chronic respiratory disease is increasing (Aditama, 2002). These health problems are becoming the leading causes of mortality and morbidity, with smoking-related chronic diseases as the leading cause of mortality. Indeed, 36.8 percent and 14.3 percent of deaths in 2001 were attributed to cardiovascular diseases and cancer respectively (National Health Survey, 2001). The widely known fact that smoking is a direct cause of preventable morbidity and premature mortality is a reality in Indonesia (Kosen, 2004). The high prevalence of adults currently smoking for males (63%) and females (4.5%) in 2004 has been

identified as a substantial contributor to the burden of chronic disease in Indonesia (Kosen, 2004).

In sum, Indonesia has been facing great health challenges, which necessitate considerable investments in tobacco control/prevention programs specific to the Indonesian population. Preventing smoking initiation and providing successful cessation programs for tobacco use will reap increasing benefits each year, as fewer people will suffer from smoking-related morbidity. As the vast majority of smokers start smoking as adolescents, it is crucial to obtain an understanding of the factors, which lead to smoking to achieve the prevention goals.

Meanwhile, the Government of Indonesia (GoI)'s policy in controlling tobacco-use is still ambiguous. On the one hand, GoI has realized the dangerous impacts of tobacco for its population but on the other hand the tobacco significantly has high contribution to the country income and the labor proportion which have helped Indonesia to reduce the unemployment and poverty rate. Therefore, GoI is still not able to optimize the implementation of its policy in controlling tobacco-use.
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However, sufficient research regarding how Indonesian perceive and experience the rapid and extensive social changes and the capacity to address the epidemic at a national level are lacking among public health officials. Additionally, the differences in sociodemographic factors associated with tobacco use and morbidity and between developing and developed countries were reported. (Maziak et al. 2000) point out the importance of examining such issues among Indonesian in order to improve the understanding of and the ability to deal with the epidemic. This research will provide detailed-description on tobacco-use in Indonesia which will be useful and can be used as inputs for the Government and/or relevant institutions in developing a policy in order to protect its citizens from the negative impacts of smoking.

1.2. Research Objective

The objectives of this research are to obtain the factors that influence the smoking behavior and the impacts of smoking behavior to the smoking-related morbidity in Indonesia.

1.3. Research Questions

The objectives above lead to three main questions:

1. What kind of demographic characteristics influence smoking behaviour in Indonesia?
   a) Does age have an influence on smoking behaviour?
   b) Does sex have an influence on smoking behaviour?
   c) Does marital status have an influence on smoking behaviour?
   d) Does area of residence have an influence on smoking behaviour?
2. What kind of socioeconomic status influence smoking behaviour in Indonesia?
   a) Does economic status have an influence on smoking behaviour?
   b) Does education have an influence on smoking behaviour?
3. What is the impact of smoking behavior on smoking-related morbidity?
   a) Do demographic characteristics have an effect on the relationship between smoking behaviour on smoking-related behaviour?
   b) Do socioeconomic status (SES) have an effect on the relationship between smoking behaviour on smoking-related morbidity?

1.4 Structure of the Thesis

In order to answer the research questions above, this thesis will be divided into five (5) chapters. The first chapter is introduction which will include the background, objectives, and questions of the research. The second chapter will explain the conceptual and theoretical framework of the research which will be the primary materials in withdrawing the hypotheses of the research. The third chapter will consist of the data and method used during the implementation of this research. The data analyses and the results of the research will be presented in the fifth chapter. The last chapter will provide the conclusions and recommendations by the researcher based on the results of the data analyses. The recommendations will not only be specified for the policy makers, but also for the future research/study on the same or related-issue.

CHAPTER 2

THEORETICAL AND CONCEPTUAL FRAMEWORK

2.1 Theoretical Framework

"Theory is a systemic explanation for the observations that relates to a particular aspect of life" (Babbie, 2006). Theory is needed to explain how an issue or a phenomenon can happen. Theories are provided based upon a hypothesis and supported by evidences. For this research context, theories are needed to direct the research steps or the flow of the research. From the theories, the hypotheses will be concluded and then the research can be continued to the further steps including collecting and analyzing the data; concluding the results of the research; and providing recommendations.

There are many theories and models used in this research specifically the theories on the influences of demography characteristic and social-economic status on the smoking behavior; and the impacts of smoking behavior on morbidity. There are three (3) important theories used as the major sources in this research namely i) **Theory of Planned Behavior** (Ajzen and Fishbein, 1975); ii) **Stage of Tobacco Epidemic Model** (Lopez et al. 1994); and (iii) **Relationships between Cigarette Smoking and Health Problems Model** (Pampel and Rogers, 2004). The theories are ordered in decreasing the level of abstraction. The theory of planned behavior explains about how behavior is formed; the model of stages of tobacco epidemic describes the relationship between smoking behavior with demographic variables; and the third theory explains the relationship between cigarette smoking and health problems.

There are three (3) variables in Theory of Planned Behavior (TPB) namely attitude behavior, subjective norms, and perceived behavioral control. Those three variables are relevant with the situation in Indonesia toward smoking behavior including its social norms in smoking behavior; level of education and social economic which are relatively low. This research uses the Stage of Tobacco Epidemic Model because this model is able to provide a macro-description to explain the phenomena of smoking behavior in developing countries which will help the researcher in understanding the smoking behavior phenomena in Indonesia. Meanwhile, the Relationship between Cigarette smoking and Health Problems Model will be a guidance for this research in explaining the influence of social economic status (SES) to the associative relationship between smoking behavior and morbidity. Until now, there are no researches yet on smoking behavior in Indonesia using this model.

2.1.1. Theory of Planned Behaviour

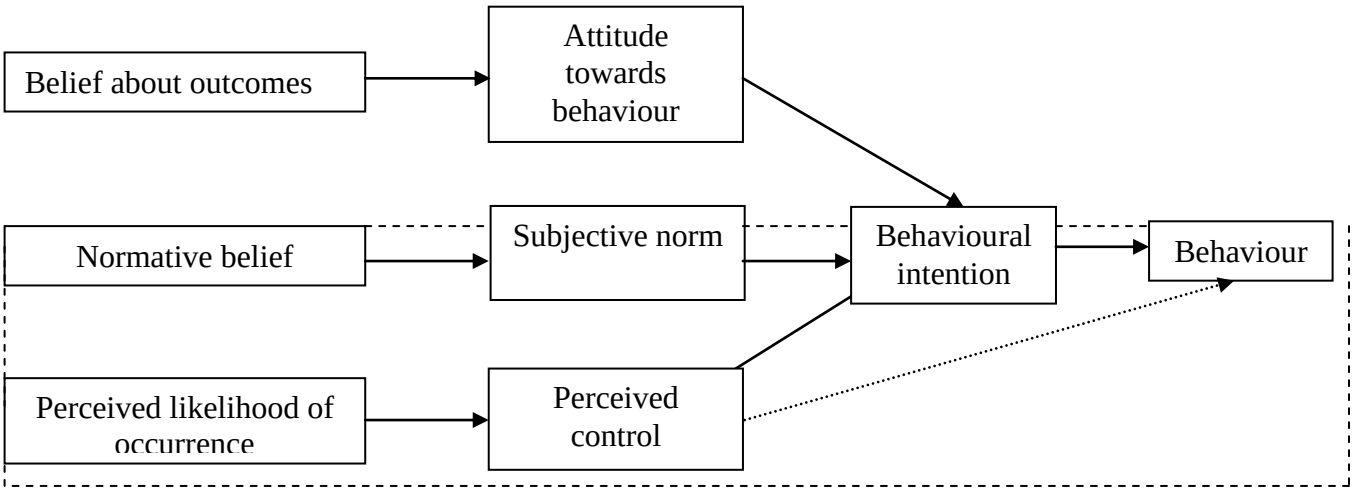
Theory of Reasoned Action by Ajzen and Fishbein (1975) determines a framework to observe attitude and behaviour. The theory describes that the most important determinant in human behaviour is the intention to behave or behaviour intent. The Theory of Planned Behavior (TPB) is a theory about the relationship between attitude and behavior. TPB has been applied to many studies or researches of the relations among attitudes, behavioral intentions and behaviors in various fields such as healthcare. According to this theory, human social behavior is guided by three (3) kinds of consideration:

i) *Behavioral Attitude* is beliefs about the likely consequences of the behavior. This will produce a favorable and unfavorable attitude toward the behavior;
ii) *Subjective Norms* is beliefs about the normative expectations of others. It results in perceived social pressure or subjective norm;

iii) *Perceived Behavioral Control* is beliefs about the presence of factors that may facilitate or impede performance of the behaviors. This gives rise to perceived behavioral control.

The three (3) variables above lead to the formation of a behavioral intention in leading a certain behavior (see Figure 2.1). As general rule, the more favorable the attitude and subjective norm and the greater the perceived control, the stronger should be the person/community's intention to perform the behavior in question.

Figure 2.1 the Theories of Reasoned Action and Planned Behaviour by Ajzen and Fishbein



Source: Cited from Bennet and Murphy, 1997, p. 32.

Attitude towards a behaviour is influenced by belief that a behaviour will lead to desired and undesired results. The beliefness concerning the normative behaviour and the motivation to act according to such normative expectation formed subjective norm in the individu. The control of behaviour is determined by the past experience and the mind of individu concerning how difficult or how easy to behave in such behaviour (Bennet and Murphy, 1997).

Bennet and Murphy (1997) also discovered that the most often and obvious cause of death is caused by some negative behaviour factors, for instance smoking, diet, alcohol consumption and excessive activity pattern. Such negative behaviours are also the determinant factors in accelerating or decreasing the age of someone who behaves in such a way.

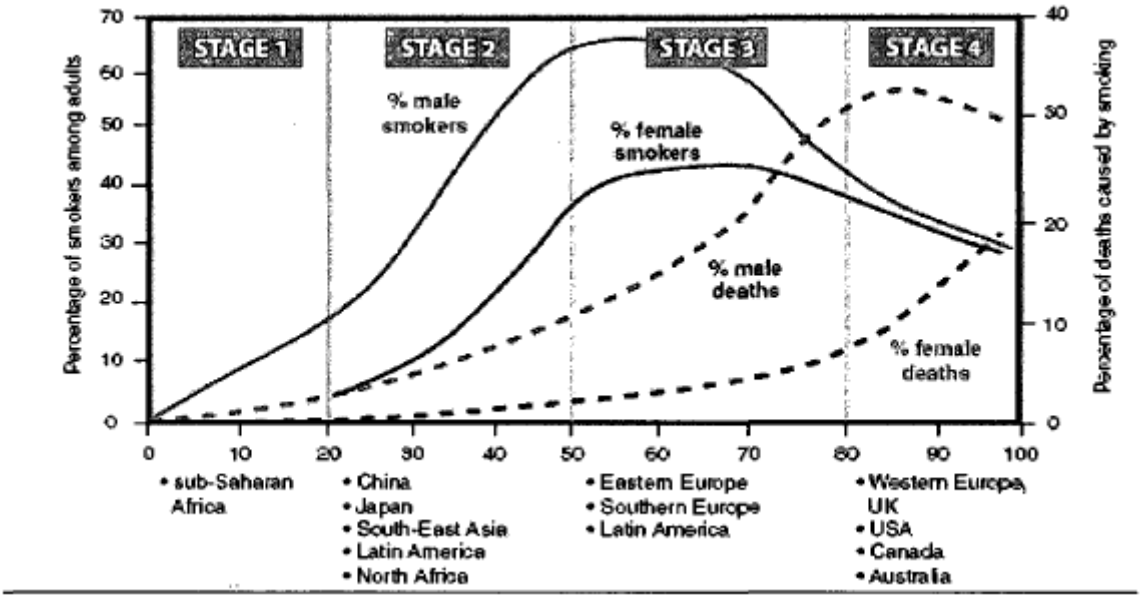
2.1.2. The Four Stages of Tobacco Epidemic

A paradigm illustrating the worldwide typical progression of tobacco use that was first proposed by *Lopez et al* and later adopted by the World Health Organization (Shafey et al. 2003) is presented in Figure 2.2. The experiences of patterns of tobacco use fit this WHO adopted model in many countries, which also provides a useful framework into which many countries can be placed. It also enables countries currently at an earlier stage in the paradigm to recognize their situation, learn from international experience and introduce strong public health interventions to reduce the impact of tobacco use on their population

The model uses four-stages to predict tobacco use in developing countries (WHO, 2008). Thus, in monitoring the tobacco epidemic and underlying Lopez's theory, there are three aspects to consider. The first aspect is **gender**, men usually begin to smoke before women do

and in much larger number, thus female prevalence generally does not reach the same level as that/or men, and reaches a peak only several years later. The second aspect is **age**, the classical pattern of age specific prevalence indicates younger age groups to begin smoking first, with older women smoking much less. The third is the **socioeconomic status** in which prevalence has been found to vary markedly according to socioeconomic status. At earlier stages of the tobacco epidemic, it is frequently the higher social groups that can afford cigarettes. As health campaign takes effect, prevalence tends to fall first among this better educated group, with the result showing that lower socioeconomic groups have the highest prevalence with the gap widening over time (WHO, 2008).

