

## Health Promotion for Primordial Prevention of Tobacco Use

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Prevention of tobacco use is critical for primordial prevention of cardiovascular diseases. Low- and middle-income countries such as India face a burgeoning burden of tobacco-related cardiovascular diseases. A focus on adolescents and young people is consistent with a primordial approach to cardiovascular disease prevention and appropriate given the natural history of tobacco use, in regards to its onset and progression. The primordial prevention approach is feasible, because it attempts to bring about behavior change (sustained abstinence for nonusers) at the population level. This paper reviews effective strategies for population-based tobacco control among adolescents including settings-based interventions at school, at home, and in the community, as well as policy and media interventions. It goes on to briefly touch on the pivotal role that medical professionals, particularly cardiologists, play in fortifying such interventions and summarizes some key recommendations based on review of evidence on the effectiveness of these interventions.

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Primordial prevention has its scientific origin in epidemiology and its focus on the community [1]. Strasser coined the term “primordial prevention” in 1978, meaning activities that prevented the penetration of risk factors into populations [2,3]. In subsequent literature, other authors, as noted here, have described primordial prevention.

Primordial prevention consists of actions and measures that inhibit the emergence and establishment of environmental, economic, social and behavioral conditions, cultural patterns of living, and so on, that are known to increase the risk of disease [4].

Primordial prevention employs a population based and public health approach that attends to the first underlying broad social forces that begin the disease process [5].

Primordial prevention thrives on public education, media, legislation and government policy. It entails promotion of healthier lifestyles in the population as a whole by encouraging people to seek healthy alternatives and making these easily available [6].

This paper focuses on the prevention of tobacco use among adolescents as a critical opportunity for primordial prevention of cardiovascular diseases (CVD). Particular attention is given to the epidemic of tobacco use in low- and middle-income countries, especially India, given the burden of tobacco use and CVD that these countries now bear. Annual CVD-related deaths in India are projected to rise from 2.7 million to 4 million in 2030 [7]. In India, about 60% of heart disease and 53% of myocardial infarction cases among urban men under 40 years of age are attributable to tobacco [8]. A policy statement of the American Heart Association titled “Value of Primordial and Primary Prevention for Cardiovascular Disease” [9] elucidates that appropriate public policy and lifestyle interventions focused on prevention of tobacco use are some of the key strategies for CVD prevention. Youth-focused examples of these kinds of interventions will be reviewed here.

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A focus on young people is consistent with a primordial approach to CVD prevention and appropriate given the natural history of tobacco use, in regards to its onset and progression [10]. Adolescence is the age when experimentation with tobacco and the transition to daily smoking is most commonly reported [11]. In India, the average age of initiation of tobacco use is 17.8 years as estimated through the Global Adult Tobacco Survey, and despite the fact that about two-thirds of Indians initiate at or after 18 years of age [12], some independent research studies have shown that the age of initiation can be as low as 6 years in communities belonging to low socioeconomic status [13]. Moreover, this is the period when lifestyle habits are being formed and these behaviors persist throughout their life [14]. Although each of the 5 stages of the life course has its unique individual characteristics, influences at each stage can potentially have a profound impact on the subsequent stages [15]. Prevention efforts targeted at one point can have a lasting impact later in life or even from generation to generation [9]. Tobacco use is such a behavior that tracks across the life course. If the onset of tobacco use could be prevented, the size and impact of the tobacco epidemic would diminish considerably [11]. Children and adolescents are therefore critical targets for tobacco prevention efforts, when they can be taught about the consequences and laws related to tobacco use and when they have not yet experimented with tobacco. Youth (in urban as well as rural settings) form the prime targets for effective primordial prevention strategies for CVD prevention. However, adults who have not yet acquired the risk factors (tobacco use being among the most potent risk factors) can also potentially benefit from such efforts [16].

