

**More similarities than differences: an international comparison of
CVD mortality and risk factors in women**

Shortened version of the title:

CVD mortality and risk factors in women

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Abstract

This article describes global cardiovascular risk factor trends in women, both behavioural (eg, exercise, and tobacco use) and physiological (eg, serum lipids, blood pressure, obesity, and diabetes) in order to improve the understanding of cardiovascular health of women. This information will inform interventions and policies to improve the cardiovascular health of women. Although differences are apparent between developing and developed countries, a range of commonalities exist that allow a global approach to improving the health of women. A multifaceted approach considering physiological, social, economic and political determinants is critical to improve the cardiovascular health outcomes of women.

Declines in stroke rates since 1920 and decreases in coronary heart disease (CHD) since the 1960s in the developed countries have afforded cautious optimism about the capacity of both primary and secondary prevention strategies to improve health outcomes in relation to cardiovascular disease (CVD) (Cooper, 2000; Reddy, 1998; Shahwan.Akl, 2001; McNeil, 2002; Davidson, 2004; Tobacco Control Program, 2000; Australian Institute of Health and Welfare, 2005). Unlike developed nations, cardiovascular mortality rates have been rising steadily in Eastern Europe and other developing countries (American Heart Association, 2005d) and significantly, these countries contribute a greater share to the global burden of CVD than the developed countries. The World Heart Federation statistics show that 80% of CVD deaths occur in low-to-middle income countries, such as China, Russia, and Poland (American Heart Association, 2005c).

Further, there is evidence that some CVD risk factors, such as obesity and diabetes are increasing globally, particularly among disadvantaged populations including women (Cooper et al., 2000). By 2020, it is projected the relative and absolute burden of CVD events will increase significantly and 37% of deaths will be due to CVD worldwide (Neal, Chapman, & Patel, 2002). Figure 1 illustrates the distribution of major causes of mortality in 1990 and the projection for this distribution in 2020. The World Health Organisation (WHO) raises concern about the issue and calls for global action to address the growing impact of CVD (World Health Organization, 2005). Considering the multifactorial notion of the disease, joined hands of a variety of disciplines including cardiologists, nurses, dieticians, and occupational therapists and advocacy from policy makers are needed to reduce the burden of CVD. In this article, we describe the global CVD risk factor trends in women and outline the key issues which call for further attention.

Cardiovascular disease in women

In contrast to popular opinion (Lonn, 2001; American Heart Association, 2005; Cooper, 2000), CVD is the largest single cause of death among women, accounting for up to one-third of all deaths in women worldwide (American Heart Association, 2005b; Lockyer & Bury, 2002). Figure 2 illustrates international cardiovascular disease statistics among women. Of concern, not only women but also health care providers often ignore the significance of CVD among women resulting in a substantial evidence of disparity between women and men in referral patterns, treatment, and prognosis (Cooper, 2000; American Heart Association, 2005; Lonn, 2001; Meagher, 2005). Decisions on the management of heart disease in women are often based on research and diagnostic tests evaluated in men (Judelson, 1994; Meagher, 2005).

Yet a growing body of literature distinguishes the biological, behavioral, and psychological differences between men and women (Davidson, Daly, Hancock, & Jackson, 2004). Some of these differences relate to the coronary artery anatomy, effects of female hormones on endothelial function, atherosclerosis, coronary artery vasospasm, and also differences in distributions of body fat in women (Davidson et al., 2004). The diagnosis of CVD often presents a greater therapeutic challenge in women because of the older age at onset. This is reflected in the higher mortality rates among older women. For example, women are twice as likely to die from a heart attack than men (Davidson et al., 2004; Goldberg & Rogers, 2005; Judelson, 1994; Mosca et al., 1997). In addition, gender differences are described in the impact of psychological factors upon the occurrence and prognosis of heart disease, perception of the risk, and health seeking behaviors (Davidson et al., 2004; Giorgianni, 2003; Mosca et al., 1997; Wellbery, 2003).