Figure 2.2 Stages of Tobacco Epidemic



Source: Lopez et al. 1994.

Based on Figure 2.2, Indonesia is considered as a country at stage two (2) with around 60% prevalence of smoking among male; an increasing prevalence among youth and women; an early smoking initiation among youth; and an increasing mortality and morbidity attributable to smoking. This is indicated by the average increases in smoking prevalence in all age groups (45-49 years) with persistently high increases in ages 15-19 years (National Socio-Economic Survey, 2004). Although there are many cases and researches that show the increasing lung cancer cases and other chronic illnesses due to smoking among men, the model predicts that public and political understanding of and support for tobacco control initiatives are still limited (Kheirallah, 2009).

At stage 3, male smoking prevalence is expected to hit the highest point of 70% and female smoking rate is expected to slightly increase to around 42%, and then start decreasing slowly. During this stage, the burden of diseases attributable to smoking is expected to escalate because of the delayed effect of smoking on chronic illnesses. Therefore, it is predicted that smoking will account for between 10- 30% deaths (about 75% of these in men). While smoking prevalence continues to fall in stage 4, smoking deaths peak in men at approximately 30-55% and 20-25% in women (Lopez et al. 1994).

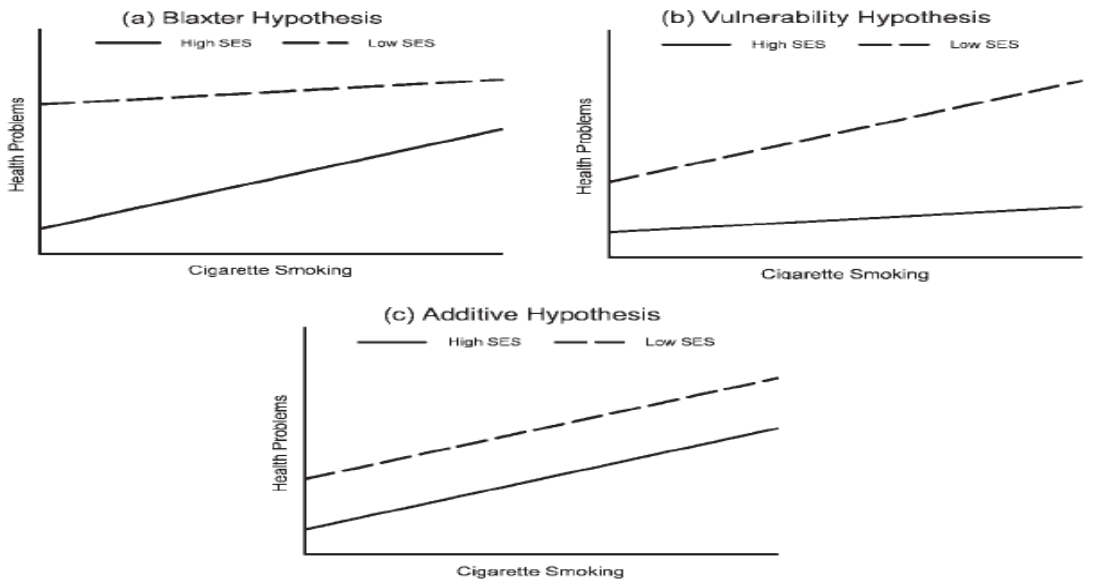
The model also presumes that comprehensive tobacco control measures have to take place at stage 2 or at most 3 stages to induce decline in smoking prevalence in late stage 3 and early

stage 4. However, without such comprehensive measures, the worst facets of stages 3 and 4 of the model will lead to very high rates of smoking that coexist with very high rates of smoking attributable deaths (Lopez et al, 1994). The message from these predicted trends is clear, without immediate intervention among Indonesian youth; many people will die prematurely from tobacco-related causes, even as other causes of premature death diminish.

2.1.3. Socioeconomic Status, Health, and Smoking

The conceptual framework also used to specify study hypotheses draws and defines upon the relationships between smoking behaviour and smoking-related morbidity by demographic factors and socioeconomic status. Pampel and Rogers (2004) describe three theoretical debates in order to explain the influence of socioeconomic status (SES) on health. Each of the theories concern has been supported and opposed in several literatures. Although the methods are different, the tendency why the studies on those literatures are conducted is to make sure that there is association between SES and demography towards health. Those three theories as presented on figure 2.3 give different logic in sense of socioeconomic status influence towards health differences amongst smokers and non-smokers (Pampel and Rogers, 2004).

Figure 2.3 Relationships between Cigarette Smoking and Health Problems by Socioeconomic Status



Source: Pampel and Rogers (2004).

The first theory, the Blaxter hypothesis, shows that smoking has bigger impact on health in non-manual compared with to manual social classes (Blaxter, 1990). According to Marang-van de Mheen et al (1999), it is because of the unhealthy neighbourhood and work environment that worsened their health condition compared with to manual social classes. Therefore, it is riskier for them to be aggrieved by smoking and other bad health behaviour compared with individual with higher socioeconomic status (Marang-van de Mheen et al. 1999).

In the second theory that are contrary to the previous theory, the social vulnerability shows that individuals with higher socioeconomic status will experience negative effects towards bad health behaviour compared with individuals with lower socioeconomic status. Pampel and Rogers (2004) explain that individuals with higher socioeconomic status have more knowledge and resources to take care and maintain their own health. Therefore, Birch et al.

(2000) explains that negative effects from the bad health behaviour will be worse suffered by individuals with lower socioeconomic status compared with individuals with higher socioeconomic status. Ferraro and Kelley-Moore (2003) emphasize that this perspective is in accordance with cumulative loss perspective which shows some risk factors such as low socioeconomic status, bad health behaviour and high stress that can interact and cause worse health condition than suggested by each of those factors.

The last theory, explained by Pampel and Rogers (2004), depicts the possibility of additive relationship between socioeconomic status and health. From their point of views, smoking and low socioeconomic status can be associated with bad health, however smoking cannot aggravate/worsened or decrease health risk related to low socioeconomic status.

2.2. Literature Review

Marang-van de Mheen et al (1999) had tested the Blaxter Hypothesis which examines the death risk related to smoking differences between manual level and non-manual classes in West Scotland. They explain that an age-adjusted mortality rate ratio is a bit higher on male than on female from non-manual social class. However, statistically the difference amongst social levels is insignificant. The difference amongst social levels, statistically, remains insignificant, if it is controlled by other independent variables, such as cholesterol concentrations, diastolic blood pressure, body mass index, ischemia and bronchitis.

Duncan et al. (1993) and Sterling and Weinkam (1990) find out indirect support for the Blaxter Hypothesis. Sterling and Weinkam (1990) also explain that smokers that consists of several group works and social classes tend to be more easily affected by the danger in work environment, such as dust, smoke and toxic substances. Therefore the effects from smoking towards health are decreasing when those effects are controlled by working environment. Smith and Shiple (1991) explain that socioeconomic status gradation and health cannot be eliminated even if risk factors including smoking and alcohol drinking is involved and/or calculated. It causes them to conclude that the effect of such risk behaviour can be excessive because it is caused by unhealthy environment and unhealthy individual behaviour which is associated each other. Nevertheless, analysis which involves social class variables is irrelevant.

Birch et al. (2000) tries to look the social vulnerability hypothesis by examining the health determination factors from social groups in Quebec province, Canada. Their analysis result of logistic regression shows that there is similarity between smoker and non-smoker, whereas significantly, the possibility of bad health on individuals with lower socioeconomic status is bigger. Pampel and Rogers (2004) also find out indirect relation between smoking behaviour, health and mortality in the USA when testing its social vulnerability hypothesis. They find that the health effects from smoking are different based on socioeconomic status and its demographic factors. In detail, their studies explain that negative effect from smoking on morbidity will decrease on higher socioeconomic status level.

A study which was conducted by Marang-van de Mheen et al. (1999) and Pampel and Rogers (2004) investigates the relation between socioeconomic status and health as explained by additive hypothesis. Marang-van de Mheen et al. (1999) explains that smoking effect is relatively similar in some socioeconomic groups. It is in accordance with the study conducted by Pampel and Rogers (2004) showing that the effects of smoking on health is not significantly different on several socioeconomic groups, from gender variable or area of residence.

From literature study mentioned above, it can be shown that the study concerning the relation between smoking behaviour and health, morbidity or mortality has been frequently conducted in Europe and USA (for instance Birch et al. 2000; Duncan et al. 1993; Marang van de Mheen et al. 1999; Pampel and Rogers 2004; Sterling and Weinkam 1990). With limited number, the same study is also found in China and Indonesia (i.e. Hiu-Peng Liewa et al. 2009). Although those studies utilize different methods, but generally the study result concludes that smokers tend to have worse health condition compared with non smokers.

Similarly, studies concerning factors underlying smoking behaviour have been frequently conducted. A lot of literatures show that some variables from demographic factors and socioeconomic characteristic also affect smoking behaviour (Lopez et al, 1994; Pampel and Rogers, 2004), as presented in the previous discussion. Krieger and Fee (1994) explain that demography and socioeconomic factors can give information related to standard of living and level of community development. Robert (1998) explains that living in a certain community with low socioeconomic characteristic can influence bad health behaviour on individual level; which according to Reijneveld (1998) negatively associated with smoking behaviour. Some studies in Indonesia which examine smoking effect towards health also conclude that smoking causes escalation of morbidity level especially cardio-vascular and respiratory diseases, lung cancer, mouth and gum diseases and asthma diseases.

In Indonesia, most researches concerning cigarette were conducted to see level of prevalence, smoking behaviour, economic effect from cigarette industry and smoking effect. However, most of these studies make Java island research location which is an island where biggest cigarette industries are located. Some studies were conducted by taking certain areas as samples, however the results of the studies were generalized for the Indonesian population in general (Djuharta and Vijaya 2003). It is due to the lack of morbidity data on the national level (Aditama, 2002). But, there is no research or study which systematically examines smoking effects towards health by involving demography and socioeconomic variables such as those depicted in the debated hypothesis by Pampel and Rogers (2004).

This research is aimed to fill out those empty spots on the previous researches or studies by using the secondary data from Indonesian Family and Life Survey (IFLS) in 2007. These secondary data include 13 of 33 provinces in Indonesia so this research will be more representative and reliable in describing the smoking behavior in Indonesia.

2.3 Conceptual Framework

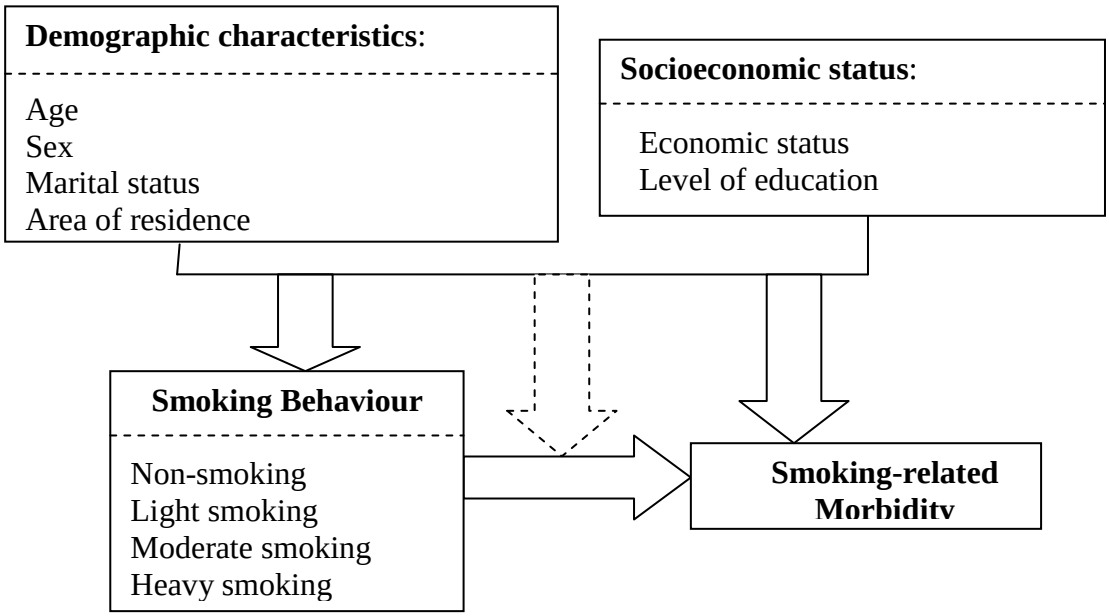
The literature review above shows that demography characteristics and socioeconomic status variables as independent variable shape smoking behaviour as a life-style (Lopez et al. 1994). In another aspect, Pampel and Rogers (2004) shows that smoking behaviour as an independent variable towards morbidity, because demographic characteristic factors and SES determine the quality of human resources that influence directly and/or indirectly on morbidity.

