

Editorial

Improving cardiovascular health in women & children around the world

The World Heart Federation (WHF) has introduced the notion of '*one world, one home, one heart*' to spur the promotion of cardiovascular health and prevention of cardiovascular disease (CVD) worldwide on the occasion of the World Heart Day 2012 (September 29)¹. Estimates from the World Health Organization (WHO) suggest that about 17.3 million people die from CVD every year, with CVD representing 30 per cent of all global deaths². The burden of CVD falls more heavily on low- and middle-income countries that are disproportionately affected: over 80 per cent of CVD deaths take place in these countries, occurring almost equally in men and women. Additionally, it is estimated that CVD rates will escalate globally in the near future; approximately 23.6 million people will die from CVD (predominantly from heart disease and stroke) by the year 2030². Indeed, CVD will become the number one killer in the developing world in the 21st century. These sobering data provide the rationale and background for the WHF slogan.

Current status of cardiovascular health in women and children

The WHF has earmarked 2011 and 2012 as the years for promoting cardiovascular disease prevention in women and children¹. The specific focus on women and children seems justified and timely for several reasons. First, there is a prevalent myth that CVD, including heart disease, is predominantly a condition that afflicts men. This incorrect belief flies in the face of objective data that indicate that about half of the 17.3 million annual deaths attributable to CVD occur in women (*i.e.*, an estimated 8.6 million women die of CVD every year, or about one death every minute), and CVD accounts for a third of all deaths in women worldwide². Second, women (especially so in the developing

world) are often the caregivers for their children and shoulder major household responsibilities, literally serving as the gatekeepers of the health for the entire family. Hence, the 'sickness' of a woman may herald considerable hardship for the whole family. Third, children are particularly vulnerable to the development of CVD risk factors because they may have limited control over their environment, including their choices of eating 'heart healthy' foods. Fourth, the children of today represent the work force of tomorrow. As such, the adverse consequences posed by CVD (and its risk factors) for children likely foreshadow economic challenges that will be faced by society in the future. It is noteworthy that there is currently a high prevalence of elevated BP, dyslipidaemia, and diabetes in children around the world, fuelled by a global epidemic of obesity and excess adiposity.

Determinants of CVD health in women and children: role of modifiable lifestyle factors

Substantial amount of data from both observational epidemiological studies and clinical trials have established that CVD is both a lifecourse and a lifestyle disease. In other words, the development of CVD occurs over the lifespan of individuals: it takes place over decades, starting with the development of CVD risk factors that in turn evolve into the onset of subclinical atherosclerosis, followed in time by the incidence of overt clinical events. This chain of events is initiated by a combination of genetic and environmental factors, with lifestyle choices emerging as key contributors to the latter. The INTERHEART Study, which evaluated individuals in 52 countries using a case-control design (comparing people with and without myocardial infarction) concluded that "abnormal lipids, smoking, hypertension, diabetes, abdominal obesity, psychosocial

Table. Promoting 'heart health' at the family level: Simple suggestions from the WHF

1. Implement a 'no tobacco' rule at home.
 - Say 'no' to all tobacco products in the home environment.
 - Consider adding disincentives at home for tobacco use: "for every cigarette someone smokes, insist on an extra household chore".
2. Food options at home should focus on a 'heart healthy' food menu.
 - Consider preparing and carrying one's own lunch (to school or work) to maintain healthier food choices.
 - Strive towards evening meals that contain 2-3 servings of fruits and vegetables for every household member.
3. Promote physical activity at home.
 - Limit TV watching to less than 2 h per day.
 - Encourage family outdoor activities, such as playing in the park, and, where possible, initiate other activities such as cycling.
 - Consider walking or cycling to any destination instead of the use of motorized transportation.
4. Everyone in the family must 'know their numbers'.
 - Family members must visit any healthcare professional who can measure their 'numbers', *i.e.*, blood pressure, blood cholesterol and glucose levels, and body weight [to calculate body mass index (BMI)].
 - Discuss with the healthcare provider the implications of 'numbers' from screening tests in terms of overall CVD risk, and develop a specific plan of action to improve heart health of all family members.

Source: Modified from Ref. 14

factors, consumption of fruits, vegetables, and alcohol, and regular physical activity account for most of the risk of myocardial infarction worldwide in both sexes and at all ages in all regions"³. Notably, three lifestyle-related risk factors (representing choices that we can influence), *i.e.*, smoking, physical inactivity, and dietary factors, contribute substantially to the global burden of CVD.