Of concern, the improvements in outcomes related to CHD have been less pronounced in women than men internationally (Davidson et al., 2004; Johanssona, Wilhelmsenc, Lappasa, & Rosengrena, 2003). This disparity has been attributed in part to targeting coronary risk

reduction messages at the male population and also because of the greater importance of metabolic factors, such as dyslipidaemia in the development of CHD in women (Johansson et al., 2003; Meagher, 2005; Medscape General Medicine, 1999).

The increasing evidence of inequity in cardiovascular health outcomes calls for considering CVD more seriously among women. It has taken society a long time to be convinced that children are not little adults, physiologically and psychologically (Pediatrics, 2002). Now it is time to accept that women differ from men not only physiologically but psychologically as well. These differences must be taken into account in the prevention, diagnosis and management of CVD (Davidson et al., 2004).

Methodology

An integrative review method was applied in the conduct of this review. This method allows for the simultaneous inclusion of experimental and non experimental research, in order to more fully understand a phenomenon of concern (Whittemore, 2005). This article aims to describe trends in CVD risk factors in women, both behavioural (eg, exercise, and tobacco use) and physiological (eg, serum lipids, blood pressure, obesity, and diabetes) in order to improve the understanding of cardiovascular health of women and inform model development that will more effectively prioritize and implement CVD risk factor modification efforts for women on a global scale. A literature search was conducted on all available citations using Medline, CINAHL, EMBASE databases and analysis of reference lists of the retrieved reports. The World Wide Web was also searched using the Google Search Engine. The key search terms used in this search were 'women', 'cardiovascular disease', 'risk factor', 'coronary heart disease', 'developed countries' and 'developing countries'. Documents were included if they met the following criteria: (1) published in English language; (2) reported primary data on modifiable CVD risk factors. Studies reporting local level data were excluded from the review if data at a national level was able to be accessed. Overall, 42 documents met the criteria for this review. The findings are reported below.

Mortality among women in the developed vs. the developing countries

Mortality rates from heart disease have been decreasing in the developed countries over the past several decades (Reddy & Yusuf, 1998). Yet, CVD still causes 8.5 million deaths annually among women (American Heart Association, 2005b). The Multinational Monitoring of Trends and Determinants in Cardiovascular Disease (MONICA) Project, reported that between the period mid-1980s to the mid-1990s the coronary event rate in women was highest in the United Kingdom (Glasgow, Scotland, 265/100,000) and lowest in Spain (Catalonia, 35/100,000) and China (Beijing, 35/100,000) (American Heart Association, 2005b). From 1965 to 1990, CVD related mortality, in both sexes, fell by almost 50% in most developed countries such as Australia, Canada, France, and the United States of America (USA) and by 60% in Japan (Reddy & Yusuf, 1998). Other parts of Western Europe reported more modest declines, from 20% to 25%. In 1988-1998, the death rate declined by 41% in the UK, 46% in Finland, and by 44% in Ireland among women (American Heart Association, 2005b). The United States reported further decline in mortality rate due to CVD and CHD among women by 5.7% and 1.1% respectively From 1999-2003 (American Heart Association, 2006).

Even though there is a paucity of reliable data from the developing and the least developed countries on previous and current levels of CVD risk factors among women, available data suggest that these risk factors are worsening in most under -developed countries (Neal et al., 2002). About half of all deaths among women over 50 years of age are attributed to CVD in these countries (American Heart Association, 2005b). Further, by 2040, women in the study countries (Russia, Brazil, India, China, South Africa) will represent a higher proportion of CVD deaths than men (American Heart Association, 2005b). Therefore, attempts to understand and reduce the global increase in CVD risk factors will be crucial, particularly in the developing and the least developed countries.