According to Ajzen and Fishbein (1975) a behaviour which occurs within a process, namely from the formulation of attitude towards behaviour subjective norms, and perceived control, which then these three factors will slowly form behavioural intention. Behaviour occurs when the behavioural intention is implemented in the form of actions, therefore it becomes a habit. Factors of demographic characteristic and socioeconomic status also contributed to the three factors which create smoking behavioural intention. The attitude that men will look more masculine by smoking, smoking as an "*elite*" life-style, low educational level which

influences the level of awareness for perceived control are the examples of demographic characteristic and SES factor that influence the occurrence of such smoking behavioural intention.

Pampel and Rogers (2004) explained that the relationship between smoking behaviour and smoking-related morbidity was influenced by demographic characteristic factors and socioeconomic status. The forms of the influence of such demographic characteristic factors and socioeconomic status are formulated in three different forms of hypotheses as visualized in figure 2.3. See figure 2.4 for detailed description

Figure 2.4 Conceptual Model



2.4. Definition of Concepts

This section gives operational definition to the key concepts that emerge through the theories and review of literatures in-line with the conceptual model which are mentioned in figure 2.4. The following is a detail discussion on those all concepts. Chapter 3 in section 3.5 briefly explains all variables operational definition.

Demographic Characteristics: relate to personal characteristics such as age, gender, area of residence, and marital status.

Socioeconomic status: The condition which defines the social and demographic condition of a person in society (Bruijn, 2005). These are shared or societal financially viable experiences and realities that help mood one's personality, attitudes and lifestyle (Chase, 2007). In this study educational level and economic status are considered.

Smoking Behaviour: It refers to the definition of Pampel and Rogers (2004), i.e. the average number of cigarette stick they spend per day and how soon after waking up smokers smoke the first cigarette, cigar or pipe. It is classified into 5 categories, namely: (i) Non-smoking if respondent has ever and never chewed tobacco, smoked a pipe, smoked self-rolled cigarettes, or smoked cigarettes/cigars; but have totally quitted now or in the past; (ii) Light smoking spends 10 sticks per day, and smoke the first cigarette > 60 minutes after waking up; (iii)

Moderate smoking spends 11-20 sticks per day, and smoke the first cigarette 31-60 minutes after waking up; and (iv) Heavy smoking spends > 21-30 sticks per day, and only 5 minutes after waking up smoke the first cigarette.

Smoking-related Morbidity: It refers to the definition of Djuharta and Vijaya (2003) the presence of either coughing, shortness of breath, high-blood pressure, or other heart and lung diseases in which these are the most common symptoms or diseases directly caused by smoking.

2.5 Research Hypothesis

According to the conceptual model mentioned above, nine hypotheses whose correctness will be examined in this research can be formulated. The nine hypotheses concerns are as follows:

1. The older the age, the higher proportion of smoking behaviour
2. Smoking behaviour is mostly found among men than women;
3. Smoking behaviour is stronger among the unmarried;
4. Smoking behaviour is much greater in rural areas than urban areas;
5. The proportion of people with low education level are greater than that of higher education;
6. Smokers are mostly found in people whose low economic status than high economic status;
7. Smoking behaviour is associated with smoking-related morbidity;
8. Demography variables influence the relationship between smoking behaviour and smoking-related morbidity;
9. Socioeconomic variables influence the relationship between smoking behaviour and smoking-related morbidity.

CHAPTER 3

DATA AND METHODS

3.1 Study Design

The study uses a positivist quantitative descriptive approach and relies on data derived from the Indonesian Family Life and Survey (IFLS) 2007. This study describes the factors that influence the smoking behavior; and the impacts of smoking behavior to the smoking-related morbidity in Indonesia. This research is categorized as a quantitative research, which exercise cross sectional study. Cross-sectional approaches are less suitable for processes that occur over time due to the fact that they draw conclusions from only one point in time (Babbie, 2010). The number of subjects experiencing the effect, the subject group experiencing risk factor as well as the group without risk factor is compiled in 2 x 2 table. The data result is prevalent, therefore this study can also be called as prevalence study (Kelsey, 1986). To analyse the data, descriptive analysis, bivariate and logistic regression analysis methods will be applied.

3.2 Indonesian Family Life and Survey (IFLS)

The decision to use IFLS data is based on the accessibility of IFLS data, abundant information on smoking behaviour and morbidity, which is available in IFLS data. This makes IFLS data sufficient to explore and provide answer to the study research questions. To acquire a better understanding on IFLS, its research design, and which data available through IFLS, this section below will briefly discuss IFLS history, the research design of IFLS 2007, and data which could be obtained through IFLS 2007.

3.2.1 General Information about IFLS

IFLS is a survey of household panel and a community which is organised by RAND in Santa Monica, USA and Population Research Centre of Gadjah Mada University in Yogyakarta, Indonesia. According to data of wealth and its characteristic as data panel, it is possible for IFLS to conduct an observation towards an individual, household and overall community. The first IFLS (IFLS 1) was organised in 1993, the second (IFLS 2) in 1997, the third (IFLS 3) in 2000, and the fourth (IFLS 4) in 2007.

The original sampling scheme is stratification according to province and village/city locations. IFLS was organised in 13 provinces which covered 83 percent of the population in Indonesia, which are Yogyakarta Central Java, East Java, Jakarta, West Java, Lampung, South Sumatera, West Sumatera, North Sumatera, Bali, West Nusa Tenggara, South Kalimantan and South Sulawesi. Among those provinces, 321 enumeration areas were randomly chosen based on a sampling framework from SUSENAS which was organised by ICBS in 1993.

In IFLS 2, IFLS 3, and IFLS 4, the interview was conducted on household members who have moved but still lived in IFLS area. IFLS also interviewed households which were the fraction from the previous IFLS families, who established new families. IFLS was designed to provide demography data, economic behaviour and the outcome. The compiled information consists of economy welfare, education, migration, labour force, marriage, fertility, contraception utilization, health status, health service utilization and health insurance.

3.2.2 Research Location and Sample Taking

This research is adapted to the location of Indonesian Family Life and Survey (IFLS) in 2007 as shown in figure 3.1. IFLS 2007 was conducted in 13 provinces in Indonesia which were in Yogyakarta, Central Java, East Java, Jakarta, West Java, Lampung, South Sumatera, West Sumatera, North Sumatera, Bali, Nusa Tenggara Barat, South Kalimantan, and South Sulawesi. These 13 provinces were already concluded 83 percent of the population in Indonesia (Straus et al. 2000).

Figure 3.1 The Map of IFLS 4 Location

Source: Cited from IFLS-4 in initial public release, www.rand.org.

3.3 Sample Selection

Survey sample framework in IFLS 4 was a census block list which was utilized for National Economic Social Survey (SUSENAS) in 2000 which comes from the Indonesian Central Bureau of Statistic (ICBS). More than 30.00 persons in 7224 households were samples. Sample scheme of IFLS 4 consist of levels in provinces and village areas also cities inside provinces. Calculation areas were sampled randomly in layers of this area, and in households in the calculation areas. The resulted sample covered 13 provinces in Java, Sumatera, Bali, Kalimantan, Sulawesi and Nusa Tenggara (Strauss et al. 2000).

Three hundred and twenty one (321) of enumeration areas in thirteen (13) provinces were sampled randomly consisting of examples taking of enumeration areas in cities and enumeration areas in smaller provinces. Therefore, comparison between village-city and Java-non Java can be fulfilled. Each enumeration areas was located in village area. This strategy decreased the expensive cost between enumeration areas in villages and decreased the intra-cluster correlation in all of cities area which tends to be similar with households in the villages area (Strauss et al. 2000).

In IFLS 4, 7.730 household was chosen as original sample target. From the households, 7.224 (93%) were interviewed, which consist of 43.600 persons. 7% of the households have never been interviewed, 2% refused and 5% has never been found. In households which were successfully interviewed individually, there were 27,506 individuals who met the criteria as respondents in book III B and were successfully interviewed.

Each population of this research is all of population in 13 provinces in Indonesia who are smoking or not that is resulted from IFLS 3 data collection. All of this population who become subject of this research are also the research samples. The determination of smoking

or not is fully based on IFLS 4 questionnaires which was categorized as (i) smoking if respondent have ever chewed tobacco, smoked a pipe, smoked self-rolled cigarettes, or smoked cigarettes/cigars and still have those habits; and (ii) no-smoking if respondent have ever and never chewed tobacco, smoked a pipe, smoked self-rolled cigarettes, or smoked cigarettes/cigars but have totally quitted now or in the past. Moreover, it is also based on a research conducted by the Ministry of Health in 2004 which also categorized the frequency of smoking included in the sample for the research concerning smoking. The final analysis sample consists of 27,510 individuals.

3.4 Selection of Research Variable

In order to test the hypothesizes and find out answers of the research questions from the conceptual framework figure 2.4, variables are classified into independent and dependent which are as follows:

- ***Dependent Variables***
  • Smoking-related morbidity
- ***Independent variables***
  Three categories of variables will be used as predictors of smoking-related morbidity which are listed below:
  - **Smoking behaviour**
  - **Demographic characteristics**
    - Age
    - Sex
    - Area of residence
    - Marital status
  - **Socioeconomic status**
    - Educational level
    - Economic status

3.5 Operational Definition

For the finding of answers of the research question of this study, the above identified variables can be made operational in the table 3.1.

Table 3.1 Operational Definitions of Research Variables.

Variable **1**	**Operational Definition** **2**	**Measurement Scale** **3**
Age	The number of years based on the respondents' last birthday at the interview process. This refers to book IIIB that is intended for respondents 15 years and older.	**Categorical** 15 – 19 :1 20 – 29 :2 30 – 39 :3 40 – 49 :4 50 – 59 :5 ≥60 :6
Area of residence	Is information about respondent's area of residence. Classified into two: urban and rural	**Categorical** Urban :1 Rural :2

Table 3.1 continued.…

<table>
<tr>
<td>Economic status</td>
<td>Is the amount of money spent to buy and/or consume food items and non-food which is the total value of items consumed by Household (HH) even self-produced or received from another source during the last month before the interview (see table 3.1). These expenditures become assertion in calculating poverty line in which higher than poverty line means high, and lower than poverty line means low economic status.

