1. INTRODUCTION

1.1 DISEASES AND HEALTH BEHAVIORS IN SOUTH KOREA

1.1.1 Pattern of Diseases in South Korea

South Korea has experienced rapid economic and socio-demographic changes during the past three decades. Related to these changes, a dramatic shift in the leading causes of death from infectious and parasitic diseases to cardiovascular diseases and cancer occurred in the 1970s (S. Kim, Moon, & Popkin, 2000). The transition in disease patterns from communicable to noncommunicable diseases, with cardiovascular diseases as the primary cause of death, results from life-style changes and an expansion of the average life expectancy (M. J. Lee, Popkin, & Kim, 2002).

Cardiovascular diseases (CVD) do not have a single origin, but are rather caused by multiple risk factors that may be more or less distal to the end state of the disease, e.g. heart attack. Epidemiological research in the Framingham Heart Study identified a set of major correctable risk factors e.g., hypertension, hypercholesteremia and obesity that impacted the development of each of the major clinical manifestations of cardiovascular diseases (Kannel, D'Agostino, Sullivan, & Wilson, 2004). Moreover, a large prospective MRFIT (multiple risk factors intervention trial) study, which followed over 350,000 adults over six years found a significant linear relationship between baseline cholesterol level and subsequent CVD (Neaton, Blackburn, Jacobs et al. 1992). It has been shown that a 10% reduction in serum (blood) cholesterol is associated at the five-year follow-up with a 54% reduction in the incidence of coronary heart disease at age 40, a 27% reduction at age 60 and a 19% reduction at age 80 (Law, Wald, & Thompson, 1994).

Results from the Korean Medical Insurance Corporation (KMIC) sample that included 67,861 female workers and a random sample of 115,200 insured male workers (both samples with an age range from 35 to 59 years old) revealed that the prevalence of hypertension was 29% in male and 16% in female individuals (Jee, Appel, & Suh, 1998). Another risk factor, hypercholesteremia, is even more prevalent than hypertension. In a study of 106,745 South Korean men aged 35-59 years, 40% had an elevated cholesterol level, i.e. above the from the WHO recommended 200 mg/dl (Jee, Suh, Kim, & Appel, 1999).

1.1.2 Behavioral Risk Factors for CVD

What are the pathways that lead to elevated cholesterol? Cholesterol is a lipid (fat) which is present in our bodily cells. Through fatty diet, for example, the normal level can be increased to a pathological one. Foods high in saturated fats contain substances known as low-density lipoproteins (LDL) which enter our bloodstreams and can result in the formation of plaques in the arteries. If fat molecules are not metabolized during exercise or activity, then their circulating levels become high, and plaques (fatty layers) are laid down on the artery walls (atherosclerosis), causing them to thicken and restrict blood flow to the heart. Arteriosclerosis, An often related condition, exists when increased blood pressure causes artery walls to lose elasticity and harden, with a resulting effect on the ability of the cardiovascular system to adapt to the increased blood flow (Morrison & Bennett, 2006).

The narrowing of the arteries and therefore the increase in likelihood of thrombosis is also caused by tobacco consumption. Tobacco products contain carcinogenic carbon monoxide which reduces the amount of oxygen feeding the heart muscles; nicotine makes the heart work harder by increasing blood pressure and heart rate and together these substances cause narrowing of the arteries (Morrison & Bennett, 2006). The non-smokers from the Framingham Heart Study lived ca. 8 years longer and ca. 5 years longer free of CVD than smokers (Mamun et al., 2004).

Besides fatty food, a high dietary salt intake can be linked to another risk factor for cardiovascular diseases - hypertension. A meta analysis by He and MacGregor (2002) demonstrated that a modest reduction of salt intake (4.6g of salt/day) has a significant effect on lowering blood pressure. Moreover, in a prospective study high sodium intake predicted mortality and risk for coronary heart disease, independent of other cardiovascular risk factors, including blood pressure (Tuomilehto et al., 2001).

Hypertension, hypercholesteremia and nicotine are risk factors that via clinical randomized controlled trials empirically proved to cause CVD. There is, however, a number of other risk factors such as, for example, physical inactivity and heavy alcohol consumption that also contribute to the risk of developing CVD, although the definitive empirical proof still has to be adduced (WHO, 2005). Physical activity lowers the risk of CVD by helping the body burn sugars and fats, strengthening heart muscle and bones and lowering blood pressure. Although moderate alcohol

consumption can even lower the risk for CVD (Rimm, Williams, Fosher, Criqui, & Stampfer, 1999) heavy alcohol consumption may increase blood pressure, cause heart failure and lead to stroke (American Heart Association, 2007). Moreover, there is an established relationship between alcohol use and mouth, esophageal, laryngeal, breast, and liver cancer (Singletary & Gapstar, 2001).