Risk factors of CVD in women

The aetiology and progression of CVD are related to a complex interplay of genetic, biological, economic and social determinants (Australian Institute of Health and Welfare, 2005b; Halfon & Hochstein, 2002). Factors such as diet, smoking, and the level of physical activity all influence body weight, blood pressure, and blood cholesterol levels which increase the risk of developing CVD (Australian Institute of Health and Welfare, 1999). Figure 3 illustrates a conceptual model of CVD development taking into account lifestyle changes. Even though women often share similar risk factors of CVD with men, some risk factors such as high blood triglyceride levels and low high density lipoprotein cholesterol (HDL) are more likely to increase the risk of developing CVD among women. Diabetes also appears to be a stronger contributing risk factor for heart disease in women than men suggesting that risk factors and magnitude can not be ignored in women (American Heart Association, 2005a; Berg et al., 2005).

Despite these differences, available data clearly document that the major modifiable risk factors have a substantial impact on absolute CHD risk in women (American Heart Association, 2005a). About 80% of heart attacks occur in women who have a single major risk factor such as high blood pressure, cholesterol, a smoking habit, or diabetes (Goldberg & Rogers, 2005; Yusuf, 2004). Moreover, the INTERHEART global study (Yusuf, 2004) found that 94% of acute myocardial infarctions are predicted by nine CVD risk factors (Table 1). This seminal study demonstrates the importance of gender in the prevalence and trends of CVD risk factors in women globally. The contribution of CVD risk factors and the trends in both the developed and the developing countries are discussed below.

Smoking In developed countries

Cigarette smoking causes about 30 percent of CVD deaths worldwide (American Heart Association, 2005b) and It is of higher risk for women than men (World Health Organization, 2005b), particularly in women after the menopause (American Heart Association, 2005b).

Promisingly, there has been a decline in the rates of smoking in most the developed countries over recent decades for both women and men. In Australia, for example, 25.1% of female adults, aged 18 or more, were smoking in 1990 whereas this number has decreased to 20.8% in 1995 (Australian Institute of Health and Welfare, 1999). In 2001, 19.5% of Australian female aged 14 or more were smoking (Australian Institute of Health and Welfare, 2005a). In the USA, cigarette smoking also declined significantly by 8% in women between 1980 and 1992 and continued to 1997 (Arnett et al., 2002). Swedish women reported a modest decline from 30% in 1985 to 25% in 2002 (Berg et al., 2005).

Unfortunately, the decline in smoking rates has not been as great among women as men. In Canada; for example, the rate of decline was 50% in men, compared with only 5% in women over the past 30 years (Canadian Cancer Society & British Columbia Ministry of Health, 2005) or in Japan, the Hisayama study (Kubo et al., 2003) documented a 26.4% decrease in smoking rates in men compared to 9.9% in women. Perhaps of greatest concern is the rate of smoking among teenage girls and young women (age 15 to 24 years). These rates are even higher than young males. An alarming increase in smoking rates has been reported among Canadian women since 1991, particularly among young women (23% young women vs. 21% young men) (Lonn, 2001). At ages 15–17, 25% of females were smoking compared to 19% of males in 2000 in Canada (Tobacco Control Program, 2000). Smoking rates are also rising in the Russian Federation, particularly among younger women. Similarly, the rate of teenage girls who smoke increased to 12.7% in 2001 compared to 10.6% in 1998 in Australia. Currently, more teenage girls than boys smoke in Australia (Australian Institute of Health and Welfare, 2005b; National Centre for Monitoring Cardiovascular Disease, 2001).

Nicotine smoking is not evenly distributed among the female population and appears to be influenced by social and cultural factors. Aboriginal women and those of lower socioeconomic status have disproportionately higher rates of smoking in Canada (Canadian Cancer Society & British Columbia Ministry of Health, 2005), while Hispanic and Asian

women have the lowest rates of smoking in the USA (Cooper, 2000 #346). More over, increasingly, tobacco use is shifting in popularity from advantaged to disadvantaged populations. Consequently, race, gender, and socio-economic level are becoming more and more determinants of tobacco consumption (Canadian Cancer Society & British Columbia Ministry of Health, 2005 ; Judelson, 1994). The rate of smoking is still high among women in most the developed countries. Sadly, 23% of women (age ≥ 18 years) in the USA and 25% of women (age ≥ 16 years) in the United Kingdom (UK) currently smoke cigarettes (National Centre for Monitoring Cardiovascular Disease, 2001).