Table 3.2 Poverty Line in Rupiah (Rp) in the year of 2007
<table>
<tr><th>Province</th><th>Urban</th><th>Rural</th></tr>
<tr><td>North Sumatera</td><td>205,379</td><td>154,827</td></tr>
<tr><td>West Sumatera</td><td>213,942</td><td>163,301</td></tr>
<tr><td>South Sumatera</td><td>205,145</td><td>161,205</td></tr>
<tr><td>Lampung</td><td>187,923</td><td>145,634</td></tr>
<tr><td>Jakarta</td><td>266,874</td><td>-</td></tr>
<tr><td>West Java</td><td>180,821</td><td>144,204</td></tr>
<tr><td>Central Java</td><td>168,186</td><td>140,803</td></tr>
<tr><td>Yogyakarta</td><td>200,855</td><td>156,349</td></tr>
<tr><td>East Java</td><td>166,546</td><td>140,322</td></tr>
<tr><td>Bali</td><td>179,141</td><td>147,963</td></tr>
<tr><td>West Nusa Tenggara</td><td>176,591</td><td>130,867</td></tr>
<tr><td>South Kalimantan</td><td>185,289</td><td>144,647</td></tr>
<tr><td>South Sulawesi</td><td>149,439</td><td>115,788</td></tr>
</table>
Source: ICBS, 2009.</td>
<td>Categorical
Low :1
High :2</td>
</tr>
<tr>
<td>Educational level</td>
<td>Educational level is information about the highest level of schooling attended by respondents. Classified into five categories, namely:
< Elementary school
Elementary school/equivalent;
Junior high school/equivalent;
Senior high school/equivalent;
> Senior high school; and</td>
<td>Categorical
< Elementary school :1
Elementary school /equivalent :2
Junior high school /equivalent :3
Senior high school /equivalent :4
> Senior high school :5</td>
</tr>
<tr>
<td>Marital status</td>
<td>Is information about respondent’s marital status. Following Pampel and Rogers (2004), the status is classified into 4 categories:
single; married; separated and divorced; widowed</td>
<td>Categorical
Single :1
Married :2
Separated and divorced :3
Widowed :5</td>
</tr>
<tr>
<td>Smoking-related morbidity</td>
<td>Is indicated by a dichotomous variable for the presence of either coughing, shortness of breath, high-blood pressure, or other heart and lung diseases. These are the most common symptoms or diseases directly caused by smoking (Djutaharta and Vijaya, 2003).</td>
<td>Dichotomous
Yes :1
No :0</td>
</tr>
</table>

Table 3.1 continued.…

Sex	Is information about the sex of respondent. Classified into 2 categories, namely: Male and female	**Categorical** Male : 1 Female : 2
Smoking Behaviour	It refers to the definition of Pampel and Rogers (2004), i.e. the average number of stick they spend per day and how soon after waking up smokers smoke the first cigarette, cigar or pipe. It is classified into 5 categories, namely: **Non-smoking** if respondent has ever and never chewed tobacco, smoked a pipe, smoked self-rolled cigarettes, or smoked cigarettes/cigars; but have totally quitted now or in the past. **Light smoking** (spends10 sticks per day, and smoke the first cigarette > 60 minutes after waking up); **Moderate smoking** (spends 11-20 sticks per day, and smoke the first cigarette 31-60 minutes after waking up); **Heavy smoking** (spends > 21-30 sticks per day, and only 5 minutes after waking up smoke the first cigarette)	**Categorical** Non-Smoking: 1 Light Smoking :2 Moderate Smoking :3 Heavy Smoking :4

3.6 Data Processing

In sum, the research will be implemented in four (4) steps as below:

1. Preparation Step
   During this step exploration of IFLS 2007 data to acknowledge the possibility of the implementation of smoking behaviour research and the effects on morbidity in Indonesia was conducted. Moreover, after there is conformity between data and the research topic, proposal making was then carried out.

2. Data Collection
   Utilized data in this research can be downloaded to be utilized limitedly from website http://www.rand.org/FLS/IFLS which are raw data file resulted from IFLS 4. Analyze the IFLS data to find out the possibility to implement the research. IFLS 4 data in the format of STATA was chosen in accordance with the purpose the research. The research tool applied was the structured questionnaires which was also used in IFLS 4.

Table 3.3 The Used Variable, File and Questionnaires Code in Research

No	Variable	File Code	Questionnaires Code
1	Age	bk_ar1.dta	AR 09
2	Area of residence	bk_sc.dta	AR 10
3	Economic status	b1_ks1.dta, b1_ks2.dta, and b1_ks3.dta	KS 02, KS 03, and KS 06
4	Educational level	bk_ar1.dta	AR 16
6	Marital status	bk_ar1.dta	AR 11
7	Smoking-related morbidity	b3b_cd3.dta	CD 03
8	Sex	bk_ar1.dta	AR07
9	Smoking behaviour	b3b_km.dta	KM 01, KS 03, and KS 07

Source: IFLS 4 in 2007.

The IFLS 4 questionnaires that were used include 3 types of questions/questionnaire lists: questionnaires for characteristic of household (book T, book II and book IIIA), and questionnaires for general health (book IIIB). Basic informations gathered from each member of households are demographic characteristics, socioeconomic status, and smoking-related morbidity as well as other members of the households. The research is utilizing instruments which are parts of IFLS questionnaires in 1993-2007 which are BK-I until BK-V to describe the relationship between a smoking behaviour on smoking-related morbidity (Table 3.3). Below are data table which are utilized in the research based on file and code in IFLS 4 questionnaires in 2004.

3. Data Processing
   Data processing is a step to answer all the research objectives and questions by using certain methods or techniques. For this research, the data will be analyzed with SPSS (*Statistical Package for the Social Sciences)*. Steps in the data processing consist of:
   a. Selection of variables in files appropriate with the research needs and merge the household and individual variables which are utilized into one file.
   b. Making new variables as research variable.
   c. Coding and regrouping those data.
   d. Analysing by bivariate and logistic regression analysis.

3.7 Data Analysis

The study will use descriptive statistics to describe the extent of demographic character tics and socioeconomic variables influence to smoking behaviour and the relationship between smoking behaviour and smoking-related morbidity. After data are obtained, the next step is analysing the relationship between independent and dependent variable. Prior to the implementation of gradually data analysis, data processing was conducted with computerisation.The implementation of gradually data analysis are as follows:

3.7.1 Univariate Analysis

Univariable analysis to gain general image of research subject by distributing frequency are variables existed in this research that are formulated descriptively. Frequency distribution table included demographic characteristics (age, area of residence, marital status, and sex), socioeconomic status (educational level, and economic status), smoking behaviour, and smoking-related morbidity.

3.7.2 Bivariate Analysis

Bivariate analysis is an analysis using cross tabulation and chi-square. Such analysis is conducted to find out the relation between independent variable and dependent variable based on distribution of existed cells. At the next step, cross tabulation is conducted to all of other variables which are also analysed between (i) demographic characteristics, socioeconomic status and smoking behaviour; (ii) demographic characteristics, socioeconomic status and smoking-related morbidity; and (iii) smoking behaviour and smoking-related morbidity. In this bivariate analysis, two out of three questions related to what kind of demographic characteristics and socioeconomic status influence smoking behaviour of Indonesian population will be answered.The utilized statistic test is chi-square with statistical significance $p<0.05$ to acknowledge the strength of the relation between those variables.

3.7.3 Logistic Regression

Logistic regression analysis is applied to acknowledge whether the relationship between smoking behaviour and smoking-related morbidity is influenced by other variables such as demographic characteristics and socioeconomic status. Logistic regression will be used to model the likelihood of smoking-related morbidity; it is similar to a linear regression model but is suited to models where the dependent variable is dichotomous (Nourusis, 1997). This type of analysis allows assumptions about the "simultaneous relationships among several variables" (Babbie, 2010).

In this study, the logistic regression with enter method was applied to know the effect of the set independent or explanatory variables on smoking-related morbidity. Enter method is all potential explanatory variables that are entered into the model without testing (Nourusis, 1997). The outcome or dependent variables is dichotomous with categorical responses 'yes' or 'no' for the presence of either coughing, shortness of breath, high-blood pressure, or other heart and lung diseases and coded into 1= 'yes' and 0= 'no'.

Three categories of variables will be used as predictors of smoking-related morbidity: (i) smoking behaviour; (ii) respondent's demographic characteristics consist of age, sex, marital status, and area of residence; and (iii) measures of socioeconomic characteristics at the individual consisting of educational level and economic status. The first category of smoking behaviour, smoking status is indicated by non-smoking (reference category), light smoking, moderate smoking, and heavy smoking.

The second category includes individual's age, sex, marital status, and area of residence. Age is categorized by seven category, i.e.; (i) 15-19 (reference category); (ii) 20-29; (iii) 30-39; (iv) 40-49; (v) 50-59; and (vi) > 60 years. Sex is indicated by dummy variables for men and women (reference category). Marital status is indicated by five dummy variables: single (reference category), married, separated and divorced, and widowed. Area of residence is indicated by dummy variables for urban and rural (reference category). The final category includes measures of socioeconomic status at the individual. Measures of socioeconomic status at the individual level are represented by education and economic status. Educational level is indicated by five variables, i.e. < elementary school (reference category); (ii) elementary school/equivalent; (iii) junior high school/equivalent; (iv) senior high school/equivalent; and (v) > senior high school. Economic status is indicated by dummy variables for high (reference category).

With these variables, five models will be built in the analysis. The first (baseline) model includes only one main effect of smoking-related morbidity, i.e. smoking behaviour. Second, model includes two of the main effect of smoking-related morbidity, i.e. smoking behaviour and demographic characteristics. Third, similar to the previous model which includes the main effect of smoking-related morbidity, i.e. smoking behaviour and socioeconomic status. Fourth, model includes all of the main effect of smoking-related morbidity, i.e. smoking behaviour, demographic characteristics, and socioeconomic status. The fifth model adds interaction terms. Only coefficients with $p \leq 0.05$ are regarded as significant.

Interpretation of the parameters of the models involves determining functional relationship of the dependent and Independent variable; the Odds ratio approximates how much more likely or unlikely it is for an outcome to be present among those with x=1 (Hosmerslow and Lemeshow, 2003). In order to have a meaningful interpretation of the five models, odds ratios of the coefficients will be computed. The Odds ratio is defined as probability of success over

failure (Nourusis, 1997). If Odds ratios < 1, it indicates that the odds of smoking-related morbidity increase and the p(y=1) becomes smaller. On the other hand, if Odds ratios > 1, the odds ratios of smoking-related morbidity increase and the p(y=1) becomes larger. Meanwhile, Odds ratio =1, the odds ratios of smoking-related morbidity and p(y=1) has no effect on the outcome.

3.8 Ethical Considerations

The protection of the subjects' privacy is important even when dealing with quantitative data on a large scale (Babbie, 2010). This study is based on the micro data of Indonesian Family Life and Survey 2007 which is only released under strict conditions. Users have to sign "an undertaking stating that the information will only be used for statistical purposes" and need the approval of the the RAND Corporation. The data from the Indonesian Family Life and Survey 2007 files has to be treated confidentially.

CHAPTER 4

RESULTS

4.1 Introduction

In this chapter, data results and analysis are presented in four sections in which the second and third sections give the research result by questions and hypothesis. First, univariate analysis section provides the descriptive statistic of sample including all of variables such as demographic characteristics, socioeconomic status, smoking behaviour and smoking-related morbidity. Second, bivariate analysis section provides cross tabulation cross of all variables which are also analysed between independent and dependent variable: (i) demographic characteristics, socioeconomic status (independent variable) and smoking behaviour (dependent variable); (ii) demographic characteristics, socioeconomic status (independent variable) and smoking-related morbidity (dependent variable); and (iii) smoking behaviour (independent variable) and smoking-related morbidity (dependent variable). Finally, logistic regression analysis session gives five models as belabored in the previous chapter to acknowledge whether the relationship between smoking behaviour and smoking-related morbidity is influenced by other variables (demographic characteristics and socioeconomic status).

4.2 Characteristics of Respondents

It is important to note that there are some differentials in the original sample of 2007 Indonesian Family Life and Survey before discussing the results of the bivariate and logistic regression analysis. Table 4.1 below describes the individual's demographic characteristic, socioeconomic status, smoking behavior, and smoking-related morbidity of respondents.

Table 4.1 Distribution of the Characteristics Respondents by Demographic Characteristics, Socioeconomic Status, Smoking Behaviour, and Smoking-related Morbidity, 2007 IFLS

Variable	All (n= 27,510)	Percentage (%)
Demographic Characteristics (%)		
Age		
15-19	3,164	11.5
20-29	7,538	27.4
30-39	6,358	23.1
40-49	4,535	16.5
50-59	2,974	10.8
≥ 60	2,928	10.6
Missing cases	13	0.0
Sex		
Men	13,157	47.8
Women	14,353	52.2
Area of Residence		
Urban	14,785	53.7
Rural	12,725	46.3
Marital Status		
Single	7153	26.0
Married	17,854	64.9
Separated and divorced	660	2.4
Widowed	1,623	5.9
Missing cases	220	0.8

Table 4.1 continued….

Socioeconomic Status (SES) (%)		
Educational Level		
< Elementary School	2,165	7.8
Elementary School/Equivalent	9,692	35.2
Junior High School/Equivalent	4,998	18.2
Senior High School/Equivalent	7,777	28.3
> Senior High School	2,876	10.5
Missing cases	2	0.0
Economic Status		
High	7,890	71.3
Low	19,620	28.7
Smoking behaviour (%)		
Smoking behaviour [1]		
Non-Smoking	18,089	65.8
Light smoking	4,431	16.1
Moderate smoking	4,259	15.5
Heavy smoking	731	2.7
Smoking-related Morbidity (%)		
Smoking-related Morbidity		
Yes	10,397	62.2
No	17,113	37.8

The total sample in this research based on secondary data 2007 IFLS was 27,510 respondents. The age distribution of respondents is skewed to right, that is, the frequency of ages rises from 11.5 percent among teenagers to 27.4 percent among ages 20-29 and gradually falls (10.6%) up to ages 60 years and over. The sex distribution of respondents indicates that the majority (52.2%) are women that are a low sex ratio. There were 13 respondents for missing cases in age categories. In addition, data indicates a rural-urban dichotomy that is unequal distribution of respondents by residence status. The majority (53.7%) of the respondents are indicated to have come from urban areas as opposed to rural areas. A look at the distribution of respondents by marital status indicates that a great majority (64.9%) were married; only a quarter (26%) was not married or single. Only 5.9 percent of respondents were widowed, and two percent were separated and divorced. There were missing cases in marital status that is equal to 0.8 percent or equivalent to 220 respondents.