The tobacco epidemic is spreading rapidly in developing countries [17]. As per the Global Youth Tobacco Survey conducted with 13- to 15-year-old school students in 131 countries, 8.9% of students currently smoked cigarettes [18] with the prevalence rates increasing globally except in some high-income countries and upper-middle-income countries [19]. Factors contributing to youth tobacco use in developing countries include cultural acceptability, easy accessibility and affordable pricing, peer and family influences, and aggressive marketing and promotion by tobacco companies [17]. Some other studies conducted in developing countries have revealed additional determinants (psychosocial risk factors) that predispose adolescents to tobacco use. Pertinent determinants include social susceptibility

to tobacco use, social norms about tobacco use, and exposure to tobacco advertising [20–22].

In India and other low- and middle-income countries, the tobacco industry uses sophisticated marketing campaigns to promote their products at points of sale, and other promotional avenues; these campaigns can have a significant impact on the uptake and progression of tobacco use among young people [21,23–25]. Through these campaigns, tobacco use is being promoted as an acceptable norm, especially among women and adolescents, despite existence of laws prohibiting advertising and such glamorization. Today, most of the tobacco industry's efforts are geared toward reducing the price of tobacco products; this, too, is problematic, as young people are especially price-sensitive and lower prices on these products makes them more accessible to youth [11]. In India, it is estimated that a 10% increase in cigarette and bidi prices would translate into a 1.7% decrease in youth cigarette smoking and an 11.7% decrease in youth bidi smoking [26]. Effective primordial prevention of CVDs will require regulation of the tobacco industry and other domestic and international market forces that produce and distribute tobacco products [27].

Traditionally, the individual approach for tobacco prevention and control would attempt to identify individual tobacco users or sufferers of tobacco-related diseases in clinics through interviews and screening (e.g., biochemical assays, biopsies) and then attempt to encourage cessation through brief advice, counseling, and/or pharmacotherapies. In contrast, the population approach would direct the intervention at the “whole population” (including tobacco users and nonusers) and attempt to bring about behavior change (sustained abstinence for nonusers) at the population level. Examples of a population-based approach to tobacco prevention and control include a comprehensive tobacco control program that consists of an educational/skill building/advocacy component in educational institutions and other settings, such as workplaces and communities; a mass media campaign; and public policies that focus on tobacco control laws and its enforcement. By definition, this population approach would be primordial prevention for nonusers. The overall aim of the population-level approach is to address the issue of tobacco use early on. To do so effectively, young people in childhood, adolescence, and/or young adulthood need to be the focus of these population-based efforts [11].

To have a balanced impact, it is important that health promotion strategies are primarily employed at the population level for tobacco use prevention, supplemented by a high-risk approach for cessation.

### EFFECTIVE STRATEGIES FOR POPULATION-BASED TOBACCO CONTROL AMONG ADOLESCENTS

**School- and home-based interventions.** Schools are ideal settings for tobacco use interventions among adolescents and provide a fertile breeding ground for internalization of health-promoting behaviors, including avoidance of all forms of tobacco use. In many ways, schools could be the nucleus of primordial prevention efforts, globally, because they provide long-term and broad access to large numbers of children and adolescents [14]. Within the school environment, school policies and positive role models, in the form of teachers and peers, are pivotal change agents. Families also have an important role to play as they provide opportunities for reinforcement of health-promoting messages and, thus, reinforce tobacco prevention strategies and messages.

Project MYTRI (Mobilizing Youth for Tobacco Related Initiatives in India) was a large scale collaborative endeavor conducted by HRIDAY (Health Related Information Dissemination Amongst Youth), a New Delhi-based nongovernmental organization, and prevention scientists in the United States, with approximately 14,000 school-going adolescents in 2 Indian cities—Delhi and Chennai. Project MYTRI was a 2-year intervention, whose components included: (1) classroom curricula; (2) parent postcards; (3) school posters; and (4) peer-led health activism. The peer-led intervention encouraged tobacco-free norms and policies at school and at home. It also nurtured students' self-efficacy to refuse offers of tobacco and advocate for tobacco-free schools and homes. Over the 2 years of intervention, tobacco use among these school-going adolescents decreased by 17% among students in the intervention schools and increased by 68% in the control school students. Intentions to smoke increased by 5% in the control schools and decreased by 11% in the intervention schools, intentions to chew tobacco decreased by 12% and 28% in control and intervention schools, respectively [28]. The evidence from this randomized control trial was employed to advocate for scaling up of the Government of India's tobacco control efforts to include school

health programs as an important component of the National Tobacco Control Program [29,30].