Smoking In developing countries

In contrast with the overall decline in industrial nations, tobacco consumption patterns have been rising in most developing countries. According to statement of International Network of Women Against Tobacco (International Network of Women Against Tobacco, 1998-2004), smoking is increasing among women in high-income and men in low-income countries. In some developing countries, the prevalence of smokeless tobacco is dramatically high, as it is more culturally accepted for women than smoking. Further, cigarette marketing targeted at women has increased noticeably in most Eastern countries, influenced by western culture (Office of Women's Health, 2001; World Health Organization, 1991). As a result, the greatest number of new deaths attributable to tobacco consumption is projected to increase in China (from 0.8 million in 1990 to 2.2 million in 2020) and in India (from 0.1 million in 1990 to 1.5 million in 2020). Of significance, these are the two largest developing countries in the world (Neal et al., 2002). The trends in per capita cigarette consumption among low and high income countries are illustrated in Figure 4. The importance of effective tobacco control policies and a health promotion message that are gender and culturally appropriate is underscored by this review.

Risky alcohol consumption in developed countries

Alcoholism is the third leading cause of death for women between the ages of 35 and 55 years. For women who drink heavily, life expectancy is cut short by an average of 15 years (Reichman, 2006). Risky alcohol consumption is considered 15 or more standard drinks per week for females (Australian Institute of Health and Welfare, 2005b). Nevertheless, those who consume three or more drinks a day may begin to show health problems such as high blood pressure, stroke, and heart disease (Chalmers, 1999; Reichman, 2006; Yusuf, 2004). These complications begin earlier in women, after 13 years of alcohol consumption versus 22 years in men (Reichman, 2006). The intake of beer and wine has increased in many countries such as the USA (Cooper, 2000), Sweden (Berg et al., 2005), and the UK, particularly among women (Institute of Alcohol Studies, 2005).

Risky alcohol consumption in developing countries

There are few data describing alcohol consumption among women in the developing countries, but available data shows that alcohol consumption in the developing countries is increasing among women, especially in the Western Pacific Region and the South East Asian Region, such as Malaysia, Nepal and Thailand. The prevalence of alcohol among women has been rising since 1995 in Thailand. According to a WHO report, 20% of women in Thailand were consuming alcohol in 2000 (Assunta, 2001; Dhital, 2001). However, the restriction on sale and consumption of alcoholic beverages in Muslim countries suggests that perhaps high risk consumption is of a less concern than other cardiovascular risk factors.

Physical inactivity in developed countries

About 22% of CHD is caused by physical inactivity globally. Significantly, 60 to 85% of the world's population from both the developed and the developing countries do not undertake sufficient physical activity to gain health benefits (American Heart Association, 2005b). This rate is even more disappointing among women. For example, the Survey of the Well- Being of Canadians in 1988 found that only 10% of women aged 20 to 64 years engaged in regular

aerobic activity, defined as 30 minutes or more every other day at 50% or more of individual capacity (Bryan, Walsh, & Walsh, 2004; Lonn, 2001). Another study reported 57% of Canadian adults, with a higher proportion of women than men, being physically inactive during their leisure time. Further, the proportion of women (>18 years) engaging in a regular physical activity fell from 36% in 1990 to 33.8% in 1995 in Australia (Australian Institute of Health and Welfare, 1999, 2005b). Over 50% of Australian women, aged 18 to 75 years, reported insufficient physical activity in 2000 (Australian Institute of Health and Welfare, 2005b). Similarly, rates of physical inactivity have decreased over time in the USA. For example, daily participation in high school physical exercise classes dropped from 42% in 1991 to 29% in 1999 (National Centre for Monitoring Cardiovascular Disease, 2001).