The educational level of respondents indicates that 35.2 percent has attained elementary education or its equivalent, followed by 28.3 percent who has attained senior high school or its equivalent. In addition, 18.2 percent of the respondents has attained junior high school and 10.5 percent having attained tertiary education (greater than senior high school) while only 7.8 percent of the respondents has not attained any form of education (less than elementary school). There were 2 respondents for missing cases in age categories. The economic status of respondents indicates that seven in ten of the respondents belonged to the high socioeconomic status. The distribution of respondents by smoking behavior indicates that

[1] The definition of smoking behaviour variable (light smoking, moderate smoking, heavy smoking, and non-smoking) contained in table 4.1 to table 4.11 refers to the definition that is presented in Table 3.1, Operational Definitions of Research Variables.

over three quarters (66%) are non-smoking, 16 percent are light smoking and 15.5 percent are moderate smoking while only 3 percent were heavy smoking. The distribution of the respondents by smoking-related morbidity indicates that 37.8 percent has exhibited unhealthiness related to smoking.

4.3 Bivariate Analysis

The bivariate analysis gives preliminary analysis of the data to check the description of frequency and chi-square statistical test regarding (i) the influence of each demographic characteristics (age, sex, area of residence, and marital status) and socioeconomic status (educational level and economic status) on smoking behaviour; and (ii) the influence of each demographic characteristics (age, sex, area of residence, and marital status), socioeconomic status (educational level and economic status), and smoking behaviour (light smoking, moderate smoking, heavy smoking, and non-smoking) on smoking-related morbidity.

Two out of three questions posed in this study are about what kind of demographic characteristics and socioeconomic status that influence smoking behaviour of Indonesian population. Demographic characteristics were drawn from the four hypotheses, namely age, sex, marital status, and area of residence that affect smoking behaviour. Meanwhile, two hypotheses were drawn from the socioeconomic status, namely educational level and economic status that influence smoking behaviour of Indonesian population.

4.3.1 Interplay of Demographic Characteristics and Smoking Behaviour

Table 4.2 is the results of statistical analysis cross-tabulation conducted to examine the influence of four variables of such demographic factors on smoking behaviour.

Table 4.2 Interplay of Demographic Characteristics and Smoking Behaviour

Variable	Smoking Behaviour (n=27,510)				p (Chi-Square)
	Light Smoking	Moderate Smoking	Heavy Smoking	Non-Smoking	
Demographic Characteristics					
Age (n=27,497)					
15-19	428 **(13.5%)**	143 **(4.5%)**	13 **(0.4%)**	2,580 **(81.5%)**	**0.000**
20-29	1,235 **(16.4%)**	1,195 **(15.9%)**	150 **(2.0%)**	4,938 **(65.8%)**	
30-39	944 **(14.8%)**	1,219 **(19.2%)**	204 **(3.2%)**	3,951 **(62.8%)**	
40-49	663 **(14.6%)**	838 **(18.5%)**	191 **(4.2%)**	2,843 **(62.7%)**	
50-59	484 **(16.3%)**	488 **(16.4%)**	111 **(3.7%)**	1,891 **(63.6%)**	
≥ 60	676 **(23.1%)**	376 **(12.8%)**	62 **(2.1%)**	1,814 **(62%)**	
Total (%)	4,430 **(16.1)**	4,259 **(15.5%)**	731 **(2.7%)**	18,077 **(65.7%)**	
Sex (n=27,510)					**0.000**

Table 4.2 continued….

Men	4,173 **(31.7%)**	4,183 **(31.8%)**	716 **(5.4%)**	4,085 **(31%)**	
Women	258 **(1.8%)**	76 **(0.5%)**	15 **(0.1%)**	14,004 **(97.6%)**	
Total (%)	4,431 **(16.1%)**	4,259 **(15.9%)**	731 **(2.7%)**	18,089 **(65.8%)**	
Area of Residence (n=27,510)					
Urban	2,146 **(14.5%)**	2,204 **(14.9%)**	405 **(2.7%)**	10,030 **(67.8)**	**0.000**
Rural	2,285 **(18%)**	2,055 **(16.1%)**	326 **(2.6%)**	8,059 **(63.3%)**	
Total (%)	4,431 **(16.1%)**	4,259 **(15.5%)**	731 **(2.7%)**	18,089 **(65.8%)**	
Marital Status (n=27,290)					
Single	1,302 **(18.2%)**	1,063 **(14.9%)**	75 **(1%)**	4,713 **(65.9%)**	
Married	2,693 **(15.1%)**	2,894 **(16.2%)**	558 **(3.1%)**	11,709 **(65.6%)**	
Separated and divorced	185 **(28%)**	194 **(29.4%)**	24 **(3.6%)**	257 **(39%)**	**0.000**
Widowed	162 **(10%)**	43 **(2.6%)**	16 **(1%)**	1,402 **(86.4%)**	
Total (%)	4,342 **(15.9%)**	4,194 **(15.3%)**	673 **(2.5%)**	18,081 **(66.3%)**	

Note: significant at <0.05.

Data table 4.2 shows that the majority (65.8%) of Indonesian population is non smokers, thus the population who becomes smokers is only minority (34.2%). However, this proportion of smokers is big enough if it is compared to that of the developing countries and other Southeast Asia as in the prevalence of daily smoking among population aged 15 + in OECD countries, namely India (32%), Jordan (30%), Myanmar (24%), Philippines (24%), Vietnam (18%), South Africa (16%), and Singapore (14%) (OECD, 2006). 34.3% of smokers is mostly light smoking (16.1%) and moderate smoking (15.5%), whereas heavy smoking are only 2.7 percent.

Age. The largest proportion of non-smoking in the population is in the youngest age group, 15-19 years (81.5%) and this proportion gradually decreases in the following older age groups. Thus, in the age group over 60 years, the proportion of non-smoking remains 62 percent. In other words, the proportion of non-smoking becomes smaller among the older age population.

It might also be concluded that the proportion of smokers tend to incline in the older age groups; so that the older age of the population thus, the proportion of smokers became higher. Chi-square statistical test shows that the positive relationship between age and smoking behaviour is quite significant, namely 0000 ($p < 0.05$). Therefore, the first research hypothesis can be accepted.

It is interesting to observe the phenomenon of heavy smoking from the data table above, where the proportion of heavy smoking tends to incline steadily from adolescent age group (15-19) up to old age group (40-49) where the proportions are 0.4 → 2.0 percent → 3.2 percent → 4.2 percent. However, the proportion of smokers from the entering old age groups decreases gradually to 3.7 percent in the 50-59 age group, and 2.1 percent in the age group 60 years and above. The data are interesting to be observed by micro study, to reveal the background of the declining proportion of smokers at the age of 50 years and over. *First*, whether that decline might be caused by economic factors, health, personal awareness, or others. *Second*, how they stop heavy smoking behaviour, whether through stopping or reducing the consumption cigarettes, thus heavy smoking becomes light smoking. As seen in data table 4.2 above, the largest proportion of light smoking (23.1 percent) is in the age group 60 years and above.

Sex. In the four stages of tobacco epidemic, (Lopez et al. 1994) indicates that men are more likely to smoke than women. Data table 4.2 also clearly shows that the influence of sex on smoking behaviour, where the proportion of men non-smoking (31%) were much smaller than the proportion of women non-smoking which reaches 97.6 percent. This suggests that men are much more affected to be smokers than women, and chi-square statistical test shows that the difference influence is statistically significant.

Thus, the second research hypothesis can also be accepted in which the difference influence is also apparent when the frequency distribution of sex on the level of smoking behaviour observed, where of the total of349 female smokers, 258 respondents or 73.9% are only light smoking. The majority of male smokers is moderate smoking while 716 respondents or 79% of male smokers are heavy smoking.

Area of residence. Table 4.2 also shows the influence of area of residence on smoking behaviour, where the proportion of non-smoking is smaller in rural areas (63.3%) than in urban areas (67.8%). This data suggests that rural residents have a greater tendency to be smokers than rural residents. If it is observed from the population of smokers, the greater proportion of smokers population in rural than urban areas is more clearly seen in the group of light smoking (18%:14.5%) and moderate smoking (16.1%:14.9%). The Chi-square statistical test shows that the difference in area of residence between rural and urban areas significantly influences smoking behaviour. Therefore, the third research hypothesis can be accepted.

Marital status. In addition, the table above also shows the influence of marital status on smoking behavior. It is statistically proven that the differences of marital status influence smoking behaviour. From the non-smoking data, it can be clearly shown that widowed has the biggest proportion (86.4%), then followed respectively by single (65.9%), married (65.6%), and separated and divorced with the smallest proportion (39%). Therefore, it is seen from the non-smoking data that those who separate and divorce show the biggest proportion (61%), then followed by married (34.4%), and widowed is only 13.6%.

The widowed appears with the impressive numbers, with a small proportion of smokers (13.6%) and mostly just light smoking. Apparently, the deceased husband or wife could be accepted without the psychological shock of protracted, so they are not encouraged to become smokers as sublime acts. The figure for smokers with separated and divorced status is also impressive (61%). It seems that they appeared dominant at all levels of smoking behavior. Divorce may have led to trauma, with psychological shocks so it encourages them

to become smokers as a sublime act either conscious or less conscious. It is in accordance with Martin et al. (2007) indicating that unmarried are more likely to smoke.
The difference of smoking behaviour between population who have single and married status is not too striking, unless they are single in which the majority of them are light smoking. The majority of those who are married are moderate smoking, and heavy smoking have quite big proportion too.

However, in general, the chi square test statistics shows that differences in marital status have a significant influence on smoking behaviour of the Indonesian population. Thus, the fourth research hypothesis can be accepted.

4.3.2 Relationship of Socioeconomic Status and Smoking Behaviour

Here is a chi-square statistical analysis to examine how the effects of both socioeconomic status factor, i.e. the variables education level and socioeconomic status on smoking behaviour.

Table 4.3 Socioeconomic Status and their Relationship with Smoking Behaviour

Variable	Smoking Behaviour (n=27,510)				p (Chi-Square)
	Light Smoking	Moderate Smoking	Heavy Smoking	Non-Smoking	
Socioeconomic Status (SES)					
Educational Level (n=27,508)					
< Elementary School	294 **(13.6%)**	214 **(9.9%)**	26 **(1.2%)**	1,631 **(75.3%)**	**0.000**
Elementary School/Equivalent	1,799 **(18.6%)**	1,595 **(16.5%)**	250 **(2.6%)**	6048 **(62.4%)**	
Junior High School/Equivalent	785 **(15.7%)**	862 **(17.2%)**	120 **(2.4%)**	3,231 **(64.6%)**	
Senior High School/Equivalent	1,196 **(15.4%)**	1,218 **(15.7%)**	246 **(3.2%)**	5,117 **(65.8%)**	
> Senior High School	357 **(12.4%)**	370 **(12.9%)**	89 **(3.1%)**	2,060 **(71.6%)**	
Total (%)	4,431 **(16.1%)**	4,259 **(15.5%)**	731 **(2.7%)**	18,087 **(65.8%)**	
Economic Status (n=27,510)					
High	2,844 **(14.5%)**	3,146 **(16%)**	602 **(3.1%)**	13,028 **(66.4%)**	**0.000**
Low	1,587 **(20.1%)**	1,113 **(14.1%)**	129 **(1.6%)**	5,061 **(64.1%)**	
Total (%)	4,431 **(16.1%)**	4,259 **(15.5%)**	731 **(2.7%)**	18,089 **(65.8)**	

Note: significant at <0.05.

Educational level. Considering the frequency distribution in the group of non-smoking in table 4.3, it is reflected that this proportion of non-smoking population increases linearly in those with educational level of elementary school/equivalent (62.4%), junior high school/equivalent (65.8%), senior high school/equivalent (65.8%), and > senior high school (71.6%). However, the proportion of non-smoking in the population with less than elementary school which appeared with the biggest number (75.3%) is a bit surprising,

thereby disrupting the strong impression of a negative relationship between educational level and smoking behaviour. However, the chi-square statistical test shows that this "*disturbance*" does not damage the significant negative influence of educational level on smoking behaviour. It means that the higher educational level, the lower the proportion of smokers. It is in accordance with Baris et al. (2004) indicating in their study that educational attainment is inversely associated with risky behavior such as smoking.