Considering the above, it is not surprising that WHO (2002) identified poor diet, physical inactivity, smoking, and alcohol consumption as some of the most important life-style related risk factors for developing cardiovascular diseases, diabetes, or obesity (WHO, 2002). In the next section an overview of the epidemiological data with regard to the occurrence of these life-style-related risk factors for CVD in the South Korean population will be given and the increasing need for health promotion will be discussed.

1.1.2.1 Nutrition

Related to remarkable economic and socio-demographic changes, large shifts in the overall structure of South Korean diet became apparent in the 1970s. The nutrition-related concerns of South Korea shifted from dietary deficit and food insecurity in the 1950s to overconsumption in the 1990s. According to Korea's National Nutrition Survey of 1995, 1.5% of the population was classified as obese (BMI > 30), and 20.5% were overweight (BMI 25-29) (Inoue et al., 2000). According to reports on the 1969-95 National Nutrition Surveys and report on the 1998 National Health and Nutrition Survey, daily per capita fat intake in South Korea more than doubled from 16.9g in 1969 to 41.5g in 1998 (S. K. Lee & Sobal, 2003). This is true for fat intake derived from both plant and animal foods. However, the animal fat share among the total fat intake has increased from 30.6% in 1970 to 48.2% in 1998, while the plant share of the fat intake has decreased gradually from 70% in the 1970s to approximately 50% in the 1990s (M. J. Lee et al., 2002). Although fat intake in South Korea is gradually rising, the proportion of fat-derived energy is significantly lower than in other Asian countries (cp. 19% for South Korea and 27% for Japan, 22% for China) (S. Kim et al., 2000). Moreover, the South Korean daily fat intake amounted to 19% of the total energy intake in 1996 and thus lay clearly within the range (15% to 30%) recommended by the WHO (WHO, 2007). The relatively low daily fat intake is characteristic for both women and men (Yoon, Oh, Baik, Park, & Kim, 2004).

As countries achieve economic development, people seem to increasingly consume a high fat diet. Although this is also true for South Korea, the South Korean nutrition transition is unique. Dietary shift was not linked with an increase of fat intake commensurate with the country increase in income (Drewnowski & Popkin, 1997). Thus, following Drewnowski and Popkin's extrapolations considering the gross national product pro capita from other countries that are comparable to South Korea and the percentage of daily fat intake of the total energy in those, the expected proportion of energy from fat in South Korea would be 35.6%. One possible explanation for the low fat intake is the adherence to the traditional South Korean diet rich on carbohydrates and vegetables (S. Kim et al., 2000). However, there is some data showing very high salt consumption (high urinary excretion) among South Koreans in comparison with people from 24 other countries (Joossens et al., 1996), probably mainly from consumption of pickled vegetables. Salt intake is also a target of preventive health measures, with high salt (sodium chloride) intake being observed by people with persistent high blood pressure, i.e. hypertension (Law, Frost, & Wald, 1991).

It can be concluded that the goals for health promotion in South Korea are twofold. First, the trend to increased fat consumption should continue to be monitored and kept from further rise. Secondly, the reduction of salt consumption should be the target of preventive health measures.

1.1.2.2 Physical Activity

Physical activity is another domain that has undergone considerable changes in South Korea starting in the 1970s. S. K. Lee and Sobal (2003) investigated physical activity transitions in South Korea. They assessed physical activity by using two types of proxy variables: The proportions of the population working in industry sectors indicated the amount of physical activity at work and the number of passenger cars along with the number of driver's licenses indicated the mode of people's transportation. The results were calculated on the basis of the Korean Statistical Yearbook (1971-1995) and the Statistical Yearbook of Transportation (1973-1993). The following trends were observed. The number of people in the primary industry sector (agriculture, fishing and forestry) decreased significantly (cp. 51% in 1969 vs. 15% in 1993), while the number of people in the tertiary industry sector (service

industries) reached more than half the working population in South Korea (cp. 28% in 1969 vs. 53% in 1993). The number of cars and driver's licenses has increased by 100 times between 1969 and 1993. Thus, as South Korea underwent rapid economic development the physical activities of the population, particularly job-related activities and transportation, have decreased significantly. Hence, recreational physical activities become increasingly important for promoting and protecting health.