Physical inactivity in developing countries

In parallel with smoking trends, the prevalence of physical inactivity is higher among teenage girls (American Heart Association, 2005b) and disadvantaged populations, particularly women from low socioeconomic status and minority groups such as Indigenous, African American, Hispanic women (Cooper, 2000; Lonn, 2001). A shift from physically demanding, agricultural-based work to largely sedentary industrial and office-based work is also occurring in almost all the developing world, resulting in higher levels of inactivity (Levenson, Skerrett, & Gaziano, 2002). Nevertheless, China documented an improvement in physical activity in both men and women from 1957 to 1990 (Levenson et al., 2002; Yua et al., 2000). However, 76% of Chinese women still did not report leisure time exercise in 1996. (Yua et al., 2000)

Obesity in developed countries

According to a report from the WHO (American Heart Association, 2005b), about 21% of CHD globally is attributable to a body mass index (BMI) above 21 kg/m². Nevertheless, being overweight is still regarded as a sign of wealth and well-being and not considered as a risk factor for CVD in some communities (National Centre for Monitoring Cardiovascular Disease, 2001). These attitudes accompanied with urbanization and availability of cheap high-calorie

foods have led to a significant rise in the incidence of obesity since 1990 in many developed and developing countries, particularly among women (Arnett et al., 2002; Erem et al., 2004; Wellbery, 2003; World Health Organization, 2005b). Since 1980, obesity rates have tripled or more in some parts of the Pacific Islands, Australia, North America, Eastern Europe, the Middle East, and China (American Heart Association, 2005b). In Canada, the prevalence of overweight and obesity increased in women between 1985 and 2000–2001, from 26% to 40% (Bryan et al., 2004). In relation to Australian women, there has been a significant increase in the proportion of those who are overweight and obese. In 1980, 7.9% of Australian women aged 25 to 64 years were obese. This increased to 22.2% by 2000 – a three-fold increase (Australian Institute of Health and Welfare, 2005b). Also in Sweden, the prevalence of overweight and obesity of women, using the waist to hip ratio (WHR), increased significantly from 1985- 2002 (Berg et al., 2005). Japan has also experienced an increased trend in obesity among women with an increase from 12.9 % in 1961 to 23.4% 1988 (Kubo et al., 2003). In the UK, there has been a steady upward trend in women's mean BMI over time; from 25.8 kg/m² in 1994 to 26.8 kg/m² in 2003. According to recent reports, 57% of women in the UK are not in the healthy weight range (Greenlund et al., 2004). Moreover, almost 50% of US women (aged 20 to 74 years) are overweight and 25% are obese (Cooper, 2000).

Obesity in developing countries

The prevalence of obesity varies not only among regions and countries but also among races and ethnic groups (Erem, 2004; Cooper, 2000); from up to 40% for women in Eastern European and Mediterranean countries and African American women in the USA to as high as to 80% in the island of Nauru in the South Pacific (American Heart Association, 2005b). The prevalence of obesity is also increasing in many developing countries. In the central province of Trabzon city in Turkey, the prevalence of obesity among women increased from 27.4% in 2001 to 29.4% in 2004 (Erem et al., 2004). In Arabic countries such as Bahrain, Kuwait, and Jordan, the prevalence of obesity is as high as 35%, 42% and 49.7%

respectively. Asian countries, with a diet that is traditionally high in carbohydrates and low in fat, have shown an overall decline in the proportion of energy from complex carbohydrates along with the increase in the proportion of fat. In China, It is estimated that 40% of women will be overweight and obese by 2025 compared with 12% in 1995 and in India, the estimated rate will reach 24% compared with 9% in 1995 (Medscape General Medicine, 1999; National Centre for Monitoring Cardiovascular Disease, 2001).