The small proportion of smokers in the group of <elementary school might be due to a lack of good samples, where the number of samples from the <elementary school is the smallest (2.165) among sample of other educational levels. Or it could be due to the specific demographic characteristics of the sample from the <elementary school. However, statistical tests on the data table chi square 4.3 has shown a significant negative relationship between level of education with smoking behaviour ($p < 0.05$), where it proves the truth of the fifth research hypothesis.

Economic status. Data table 4.3 also shows that the proportion of smokers in the group of lower economic status is larger (35.9%) than that in the group of high economic status (33.6%). Their smoking behaviour is also quite different, where the smokers in the group of low economic status are light smoking, while smokers in the group of high economic status are smokers at most moderate smoking, and big enough in heavy smoking.

The Chi-square statistic test reveals that there is a significant influence of economic status on smoking behaviour, where the population with low economic status has a greater proportion of smokers than that of the population of high economic status. However, because the choice to be smokers needs costs, the majority of them who are low economic status tend to be light smoking. Meanwhile, most of the respondents with high economic status are moderate smoking and some of them are heavy smoking.

4.3.3 Relationship of Smoking Behaviour Variable and Smoking-related Morbidity

To test the influence of smoking behaviour on smoking-related morbidity, in this sub-chapter we will give a preliminary analysis that explains the chi-square statistical analysis to examine those influences. Data Table 4.4 below shows the pattern of frequency distribution clearly demonstrating that there is strong influence of smoking behaviour on smoking related morbidity.

Table 4.4 Smoking Behaviour and their Relationship with Smoking-related Morbidity

Variable	Smoking-related Morbidity (n=27,510)		p (Chi-Square)
	Yes	**No**	
Smoking Behaviour (n=27,510)			
Light Smoking	4,081 **(92.1%)**	350 **(7.9%)**	**0.000**
Moderate Smoking	3,969 **(93.2%)**	290 **(6.8%)**	
Heavy Smoking	667 **(91.2%)**	64 **(8.8%)**	
Non-Smoking	1,680 **(9.3%)**	16,409 **(90.7)**	
Total (%)	10,397 **(37.8%)**	17,113 **(62.2%)**	

Note: significant at <0.05.

Data table 4.4 shows that the majority of population (62.2.%) does not suffer from smoking-related morbidity; it is only 37.8 percent respondents suffering from smoking-related morbidity. Morbidity is defined as previously described, namely for the presence of either coughing, shortness of breath, high blood pressure, or other heart and lung diseases. The pattern of frequency distribution in that table clearly shows that there is a strong influence between smoking behaviour and smoking-related morbidity

The distribution of frequency amongst non-smoking shows that the majority (90.7%) of them does not suffer from such smoking-related morbidity. Only a small proportion (9.3%) suffers from such smoking-related morbidity. Amongst smokers, either light smoking, moderate smoking, or heavy smoking, it can be seen that almost all of them ($\geq$ 91%) indicates that they get affected by those smoking-related morbidity. Only a small proportion (<9%) states that they do not suffer from smoking-related morbidity, even among moderate smoking only 6.8 percent is not infected. These data clearly illustrate that smoking is potentially suffered by smoking-related morbidity.

Those data explanation clearly demonstrates that there is a strong influence of smoking behaviour on smoking-related morbidity, and chi-square statistical test proves that the influence is statistically significant, thus it supports the sixth hypothesis that smoking behaviour has a positive effect on the incidence of morbidity.

Besides smoking factors, there are still many factors behind the phenomena of morbidity. Demographic characteristics factor and socioeconomic status could appear as the indirectly cause of smoking-related morbidity. The embryo of a disease might not be developed into prolonged disease if it is not supported by other factors such as decrepit, unhealthy environment of neighborhood, high depression due to the divorce, sluggish response to medical treatment because of the low medical patients or due to poverty.

The following is an analysis to observe the extent to which four variables of demographic characteristics and two variables of socioeconomic status affect on smoking-related morbidity

4.3.4 Demographic Characteristics and Smoking-related Morbidity

Here is a chi-square statistical analysis to examine how the effects of demographic characteristics factor, i.e. the variables age, sex, area of residence and marital status on smoking behaviour.

Age. The data of table 4.5below presents that the variable of age on smoking-related morbidity strongly suggests that there is a strong relationship among them. In the adolescent age group (15-19) the proportion of those suffer from those smoking-related morbidity is only 18.4 percent, but it linearly rises in the following older age groups and falls 1.9 percent in the age group of 60 years above, so that in the proportion of age group of 50-59 reaches 48.8 percent and 46.9 percent in the age group of 60 years above. The Chi-square statistical test also shows that there is a significant positive relationship, in which the older the population ages, the bigger the proportion of people suffering from those smoking-related morbidity.

When it is associated with the data analysis of table 4.2 which shows a significant positive relationship between age and smoking behaviour, in which the older age of population, the greater the proportion of smokers; it is increasingly believed that smoking behaviour is very

influential on the incidence of smoking-related morbidity, namely coughing, shortness of breath, high-blood pressure, or other heart and lung diseases.

Table 4.5 Demographic Characteristics and their Relationship with Smoking-related Morbidity

Variable	Smoking-related Morbidity (n=27,510)		p (Chi-Square)
	Yes	No	
Age (n=27,497)			
15-19	583	2,581	
	(18.4%)	**(81.6%)**	
20-29	2,580	4,958	
	(34.2%)	**(65.8%)**	
30-39	2,366	3,992	
	(37.2%)	**(62.8%)**	**0.000**
40-49	2,042	2,493	
	(45%)	**(55%)**	
50-59	1,452	1,522	
	(48.8%)	**(51.2%)**	
≥ 60	1,373	1,555	
	(46.9%)	**(53.1%)**	
Total	10,396	17,101	
(%)	**(37.8%)**	**(62.2%)**	
Sex (n=27,510)			
Men	8,709	4,448	
	(66.2%)	**(33.8%)**	**0.000**
Women	1,688	12,665	
	(11.8%)	**(88.2%)**	
Total	10,397	17,113	
(%)	**(37.8%)**	**(62.2%)**	
Area of Residence (n=27,510)			
Urban	5,362	9,423	
	(36.3%)	**(63.7%)**	**0.000**
Rural	5,035	7,690	
	(39.6%)	**(60.4%)**	
Total	10,397	17,113	
(%)	**(37.8%)**	**(62.2%)**	
Marital Status (n=27,290)			
Single	2,339	4,814	
	(32.7%)	**(67.3%)**	
Married	7,124	10,730	
	(39.9)	**(60.1%)**	**0.000**
Separated and divorced	235	425	
	(35.6%)	**(64.4%)**	
Widowed	579	1,044	
	(35.7%)	**(64.3%)**	
Total	10,277	17,013	
(%)	**(37.7%)**	**(62.3%)**	

Note: significant at <0.05.

Sex. The chi-square statistical analysis to the data table 4.5 shows that there is a significant difference influence between the variable of age and smoking-related morbidity, where men are much more problematic with smoking-related morbidity (66.2%) than women (11.8%). It means that men were more susceptible to smoking-related morbidity compared to women due to other factors not caused by smoking behaviour. This is due to the data table 4.2 that there was a significant difference in smoking behaviour between men and women, where the proportion of smokers amongst women is only 2.4 percent, and it is far below the proportion of men smokers that reaches 69 percent.

Area of residence. Data table 4.5 shows that the majority of population in urban and rural does not suffer from smoking-related morbidity. However there was a significant pattern of differed frequency distribution, where the rural areas have greater proportion of population suffering from smoking-related morbidity (39.6%) than urban areas (36.3%). Despite the little difference in the number that is shown in the table above, this difference is statistically significant. Rural areas have more population suffering from smoking-related morbidity than urban areas; this might be resulted from the less conducive of environmental conditions to health. The little awareness of health and short of health facilities in the rural areas could also be other factors that make them more vulnerable to smoking-related morbidity. The factor of smoking behaviour seems to be relevant, because the analysis of data table 4.2 shows that the proportion of smokers in urban areas are actually smaller than in rural areas.

Marital Status. Statistical analysis of data that links between marital status and smoking-related morbidity in the table 4.5 shows that there is a significant influence of marital status on smoking-related morbidity. Those data table shows that the proportion of population suffering from smoking-related morbidity is married (39.9%), then followed by widowed status (35.7%), separated and divorced (35.6%), and single (32.7%).

If it is linked with the analysis of data table 4.2 which shows that there is a significant differences influence between marital status and smoking behaviour, where widowed smokers actually have the smallest proportion (13.6%) while separated and divorced smokers appear as the biggest proportion (61%). Therefore, it can be trusted that the influence of marital status on smoking-related morbidity is not much caused by smoking behaviour.

4.3.5 Relationship of Socioeconomic Status and Smoking-related Morbidity

Here is a chi-square statistical analysis to examine how the effects of demographic socioeconomic status factor, i.e. the variables educational level and economic status on smoking behaviour.

Educational level. Data table 4.6 below shows the pattern of frequency distribution of population based on smoking-related morbidity. All follows a general pattern at every educational level, i.e. the majority said that they did not suffer from smoking-related morbidity. In general, the frequency distribution suggests a negative relationship between educational level and smoking-related morbidity, where it is clearly shown than the higher educational level, the smaller proportion of population who suffer from smoking-related morbidity. The biggest proportion who suffer from smoking-related morbidity is elementary school (43.3%) which is higher 8.7 percent than < elementary school. Subsequently, at higher educational level, the proportion linearly decreases thus amongst population with education at > senior high school/equivalent remains 29.9 %. Even amongst the educated population at < elementary school who had problems with those smoking-related morbidity decreases 8.7

percent into 34.3 %, but the chi-square statistical test proves that a negative relationship between educational level and smoking-related morbidity is still significant.

If it is linked with data table 4.3 that demonstrates the presence of significant negative influence of educational level on smoking behaviour, it can be concluded that the reduced proportion of population suffering from smoking-related morbidity is in line with the rising educational level due to reduced factor of smoking behaviour amongst population who are more educated.

Table 4.6 Socioeconomic Status and their Relationship with Smoking-related Morbidity

Variable	Smoking-related Morbidity (n=27,510)		p (Chi-Square)
	Yes	No	
Socioeconomic Status (SES)			
Educational Level (n=27,508)			
< Elementary School	743 **(34.3%)**	1,422 **(65.7%)**	**0.000**
Elementary School/Equivalent	4,172 **(43%)**	5,520 **(57%)**	
Junior High School/Equivalent	1,856 **(37.1%)**	3,142 **(62.9%)**	
Senior High School/Equivalent	2,766 **(35.6%)**	5,011 **(64.4%)**	
> Senior High School	859 **(29.9%)**	2,017 **(70.1%)**	
Total (%)	10,396 **(37.8%)**	17,112 **(62.2%)**	
Economic Status (n=27,510)			
High	7,255 **(37%)**	12,365 **(63%)**	**0.000**
Low	3,142 **(39.8%)**	4,748 **(60.2%)**	
Total (%)	10,397 **(37.8%)**	17,113 **(62.2%)**	

Note: significant at <0.05.

Economic Status. The chi-square statistical analysis to the data table 4.6 shows that there is a significant difference influence between the variable of economic status and smoking-related morbidity, where low economic status are much more problematic with smoking-related morbidity (39.8%) than high economic status (37%). It means that low economic status were more susceptible to smoking-related morbidity compared to high economic status. This might be resulted by their inability to access health facilities due to the financial problems. If it is linked with data data table 4.2 that there was a significant difference in smoking behaviour between low and high economic status, where the proportion of smokers in the group of lower economic status is larger (35.9%) than that in the group of high economic status (33.6%).

4.4 Logistic Regression

The third question proposed in this research is the effect of smoking behaviour on smoking-related morbidity, and to what extent demographic characteristics factor and socioeconomic status influence the relationship between smoking behaviour and smoking-related morbidity. In this case, three hypotheses were drawn, namely (i) smoking behaviour is associated with smoking-related morbidity; (ii) demographic characteristics variables influence the relationship between smoking behaviour and smoking-related morbidity; and (iii) socioeconomic variables influence the relationship between smoking behaviour and smoking-related morbidity.

The first and second research question has been discussed in the previous analysis. To answer the third research question a logistic regression analysis with 5 (five) models as previously described is employed. Each of these five models put smoking-related morbidity as dependent variable, namely (i) smoking behaviour as the only independent variable; (ii) smoking behaviour and demographic characteristics variables as independent variable; (iii) smoking behaviour and socioeconomic status variables as independent variable; (iv) smoking behaviour, demographic characteristics variables and socioeconomic status variables as independent variable; and (v) adds interactive effect between smoking behaviour and all of demographic and socioeconomic status variables.