In the HRIDAY-CATCH (Child and Adolescent Trial for Cardiovascular Health) study also conducted earlier by the same Indo-U.S. collaborators, adolescents in intervention schools were significantly less likely than those in control schools to have been offered, received, experimented with, or have intentions to use tobacco [31]. Studies have also shown that tobacco use prevalence is low among those school-going adolescents who have higher awareness about the harmful effects of tobacco use [32].

Various other studies have highlighted that school-based programs that include 15 or more sessions over multiple years, including some in high school; use the social influence model and interactive delivery methods; include components on norms, commitment not to use, intentions not to use, and training and practice in the use of refusal and other life skills; and use peer leaders in some role, can reduce smoking onset by 25–30%, and school plus community programs can reduce smoking onset by 35–40% [11,33].

**Youth advocacy and empowerment.** Youth-led advocacy efforts can also be an integral part of primordial prevention strategies to reduce CVD. One of the most effective strategies is to engage adolescents and youth in tandem campaigns of upstream advocacy (with policymakers, decision makers) and downstream advocacy (with peers and the community at large). Some successful examples from developing countries such as India include campaigns organized by the Youth for Health (Y4H) network, a global network of youth health advocates. Under HRIDAY's aegis, youth health advocates in India have spearheaded several key policy-level advocacy campaigns, several of them entailing in-person meetings with high-level policymakers. These campaigns have had a significant impact on a number of tobacco control policies including enforcement of effective pictorial warnings; prohibition of tobacco advertising, promotion, and sponsorship; and monitoring compliance of smoke-free provisions of the Indian tobacco control law by restaurants and hospitality venues [34]. Y4H was launched during the first Global Youth Meet on Health (2006) and has within its ambit conducted advocacy campaigns in several countries and even globally [8,35].

**Community-based interventions.** Community-based interventions generally target out-of-school adolescents but may also include school-going adolescents. Research studies conducted across

developed and developing countries suggest that several socioenvironmental and contextual factors influence the uptake and continued use of tobacco among children and adolescents [20,36]. The attitudes, perceptions, and tobacco use behavior of adolescents with regard to tobacco use is influenced by the prevailing norms, values, and behavior of those residing in the same environments, such as parents, peers, and other role models, as well as by other environmental factors, such as media or school structure [37]. Community-based interventions for tobacco prevention are usually complex multicomponent interventions with coordinated activities and support from multiple pre-existing social structures within the community [38]. Earlier, community-based interventions focused only on education about tobacco use, but, more recently, there have been changes where such interventions are more policy focused and involve the community members in decision making and implementation to a large extent; examples include: use of strategies that restrict the sale of tobacco products to minors; formation of advocacy groups for implementation of tobacco control legislation; use of media advocacy to spread awareness; and sponsorship of events for control of tobacco use. Therefore, there are no simple results that could be expected from such interventions. Impact at the population level of such interventions is much wider and complex [38].

A review comparing community-based interventions for tobacco prevention with other traditional approaches suggest that multicomponent interventions are more effective than those that employ a single strategy [11,37]. A demonstration study was conducted in Delhi, India, to test the efficacy of a community-based multicomponent intervention for tobacco prevention and control among adolescents in 2 low socioeconomic-status communities [13]. The intervention focused on individual as well as socioenvironmental determinants of tobacco use among children and adolescents. Peer leaders, adult community leaders, and local nongovernmental organization personnel were trained to facilitate the intervention activities. The intervention comprised a display of posters, audio and video films, lectures, street plays and a rally, and distribution of information, education and communication (IEC) material related to tobacco for sensitization. The results of the study suggested that the risk of fresh uptake of tobacco at the end of intervention among nonusers was about 6 times higher in the control group than in the intervention group. The intervention has been tested through a large-scale random-

ized controlled trial, Project ACTIVITY (Advancing Cessation of Tobacco in Vulnerable Indian Tobacco Consuming Youth), in 14 low socioeconomic-status communities of Delhi [39,40].