High blood pressure in developed countries

About 13% of global fatality is caused by high blood pressure (American Heart Association, 2005b). Hypertension is considered a strong risk factor among women (Grundy et al., 1998), as even a moderate elevation of blood pressure increases the risk of developing CHD by 3.5 times (American Heart Association, 2005b). There has been a significant decline in the proportion of females with high blood pressure and/or receiving treatment since the 1980s in many developed countries. In the US for example, The Minnesota Heart Survey reported a significant decrease in the usage of antihypertensive agents and a consistent decrease in systolic blood pressure, but there was an inconsistent decline in diastolic blood pressure in women from 1980 to 1997 (Arnett et al., 2002). In Australia, the prevalence of high blood pressure in females (age ≥ 18 years) was 12.6% in 1969, but fell to 10.1% in 1995 (Australian Institute of Health and Welfare, 2005b). A similar improvement in mean blood pressure and the prevalence of hypertension has been documented among Swedish (Berg et al., 2005) and Italian women over the past decades. The mean blood pressure of Italian women was 133.7 mmHg in 1987, 130.6 in 1990, and in 1994 the mean blood pressure fell to 127.9 mmHg (Ferrario et al., 2001). Nevertheless, blood pressure still has the potential to be further modified among women in the developed countries, when prevalence rates are 34% in the UK (American Heart Association, 2005b) and 27.7% in Australia (Australian Institute of Health and Welfare, 2005b). In some other developed countries such as Japan, there has been no demonstration of improvement in women's blood pressure between 1961 to 1988, in spite of an increase in the use of antihypertensive agents (Kubo et al., 2003).

High blood pressure in developing countries

In the developing countries, trends in hypertension have been quite variable. In northern Asian countries, such as China and South Korea, the rate of hypertension is rising dramatically. Chinese women experienced a significant increase in blood pressure during the period 1957- 1990. Surprisingly, the largest increase was among those with college level education (Lonn, 2001; Yua et al., 2000). In India, the rate of high blood pressure is rising among women and men and is estimated to reach 19.4% in 2025 compared to 16.3% in 1995 (American Heart Association, 2005b). Apparently, hypertension in women is more influenced by urbanization than men in the developing countries such as China and India (Levenson et al., 2002).

High blood cholesterol in developed countries

High blood cholesterol is estimated to cause 56% of global CHD (National Centre for Monitoring Cardiovascular Disease, 2001). Although declines in cholesterol levels can be seen in both genders and across ethnic groups and in all educational strata, these changes are not as demonstrable in women (Cooper, 2000). In the USA, the total cholesterol level declined significantly by 7.6 mg/dl between 1980– 1992, but increased slightly between 1990- 1997 in women. Similar to International trends, there has been no overall change in HDL in this period for American women (Arnett et al., 2002). In Sweden total and low density lipoprotein (LDL) cholesterol levels decreased from 1985–2005 in women, particularly in the older age group. In spite of this achievement, the mean cholesterol level is still higher than recommended rates (5.35 mmol/l) and there is no significant trends for high density lipoprotein (HDL) cholesterol in this country (Berg et al., 2005). In Australia, 43.2% of females (aged 25 to 64 years) in 1980, 49.9% in 1983, 44.3% in 1989, and 45.6% in 1999 had high blood cholesterol. Of note,, mean blood cholesterol levels have declined only slightly during the period 1980 to 2000 in Australia (Australian Institute of Health and Welfare, 2005b).

High blood cholesterol in developing countries

In contrast to some degree of improvement in blood cholesterol levels of women in most developed countries, some countries are lagging much behind. In Italian women, the total cholesterol increased from 5.67 mmol/L in 1987 to 5.70 mmol/L in 1990, and to 5.93 mmol/L in 1994 (Ferrario et al., 2001). Also in Japan, the rate of hypercholesterolemia increased from 3.2% in 1961 to 25.9 in 1988 among women (Kubo et al., 2003). Although, there is a paucity of data on prevalence of hypercholesterolemia in the developing countries, the available data illustrates an increase in mean level of serum cholesterol in spite of a wide variation between countries (Fuentes et al., 2003; He et al., 2004; Levenson et al., 2002).