A recent series of articles^{4,6} focused on the public health challenge posed by physical inactivity and emphasized the potential losses in life expectancy and greater hazard of CVD (and its contributory risk factors) accruing from a sedentary lifestyle. Physical inactivity is the fourth leading cause of death across the world⁶, accounting for nearly 10 per cent of premature mortality (5.3 million of the 53 million annual deaths)⁵. It is estimated that public health efforts to reduce physical inactivity by 25 per cent would prevent over a million deaths every year⁵. Obesity is a direct consequence of physical inactivity and excess caloric intake, and about a quarter of the burden of CVD is attributable to excess adiposity⁷. On a similar note, smoking, tobacco use and second hand smoke are major contributors to CVD risk across all countries⁸. Thus, it is estimated that up to 80 per cent of CVD is preventable if the predominant lifestyle factors can be modified to favour healthier choices: greater physical activity, a diet rich in fruits and vegetables, and avoiding tobacco intake in any form. Health education, the promotion of regular physical activity and healthier dietary habits, and the maintenance of ideal body weight are key steps towards preventing CVD risk factors such as high blood pressure, abnormal lipids and impaired glucose homeostasis.

Determinants of CVD health in women and children: role of pre-pregnancy, pregnancy and early childhood influences

Considerable recent research has highlighted the impact of pre-pregnancy, pregnancy, post-pregnancy, and early childhood factors on the cardiovascular health of women and children. These studies have further expanded the time horizon for the development of CVD risk, which may well begin before birth. Foetal metabolic programming begins *in utero* during the exposure of the baby to the maternal milieu interior. For instance, both foetal undernutrition and over-nutrition may have consequences for disproportionate birth size and for the development of CVD risk factors in early childhood and adolescence⁹. A low birth weight has been associated with greater 'catch up growth' in childhood and the development of metabolic risk factors such as obesity and diabetes¹⁰. Maternal factors during pregnancy also portend future CVD risk in both the baby and the mother. High blood pressure during pregnancy is associated with small-for-date babies, whereas diabetes and dyslipidaemia in the mother are associated with large-for-date babies¹¹. The presence of higher blood pressure during pregnancy (pregnancy-induced hypertension) is associated with greater risk of future hypertension, and an elevated risk of stroke and CVD in women¹². Similarly, gestational diabetes may antedate impaired glucose homeostasis and greater CVD risk in the mother in the future¹². The delivery of a preterm or small-for-age infant also has been linked to maternal CVD risk in later life¹³. These data underscore the critical role of maternal health and foetal nutrition in mediating future CVD risk in both the mother and the child. Therefore, prevention of CVD in women and

children must necessarily encompass efforts directed at maintaining optimal health in pregnant women and over the entire lifecourse.

Prevention of CVD and promotion of cardiovascular health in women and children: A Call for Action

As summarized above, a majority of CVD in women and children can be prevented or treated, and millions of untimely deaths are avoidable if we recognize the primary role of lifestyle risk factors (physical inactivity, smoking, and dietary factors) in the pathogenesis of CVD. Promoting a greater degree of awareness about the hazard of CVD in women and children via education and empowerment of families is fundamental to any effort directed towards CVD prevention. Further, acknowledging the importance of nutrition of women before and during pregnancy, and beyond would seem critical. Pregnancy provides an excellent opportunity for screening mothers for the presence of CVD risk factors or their precursors; steps to prevent the delivery of premature or low birth weight infants may contribute to lowering metabolic risk in babies during early and late childhood. It is also essential to note the importance of better monitoring of children from birth for optimal weight (to prevent future obesity) and of screening adolescents for the presence of CVD risk factors in order to promote cardiovascular health in children and young adults. The WHF has suggested steps that individual families may undertake to promote their own cardiovascular and overall health (Table)¹⁴. This strategy builds upon the notion that whereas prevention of CVD remains a multi-sectoral effort involving individuals, populations, public health leaders and clinicians¹⁵, 'charity can begin at home' by empowering families to proactively take charge of their own health. As detailed elsewhere¹⁵, an integrated approach and global effort is required to realize the dream of 'one world, one home, one heart', a state where optimal cardiovascular health exists on a global scale. To that end, the WHF efforts on the World Health Day this year¹ represent an important step in the right direction.

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