4.4.1. The Impact of Smoking Behaviour on Smoking-related Morbidity

Almost all of the smokers (83.9%) have a problem with smoking-related morbidity. On the other hand, amongs the non-smokers, only 16.1% of them have a problem with smoking-related morbidity.

Table 4.7 Impact of Smoking Behaviour on Smoking-related Morbidity (Model 1)

Variable	**Smoking-related Morbidity**	
	Odds Ratios	**Sig.(0.05)**
Main effects		
Smoking Behavior [Non-Smoking]		0.000
Light Smoking	**93.30**	0.000
Moderate Smoking	**110.74**	0.000
Heavy Smoking	**84.42**	0.000
-2 Log Likelihood	**15436.89**	

Note: significant at <0.05., [] reference category

Model 1 shows that smoking behavior significantly ($p<0.05$) predicts smoking-related morbidity. The risk of smoking-related morbidity is significantly higher for light smoking (OR=93.3), moderate smoking (OR=110.7) and heavy smoking (OR=84.4) relative to non-smoking. This indicates that the risk of smoking-related morbidity is high among smokers. Certainly, the -2 Log Likelihood improves significantly from the empty model when smoking behavior is entered into the empty model. This proves the hypothesis that smoking behaviors is directly associated with smoking-related morbidity.

4.4.2. The Effect of Demographic Characteristics on Smoking Behaviour and Smoking-related Morbidity

In model II, age, sex, marital status and area of residence of the respondents were added to the first model which had smoking behaviour only.

Table 4.8 The Effect of Demographic Factors on the Relationship between Smoking Behaviour and Smoking-related Morbidity

Variable	Smoking-related Morbidity	
	Odds Ratios	**Sig.(0.05)**
Main effects		
Smoking Behavior [Non-Smoking]		**0.000**
Light Smoking	**127.71**	0.000
Moderate Smoking	**148.63**	0.000
Heavy Smoking	**101.65**	0.000
Age [15-19]		**0.000**
20-29	**1.86**	0.000
30-39	**2.15**	0.000
40-49	**5.93**	0.000
50-59	**8.32**	0.000
≥ 60	**5.31**	0.000
Sex [Women]		
Men	0.976	0.717
Area of Residence [Rural]		
Urban	**1.10**	0.027
Marital Status [Single]		**0.000**
Married	**0.70**	0.000
Separated and divorced	0.86	0.311
Widowed	**1.36**	0.005
-2 Log Likelihood	**14489.25**	

Note: significant at <0.05., [] reference category

Results from table 4.2 indicate that smoking behavior remain a significant predictor of smoking-related morbidity when other covariates are added to the model. Light, moderate and heavy smoking have high odds ratios of smoking-related morbidity relative to non-smoking. Furthermore, model II indicates a significant effect of age, area of residence and marital status on smoking related morbidity. The odds ratios of smoking-related morbidity are high and increases directly with increase in age from OR=1.9 (20-29) to OR=8.3 among ages 50-59 relative to adolescents (15-19).

In addition, population in urban areas have significantly higher odds ratios (OR=1.10) of smoking related morbidity relative to those in rural areas. Married and separated or divorced persons have low risk (0.70 and 0.86 respectively) of smoking related morbidity as opposed to widowed population (OR=1.36) relative to population in single status. However, the risk of smoking-related morbidity is independent of an individual's sex. Though the risk to smoking related morbidity is low for men (0.98) relative women, it is not significant (p=0.717). The -2 Log Likelihood improved significantly to (14489.3) from the model with only smoking behavior (15436.9) indicating better fit of the data. The results thus, show that the null hypothesis that demographic variables directly influences smoking-related morbidity is accepted for age, place of residence and marital status while rejected for sex of an individual.

4.4.3. The Effect of Socioeconomic Status on Smoking Behaviour and Smoking-related Morbidity

In model III, educational level and economic status were added to model I which contained smoking behaviour.

Table 4.9 The Effect of Socioeconomic Factors on the Relationship between Smoking Behaviour and Smoking-related Morbidity

Variable	Smoking-related Morbidity	
	Odds Ratios	**Sig.(0.05)**
Main effects		
Smoking Behavior [Non-Smoking]		**0.000**
Light Smoking	**121.71**	0.000
Moderate Smoking	**145.98**	0.000
Heavy Smoking	**114.55**	0.000
Educational Level [< Elementary School]		**0.000**
Elementary School/	**0.80**	0.004
Junior High	**0.47**	0.000
Senior High	**0.43**	0.000
> Senior High School	**0.38**	0.000
Economic Status [High]		
Low	**0.90**	0.038
-2 Log Likelihood	**15950.06**	

Note: significant at <0.05., [] reference category

Table 4.9 shows that smoking behavior is a significant predictor of smoking-related morbidity when education attainment and economic status are added to the model. Light, moderate and heavy smoking have higher odds ratios of smoking-related morbidity relative to non-smoking. Furthermore, education attainment and economic status strongly predicts the risk smoking related morbidity. The odds ratios of smoking-related morbidity is significantly lower and decreases significantly from OR=0.80 among persons with elementary education to OR=0.38 among persons Tertiary education relative to population with < elementary school. In addition however, the odds ratios of persons in low economic status to smoking-related morbidity is significantly lower (OR=0.90) relative to population in high economic status. Hence, in accordance to the last research question, social economic statuses have an effect on smoking-related morbidity.

Henceforth, we accept the null hypothesis that social economic status has a direct influence on smoking related morbidity. The low risk to smoking-related morbidity among population of low economic class contrasts Pampel and Roger (2004) social vulnerability hypothesis. The advantage of availability of resources, more information for population in high economic class to control negative effects of smoking is not reflected in this model.

4.4.4. The Effect of Demographic Characteristics and Socioeconomic Status on Smoking Behaviour and Smoking-related Morbidity

Model IV combines all variables in model I to III that is smoking behavior, demographic characteristics and socioeconomic status variables in a single model. The model indicates that smoking behavior remain a significant predictor of the risk of smoking related morbidity amidst demographic and social economic variables.

Table 4.10 The Effect of Demographic and Socioeconomic Factors on the Relationship between Smoking Behaviour and Smoking-related Morbidity

Variable	Smoking-related Morbidity	
	Odds Ratios	**Sig.(0.05)**
Main effects		
Smoking Behavior [Non-Smoking]		**0.000**
Light Smoking	**124.77**	0.000
Moderate Smoking	**145.18**	0.000
Heavy Smoking	**101.60**	0.000
Age [15-19]		**0.000**
20-29	**1.94**	0.000
30-39	**2.23**	0.000
40-49	**6.03**	0.000
50-59	**8.36**	0.000
≥ 60	**5.44**	0.000
Sex [Women]		
Men	0.99	0.954
Area of Residence [Rural]		
Urban	**1.15**	0.004
Marital Status [Single]		**0.000**
Married	**0.66**	0.000
Separated and divorced	0.82	0.177
Widowed	**1.31**	0.018
Educational Level [< Elementary School]		**0.000**
Elementary School	**1.20**	0.023
Junior High	1.11	0.305
Senior High	**1.04**	0.655
> Senior High School	**0.79**	0.043
Economic Status [High]		
Low	0.99	0.809
-2 Log Likelihood	**14463.34**	

Note: significant at <0.05., [] reference category

The risk of smoking-related morbidity for light, moderate and heavy smoking is significantly higher (OR=124.8, OR=145.2 and OR=101.6 respectively) relative to non-smoking. Furthermore, age, education attainment and marital status remain significant predictor of the risk of smoking-related morbidity. The odds ratios of smoking-related morbidity are high and increases directly with increase in age from OR=1.9 (20-29) to OR=8.4 among ages 50-59 relative to adolescents (15-19). Married and separated or divorced persons have low risk (OR=0.70 and OR=0.82 respectively), while widowed person have higher odds ratioOR=1.36) of smoking-related morbidity relative to persons in single status. However, the odds ratios of smoking-related morbidity are significantly higher but decreases from OR=1.20 among persons with elementary education to OR=1.04 among persons senior high school and lower (OR=0.79) among persons with Tertiary education relative to persons with < elementary school. Likewise, people in urban areas have significantly higher odds ratios (OR=1.15) of smoking-related morbidity relative to those in rural areas.

On the other hand, the risk of smoking related morbidity is again independent of an individual's sex and economic status. Though the risk to smoking-related morbidity is low for men and low economic status relative to women and high economic status, it is not

significantly different. The -2 Log Likelihood improved significantly to (14463.34) from the model with only smoking behavior (15436.9) indicating better fit of the data.

This confirms earlier results that accepted the null hypothesis that demographic variables (age, place of residence, education and marital status) directly influence smoking-related morbidity. The hypothesis is rejected on sex and economic status of an individual. Likewise, the findings do not conform to Pampel and Roger (2004) social vulnerability hypothesis, since people on low economic status have lower risk to smoking related morbidity.

4.4.5. The Interactive Effects of Demographic Characteristics and Socioeconomic Status Factors on Smoking-related Morbidity

In Model V adds interactive effect between smoking behaviour and all of demographic and socioeconomic status variables

Table 4.11 The Interactive Effect of Demographic Factors and Socioeconomic on the Relationship between Smoking Behaviour and Smoking-related Morbidity

Variable	Smoking-related Morbidity	
	Odds Ratios	**Sig.(0.05)**
Main effects		
Smoking Behavior [Non-Smoking]		0.998
Light Smoking	2.72	0.984
Moderate Smoking	4.78	0.974
Heavy Smoking	2.25	0.997
Age [15-19]		**0.000**
20-29	0.920	0.988
30-39	0.931	0.999
40-49	3.54	0.981
50-59	7.30	0.980
≥ 60	8.74	0.980
Sex [Women]		
Men	**0.69**	0.000
Area of Residence [Rural]		
Urban	**1.25**	0.000
Marital Status [Single]		0.688
Married	1.02	0.914
Separated and divorced	0.85	0.545
Widowed	1.01	0.952
Educational Level [< Elementary School]		**0.000**
Elementary	**1.20**	0.023
Junior High	1.11	0.305
Senior High	**1.04**	0.655
> Senior High	**0.79**	0.043
Economic Status [High]		
Low	**0.79**	0.001
Interactive effects		
Smoking Behavior*Age [Non-Smoking*15-19]		**0.000**
Light Smoking*20-29	0.00	0.990
Light Smoking*30-39	0.68	0.999
Light Smoking*40-49	0.00	0.986
Light Smoking*50-59	0.00	0.985
Light Smoking*≥60	0.00	0.985

Table 4.11 continued....

Non-Smoking*15-19	**Ref.**	**Ref.**
Moderate Smoking*20-29	0.00	0.999
Moderate Smoking*30-39	0.00	0.999
Moderate Smoking*40-49	0.00	0.998
Moderate Smoking*50-59	0.00	0.997
Moderate Smoking*≥60	0.00	0.997
Non-Smoking*15-19	**Ref.**	**Ref.**
Heavy Smoking*20-29	0.00	0.999
Heavy Smoking*30-39	0.00	0.999
Heavy Smoking*40-49	0.00	0.998
Heavy Smoking*50-59	0.00	0.997
Heavy Smoking*≥60	0.00	0.997
Smoking Behavior*Sex [Non-Smoking*Women]		**0.001**
Light Smoking*Men	**1.85**	0.005
Moderate Smoking*Men	**2.37**	0.015
Heavy Smoking*Men	5.54	0.058
Smoking Behavior*Area of Residence[Rural]		**0.000**
Light Smoking*Urban	**0.60**	0.000
Moderate Smoking*Urban	**0.59**	0.001
Heavy Smoking*Urban	0.74	0.355
Smoking Behavior*Marital Status [Non-Smoking*Single]		0.499
Light Smoking*Married	1.71	0.413
Light Smoking*Separated and divorced	3.29	0.138
Light Smoking*Widowed	1.55	0.528
Moderate Smoking*Married	0.12	0.096
Moderate Smoking*Separated and divorced	0.24	0.310
Moderate Smoking*Widowed	0.09	0.066
Heavy Smoking*Married	2.07	0.557
Heavy Smoking*Separated and divorced	2.45	0.998
Heavy *Widowed	2.05	0.602
Smoking Behavior*Educational Level		0.254
Non-Smoking*< Elementary school	**Ref.**	**Ref.**
Light Smoking*Elementary School/Equivalent	0.77	0.183
Light Smoking*Junior High School/Equivalent	0.74	0.296
Light Smoking*Senior High School/Equivalent	0.76	0.333
Light Smoking*> Senior High School	0.56	0.102
Moderate Smoking*Elementary School/Equivalent	**0.42**	0.002
Moderate Smoking*Junior High School/Equivalent	**0.36**	0.003
Moderate Smoking*Senior High School/Equivalent	**0.43**	0.011
Moderate Smoking*> Senior High School	**0.41**	0.019
Heavy Smoking*Elementary School/Equivalent	0.00	0.998
Heavy Smoking*Junior High School/Equivalent	0.00	0.998
Heavy Smoking*Senior High School/Equivalent	0.00	0.998
Heavy Smoking*> Senior High School	0.00	0.998
Smoking Behavior*Economic Status		**0.000**
Non-Smoking*High	**Ref.**	**Ref.**
Light Smoking*Low	**1.89**	0.000

Table 4.11 continued....