Health promotion at workplaces has been shown to have the potential to reduce health risks and enhance a healthy lifestyle, resulting in a positive effect on economic- and productivity-related outcomes [41,42]. Several factors justify the significance of the workplace as an important setting for tobacco use-related interventions among young adults [43–45]. These employees, in turn, would transmit such messages to foster tobacco-free norms in their homes and their communities.

**Policy interventions.** Strong tobacco control policies are critical for augmenting and sustaining other synergistic interventions for primordial prevention as already described. Effective government–nongovernmental organization partnerships are important elements of evidence-based policy development, enforcement, and monitoring. Societal level changes needed to tackle CVD warrant policy and environment changes to foster and maintain individual level behavior change [46]. It is irrational to expect large proportions of the population to make individual behavior changes that are not encouraged by the environment and existing social norms. Further, it is also unrealistic to expect communities or organizations to enact policy changes for which there is no broad-based understanding and support [47,48]. The climate for policy and environmental interventions in tobacco control has become more conducive, with decentralization of such interventions from being restricted to governmental agencies to branching out into the community [49]. Some of the proven policy measures to curb tobacco use and exposure among adolescents include: 100% smoke-free environments; depiction of effective pictorial warnings on tobacco product packages; preventing access to tobacco products; prohibiting tobacco advertising, promotion, and sponsorship; and increasing taxes on all tobacco products as outlined in the Intervention Model for Protecting Adolescents and Children against Tobacco (IMPACT) framework [50]. Several articles of the World Health Organization Framework Convention on Tobacco Control (FCTC) and the Monitor; Protect; Offer; Warn; Enforce; Raise (MPOWER) policy package have direct implications for redressing the tobacco burden on adolescents [51,52]. Before the FCTC was ratified in 2003, tobacco use among young people was largely within the ambit of the U.N. Convention on the Rights of the Child [53].

A study conducted in the United States with school students suggested that smoke-free environments at home, public places, and schools are associated with about 0.8 times reduced risk of tobacco use in the past month among them (vs. no smoke-free environments) and also reduced risk of smoking uptake [54]. Moreover, smoke-free legislation is also associated with reduced exposure to secondhand smoke among children as evidenced by a 39% reduction in salivary cotinine levels of nonsmoking children after introduction of a smoke-free law in Scotland [55]. A study conducted in Australia to assess the impact of pictorial health warnings on adolescents' smoking-related behaviors and beliefs suggests higher exposure to the warnings was associated with lower likelihood of intentions to smoke and higher likelihood of thinking about quitting and foregoing cigarettes [56]. Achieving a 10% increase in taxes on tobacco products would lead to a 4% and 8% decrease in tobacco consumption in high-income and low-to-middle-income countries, respectively [57]. In a study conducted in the United States, a restriction on the sale of tobacco products to minors was associated with improved compliance of tobacco merchants with the law and a significant reduction in sale to minors in intervention communities (82%) as compared with control communities (45%) ( $p < 0.001$ ) [58].

In India, tobacco control policies now include: prohibition of smoking in public places and indoor workplaces; prohibition of all forms of direct and indirect advertising of tobacco products; prohibition of sale of tobacco products to and by minors and within 100 yards of educational institutions; and mandatory depiction of pictorial health warnings on tobacco products [59]. However, there exist wide lacunae in enforcement that need to be plugged [60].