The data assessing recreational physical activity in South Korea are scarce. The Korean Institute for Health and Social Affairs (KIHASA) has conducted the National Health and Health Behavior Surveys (NHHBS) every three years from 1989, using nationally representative cross-sectional samples of households. Using a subsample consisting of 4,135 households with 10,808 members from a 1998 survey Lee and Suh (2002) ascertained that only 11% of participants (age > 20 years old) exercised regularly to the point of perspiring. More men (14%) reported to exercise regularly than women did (8%). Haase, Steptoe, Sallis, and Wardle (2004) conducted a study in which they assessed leisure-time physical activity in university students from 23 countries. The results for South Korea indicated that only 20% of the students were physically active at least two to three times a week. The larger number of student being physically active in comparison to general population is not surprising considering the NHHBS age composition (> 20) and the fact that only 9.8% of people over the age of 60 said that they participated in regular exercise (Lee & Suh, 2002).

Thus, considering the relatively low participation numbers in recreational physical activities, the changes in job-related activities, and the means of personal transportation, there is an increased need for the promotion of leisure-time physical activity.

1.1.2.3 Alcohol Consumption

In the course of industrialization, the patterns of alcohol consumption in South Korea have also changed. The drinking frequency of South Korean adults is increasing. According to the Global Status Report on Alcohol (WHO, 2001) the per capita consumption of pure alcohol increased from 5.23 liters in 1972 to 14.4 liters in 1996. The results of the 1998 Korean National Health and Nutrition Examination Survey (KNHNES) showed that within the representative study group (N = 7962) 81.6% of the men and 52.4% of the women were currently consuming alcohol, and

the mean amounts of alcohol consumed per day were 30 g ethanol for men and 7 g ethanol for women (Yoon et al., 2004).

The data from the KNHNES makes the considerable sex differences in both the frequency and the amount of consumed alcohol apparent. One possible explanation for this finding might be attributed to the South Korean culture. Traditional South Korean culture encourages drinking among men (Sharpe, Abdel-Ghany, Kim, & Hong, 2001). After school or work men get together and drink at special drinking establishments and may move from establishment to establishment, drinking through the night. Alcohol consumption is viewed as a part of social custom and exchange, contributing to shared group identity. However, in the KNHNES the drinking prevalence was higher among younger women in comparison with older women: 27.5% of women in their early 20s reported drinking alcohol as opposed to 10.3% of women in their 60s (Yoon et al., 2004).

To summarize, the increased alcohol consumption in the South Korean population is somewhat alarming, especially when considering that on average men consume high amounts of alcohol (= 30 g ethanol). The study of Yoon et al. (2004) showed that blood pressure was higher in heavy alcohol consumers (> 30g ethanol per day) than in light consumers. Thus, there is an increasing need for the promotion of light/moderate levels of alcohol consumption in the South Korean population.

1.1.2.4 Smoking

The prevalence of smoking in South Korea is among the highest in the world. In 1998, 67% of men and 7% of women over the age of 20 were smokers (Lee & Suh, 2002). While South Korean women presently have a much lower prevalence of smoking than men, this offers them no protection from the harms of secondhand smoking in their homes. Moreover, South Korea opened its market to American tobacco in 1988. It has been argued that after market opening the smoking rates among youth increased due to aggressive cigarette advertisements (Chen & Winder, 1990; Winder, Chen, & Mfuko, 1994). For example, 41.9% of the high school students (16 years old) were smokers in 1988 and 48.3% were smokers one year later (Winder et al., 1994). Thus, smoking reduction should be a target for health promotion. However, due to links between government and tobacco industry, the implementation of effective national policies to reduce smoking in South Korea is

problematic (Kang, Kim, Park, Jee, Nam, & Park, 2003). The government is the main producer of cigarettes in South Korea and thereby tries to maximize revenues from cigarettes sales. At the same time the government carries the responsibility to reduce the smoking rate in order to improve public health.

Increasing fat consumption, a diet rich on salty foods, a sedentary life style, as well as high prevalence of smoking and alcohol consumption in the South Korean population constitute risk factors for CVD and cancer and therefore should be targets of health promotion interventions. In order for an intervention to be successful, i.e. effective and generalisable, it should be grounded in an empirically tested behavior change theory (Michie & Abraham, 2004). Thus, a theory that would describe and explain the determinants of peoples health behaviors. In the next section one of those behavior change theories will be introduced.