Moderate Smoking*Low	**2.73**	0.000
Heavy Smoking*Low	**3.09**	0.023
-2 Log Likelihood	**10416.15**	

Note: significant at <0.05., [] reference category

In table 4.11 shows that, with an interaction effect added to model, the significance effect of smoking behavior on smoking-related morbidity is masked. Though the odds ratios of being light, moderate and heavy smoking (OR=2.72, OR=4.78 and OR=2.25 respectively) are high relative to non-smoking, they are not significant. On the other hand, age remain a significant predictor of smoking-related morbidity but, the odds ratios to smoking-related morbidity among ages 20-59 are not significantly different from that of adolescents (15-19). It should be noted however, that the odds ratios to smoking-related morbidity are increasing with increase in age relative to adolescents. The results further show that men and people in urban areas have significantly lower and higher odds ratios (OR=0.69 and OR=1.25 respectively) of smoking-related morbidity relative to women and people in rural areas respectively. Marital status turns out not a significant predictor of smoking-related morbidity. However, married and separated or divorced persons have higher odds ratios of smoking-related morbidity relative to non-smoking.

Furthermore, education attainment and economic status significantly predict the risk of smoking related morbidity. The odds ratios of smoking-related morbidity are higher and increases with increase in level of education relative to persons with < elementary school, that is the odds ratios decreases from OR=1.20 to 0.79 among persons with elementary and tertiary education respectively. Economic status shows that people of low economic status have significantly lower odds ratios (OR=0.79) of smoking-related morbidity relative to those in high economic status.

The interaction effect between smoking behavior and age is significant and shows that light smokers ages 30-39 have lower odds ratios (OR=0.68) of smoking related morbidity relative to non-smokers ages 15-19. However, interaction between age and moderate or heavy smoking show no effect on the risk of smoking-related morbidity relative to adolescent non-smoking. In addition, men who are light, moderate and heavy smoking have significantly higher odds ratios (OR=1.85, OR=2.37 and OR=5.54 respectively) of smoking-related morbidity relative to non-smoking women. Likewise, light and moderate smoking in urban areas unlike heavy smoking in urban areas have significantly lower odds ratios (OR=0.60 and OR=0.59) relative to non-smoking in rural areas. On the other hand, the interaction between marital status and smoking behavior is not significant. That is light and heavy smoking who are married unlike moderate smoking, separated or widowed have higher odds ratios of smoking-related morbidity relative single non-smoking but the effect is not statistically significant. In addition, light and moderate smoking with elementary to high school education have lower odds ratios (significant for moderate smoking) of smoking-related morbidity relative non-smokers with < elementary school. However, there is no interaction effect between heavy smoking behavior and education attainment. In contrast, the interaction effect between smoking behavior and economic status is statistically significant. Light, moderate and heavy smoking in low economic status have significantly higher odds ratios of smoking related morbidity relative to non-smoking in high economic status.

Overall, age, sex, marital status, area of residence, education attainment and economic status are demographic and social economic factors that influence smoking related morbidity. In

addition, the interaction of smoking behavior and sex, place of residence, economic status, and education influences smoking related morbidity. On the other hand, the interaction of smoking behavior and age, marital status has no influence on smoking-related morbidity. These findings are in contrast with Pampel and Roger (2004) hypothesis. The fact that people in low economic status are not at great risk of smoking-related morbidity, the social vulnerability hypothesis does not apply. However, if we assume that people of low education occupy manual job, the Blaxter hypothesis is applicable since the odds ratios of smoking related morbidity are higher among people with low education attainment.

CHAPTER 5

CONCLUSION AND RECOMMENDATION

5.1 Conclusion

The objectives of this research are to obtain the factors that influence the smoking behavior and the impacts of smoking behavior to the smoking-related morbidity in Indonesia. Through the analysis and result, which are presented in chapter 4, the answer to these objectives is revealed. The following is the answer of the specific research questions mentioned in chapter one.

First, what kind of demographic characteristics influence smoking behaviour in Indonesia? From the whole analysis explained in the previous chapters, it can be seen that the population of smokes in Indonesia is relatively high (34.3%) compared to other countries. Most of the smoking groups are light smoking (47%) and moderate smoking (42.5%) and only a small portion of them are heavy smoking (7.8%). There are four demographic variables analyzed in this research, which are age, sex, area of residence, and marital status. Several variables from the demographic factor show a significant influence on smoking behaviour in Indonesia. Significantly, age has a positive correlation towards smoking behaviour whereas in the groups of older age, the proportion of smokers is increasing. However, there is a tendency that the proportion of heavy smoking in the group of old age (50-59) and ≥60 years old is increasing. This symptom is then followed by the increasing proportion of light smoking in those groups of old age.

The gender variable and the area of residence variable also show a significant difference in smoking behaviour of the population. The proportion of smokers in the male group (69%) is much bigger than the proportion of smokers in the female group which is only 2.4%. The majority of female smokers (73.9%) are light smoking, while most of smokers in the male group are moderate smoking (46.1%) and light smoking (46%). If viewed from the area of residence, smokers proportion in the rural (36.7%) is higher compared to proportion of smokers in urban areas (32.3%). If in the rural area, most of the smokers are light smoking (49%), then on the other hand, in the urban areas, most of the smokers are moderate smoking (46.4%) and light smoking (45.1%).

There is a significant difference that can be seen from the marital status of the population. It is found that the biggest proportion of smokers is in the separated group and the divorced group (60.1%), while the smallest proportion of smokers is found in the widowed group (17.6%). Most of the separated and the divorced smokers are moderate smoking (48.1%) and light smoking (45.9%), while the majority of the widowed smokers (73.3%) are light smoking. On the other hand, the difference between the proportion of smokers in the single group (34.1%) and the proportion of smokers in the married group (34.4%) is not big. Most of single smokers are light smoking (53.4%), while most of married smokers are moderate smoking (47.1%) and light smoking (43.8%).

Second, what kind of socioeconomic status influence smoking behaviour in Indonesia? There are two socioeconomic status variables analyzed in this research, which are educational level and economic status. This factor of socioenomic status also shows a significant relation with the smoking behaviour. The statistic test of chi-square shows that level of education has a negative correlation towards smoking behaviour whereas the higher the level of education,

then the proportion of smokers is significantly decreasing. The pattern of this negative correlation can be seen clearly from the population with low level of education which has a proportion of smokers as big as 37.6%, then it is decreasing linearly in groups of population with higher level of education. The proportion of smokers in the population whose level of education is junior high school and equivalent decreases to 35.4%, the proportion of smokers in the population whose level of education is senior high school and equivalent is 34.2% and the proportion of smokers in the population whose level of education is lower than senior high school becomes 28.4%. There is a strong impression that the level of education also plays the role to establish the awareness concerning the negative effect of smoking behaviour of the population.

The difference in economic status in the above analysis also shows a significant difference of smoking behaviour. Firstly, the proportion of smokers in the group of the population with low economic status (35.9%) is higher than the proportion of smokers in the group of high economic status (33.6%). Another prominent difference is the distribution pattern of smokers in the smoking behaviour level. The majority of the population with low economic status (56.1%) is light smoking, only 4.6% is heavy smoking, while most of the population with high economic status is moderate smoking (47%) and there is 9.1% is heavy smoking.

Third, what is the impact of smoking behavior on smoking-related morbidity? Smoking behaviors is directly associated with smoking related morbidity. It is shown by the risk of smoking-related morbidity is significantly higher for light smoking (OR=93.3), moderate smoking (OR=110.7) and heavy smoking (OR=84.4) relative to non- smoking. This indicates that the risk of smoking-related morbidity is high among smokers.

The demographic variables also directly influence smoking-related morbidity is accepted for age, place of residence and marital status while rejected for sex of an individual. In addition, social economic status has a direct influence on smoking related morbidity. The important finding is the low risk to smoking-related morbidity among population of low economic class contrasts Pampel and Roger (2004) social vulnerability hypothesis since people on low economic status have lower risk to smoking related morbidity.

5.2. Recommendation

This research is based on data of survey that was conducted in a certain period of time, cross-sectional study, which is smoking behaviour of Indonesiapopulation in 2007. The weakness of the cross-sectional study is the inability to cover the changes which happens in several variables, in line with the life course. But, smoking behaviour is not a stagnant circumstance, as several factors which are related to the life of the population are changing, and smoking behaviour is also changing from time to time.

The characteristic of demography as well as socioeconomic status of the population is moving dynamically all the time. Therefore to have a clearer view concerning the smoking behaviour of the population, longitudinal study is needed which means an examination based on data from several fragment of time.

It has been proven that several variables from demographic factors and socioeconomic influence significantly towards the smoking behaviour. For example marital status has siginificant influence towards smoking behaviour, whereas they whose status are widowed have the smallest proportion of smokers, while they whose status are separated and divorced

show the biggest proportion of smokers. Besides that, majority of smokers in the widowed group are a light smoking, while the majority of smokers in the separated and divorced are a moderate smoking and the proportion of heavy smoking is bigger comparef with the heavy smoking in the widowed group.

The proportion of smokers of the population of Indonesia is considered big and cigarette still becomes the main problem of health in Indonesia. The reason for seeking to reduce cigarette consumption is of course the very high risks to the smoking-related morbidity of smokers. Lower consumption of cigarettes thus brings gains in health outcomes. Indonesia is still lacking of policies concerning tobacco control and regulations aimed to protect the non-smokers from cigarette smoke. As mentioned before in the previous chapter, the government of Indonesia (GoI) is still not able to optimize the implementation of its policy in controlling tobacco-use. It has been proved in many countries that increasing the cigarette excise tax is an effective policy for reducing tobacco consumption.

In Indonesia, changes to the cigarette excise tax are controversial because this cigarette tax contributes a relatively large portion of government income. The government is very cautious about increasing cigarette taxes and/or prices as a policy for reducing cigarette consumption, due to they are afraid of losing government revenues and jobs. Therefore, GoI reluctant to ratify the Framework Convention of Tobacco Control (FCTC). This condition shows the view that effective policies to decrease cigarette consumption need comprehensive knowledge regarding culture, gender role and society social norms in Indonesia. In addition, comprehensive intervention programs regarding preventation and cessation of smoking must be the main focus of policies of tobaco control in Indonesia. The policies of tobacco control, nationally, must be conducted in order to enhance communal awareness of the danger of cigarettes mainly in adolescent circle especially male.

Since becoming smokers, and/or suferring from smoking addiction is a process which takes place by various initiation steps of smoking and its adaption, informative policy, policy which has characteristic to give information, to populace regarding smoking effects on health must be started since the early phase. It resonates with Ng et al (2006) which emphasized that parents, relatives and peers become the main target of such inervention policy because all of them play an important role in the initiation process of smoking in adolescent circle. This condition can protect the population, especially young people as, when they started a smoking behaviour as well as placing their health and life in dangerous circle (Ng et al. 2006).

Ng et al (2006) also emphasized that intervention policy on specific gender is also urgently required, because smoking behaviour is influenced mainly by gender role and social norms applied in Indonesia. Besides that, another attention must be given to the preventation of smoking on female adolescent circle, which becomes the main target of advertisement campaign from some of cigarette companies. The development of programs of tobacco control should also involve education institutions in order to introduce to male adolescents in an early phase or introduce alternatively about masculinity benchmark besides cigarette.

Although the process to decrease cigarettes consumption can be conducted by process of behaviour changing, we should be aware on formulating effective and efficient intervention policies in order to decrease smoking behaviour in Indonesian population. It is because the benefit obtained by terminating smoking can not be felt and implemented in short term period, but also can not be guaranteed that it can be achieved in long term period. Moreover,

Pampels and Rogers (2004) added that each individu might face pressure from their peers and other small risks which impede them from the attempt to stop smoking.

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