In addition to these international and national policy initiatives, another layer of policy interventions occur at the level of schools/educational institutions, which are now increasingly moving a step ahead of the law and adopting a comprehensive tobacco-free policy, under directives issued by educational boards and/or state governments as a result of rigorous advocacy by the civil society. A recent achievement has been the declaration of tobacco-free educational institutions across many states in India as a result of sustained advocacy by HRIDAY [61]. This campaign is now being replicated nationwide.

**Media interventions.** Dissemination of health-related information through mass media campaigns has been recognized as an important component of any CVD prevention program [62,63]. Media has

been favorably used as a medium for social- and counter-marketing in tobacco prevention and control in developed as well as in developing countries [64–67]. Research suggests that antitobacco media campaigns that depict consequences of tobacco use (e.g., adverse health effects of smoking, secondhand smoke) that cause high arousal and negative emotions are more likely to be remembered and perform better [64]. New media, for example, Internet, and other social-media applications, are now highly popular and widely used globally, especially among adolescents and youth. More tobacco users surf the Internet to obtain information on quitting than use of other cessation methods such as quitlines [64]. Internet-based smoking cessation campaigns that provide individually tailored information and are more interactive have been shown to be effective [68]. Internet-based tobacco use prevention campaigns can similarly be developed and adapted to sensitize adolescents and youth before they experiment with tobacco. HRIDAY, through Y4H, effectively uses its social networking platforms on Facebook ([www.facebook.com/youthforhealth](http://www.facebook.com/youthforhealth)) and Twitter ([www.twitter.com/youthforhealth](http://www.twitter.com/youthforhealth)) to actively engage young people for multipronged advocacy on pertinent tobacco control issues. A mobile phone-based short message service campaign (m-health) was undertaken in the United Kingdom with smokers who wanted to quit. The participants, after setting a quit date, received automated personalized messages motivating the person for abstinence. The short-term (4 months) results showed that the relative likelihood of quitting in the intervention group was 2.08 (95% confidence interval: 1.11–3.89) as compared to the control group [69]. A short message service campaign was employed for the first time in the Indian context as a part of a community-based intervention for tobacco prevention and cessation, Project ACTIVITY, wherein about 1,566 participants registered for this campaign to receive text messages based on tobacco use prevention and cessation (to be published). Mass media campaigns have been shown to augment the effect of school- and community-based tobacco control programs [70]. In India, a popular media campaign (30-s spots on television and radio channels showcasing adverse health effects of smokeless tobacco) launched by the Government of India in collaboration with the World Lung Foundation and other stakeholders was shown to be highly effective in terms of knowledge, concerns, attitudes, and practices about smokeless tobacco use behavior [66].



Medical professionals, particularly cardiologists, and their heart foundations/cardiac societies, have a multifaceted role in tobacco use prevention. They add credibility and sustainability and can effectively lead such initiatives. Some key areas of engagement include, for example: generating research evidence; being role models/resource persons for school-, home- and community-based interventions; contributing toward policy formulation; advocating for effective enforcement of legislation; contributing to effective communication and media campaigns [71–75].

### CONCLUSIONS AND RECOMMENDATIONS

1. Multicomponent tobacco use prevention interventions, focusing on children, adolescents, and young adults are an important strategy to consider for primordial prevention of CVD, with specific focus on children, adolescents, and young adults.
2. Population-based interventions focusing on school, home, and community settings have been shown to be effective in preventing tobacco use among adolescents in developing countries and hence, warrant up-scaling at the program and policy levels: for example, revitalize the “school health program” component of India’s National Tobacco Control Program.
3. Technology-based interventions such as m-health and new media (e.g., social media, Internet) should be adapted and tested in the context of tobacco control among adolescents in developing countries such as India.
4. Although key articles of FCTC and MPOWER policies allude to tobacco use prevention among children and adolescents, there is a need for international and multilateral policy dialogue on adolescent-centric tobacco control, beyond the U.N. Convention on the Rights of the Child.
5. Medical professionals, particularly cardiologists, play a critical and multipronged role in fortifying effective prevention of tobacco use; hence, their engagement and involvement in such interventions must be enhanced.

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