Diabetes in developed countries

The global prevalence of diabetes in adults was estimated at 4.0% in 1995 and it is projected to rise to 5.4% by the year 2025 (American Heart Association, 2005b). This projection is of concern, particularly for women, as it a stronger CHD risk factor for women than men (American Heart Association, 2005b; World Health Organization, 2005b). Women with diabetes have an eight times higher risk of developing CHD compared to women without diabetes (American Heart Association, 2005b; National Centre for Monitoring Cardiovascular Disease, 2001). An increased energy intake from refined foods and sedentary lifestyle are partly responsible for the increased rate of Type 2 diabetes, excess weight and insulin resistance among the population (Reddy & Yusuf, 1998). The self-reported prevalence rate of diabetes among American women increased from 3.3% in 1980–1982 to 4.6% in 1995–1997 (Arnett et al., 2002). The rate of diabetes is continuing to rise in all racial and ethnic groups in the USA (Cooper, 2000). Similarly, Australia is experiencing an increasing trend with the prevalence of diabetes among Australian females (age 25 or more) reaching 6.7% in 2000 (Australian Institute of Health and Welfare, 2004).

Diabetes in developing countries

The burden of diabetes is projected to be even much greater in the developing countries (42% in developed countries vs. 170% in developing countries). According to this projection, up to 70% of all deaths due to diabetes will be in the developing countries by 2020 (American Heart Association, 2005b). The largest increase will be in China and India (Levenson et al., 2002).

Discussion

CVD is anticipated to remain the leading cause of death among men and women worldwide (Neal et al., 2002). In spite of the invaluable achievements in CVD management in most developed regions, the burden of CVD is ominously increasing in many developing countries. Further, disparities exist in the diagnosis, referral, treatment, and prognosis of CVD among female gender, minorities, and those from lower socioeconomic status (Bunker & Goble, 2003; Health Grades, 2005). Women particularly those from minority groups have been underrepresented in most studies related to CVD, rendering a minimal baseline data and also evidence based interventions to improve the outcomes (Welty, 2001).

This article described the trends of CVD risk factors among women and attempted to highlight some CVD related concerns being shared among women in most countries. Nevertheless, comparing the trends globally is impaired because; firstly, the inability to access data sets in languages other than English results in further difficulties and impairment in international outcome comparisons; secondly, limited data sets exist from the developing countries. Further, variable data collection methods and data definitions and cut offs make the comparisons less precise. Well- designed international projects using skilful and instructed staff and consistent measurements and protocols for data collection may yield a clear idea of current level of CVD risk factors among women and facilitate interventions in an international level.

Further, undoubtedly, in order to lessen the rising burden of CVD at a global level, miscellaneous resources including international health agencies, policy makers in national level, and more importantly individuals themselves should take responsibility. The WHO advocates that by developing effective inter-country, interregional and global networks and partnerships, a coordinated approach to the global burden can be achieved (World Health Organization, 2005a).

There is also a possibility of collaboration among a variety of organizations which aim at reducing risk factors for various diseases including CVD, cancer, and diabetes, as many risk factors and opportunities for prevention are the same for many these chronic diseases. These three diseases accounted for 65% of all deaths in the year 2000 (Eyre, 2004). By addressing these common underlying risk factors and collaboration of responsible organizations, significant reductions in disability and premature death could be achieved for less time and resources (World Health Organization 2005a). Moreover, these collaborations would be more influential in lobbying for policy change, such as advocating for smoke free policies. Considering the limitations of this review study, some concerns raised from the available data are discussed in Box 1 and Box 2 and recommendations provided.

Conclusions

More similarities than differences exist in CVD risk factor trends among women globally. Clearly, there is potential for global collaboration to address these critical issues. The importance of socioeconomic and psychological factors in modulating health outcomes among women underscores the need to develop interventions to target these issues. The escalating rates of CVD rates in developing countries, such as India and China, should not be ignored and a responsibility exists among policy makers, clinicians, and researchers in developed countries to engage in mentoring activities to improve the health outcomes of women globally.

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