

gOPINION

EDITORIAL VIEWPOINT

Noncigarette Smoking Patterns, Their Health Effects and Policy Options

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Cigarette smoking is the biggest killer of people worldwide. Half of the 1 billion projected smokers will die prematurely by the turn of this century if they do not give up smoking [1]. Of those premature deaths, 70–80% could occur in low- and middle-income countries [1]. At the same time, noncigarette smoking habits, including both the use of bidis and electronic cigarettes, are growing “social norms” in the West and in the low- and middle-income countries.

Bidis are small hand-rolled cigarettes made of a small amount of sun-dried, flaked tobacco wrapped in dried *temburni* or *tendu* leaf and tied with a string; they are primarily produced and popular in India and other South Asian countries [2]. “E-cigarettes” or electronic nicotine delivery system (ENDS) look like cigarettes but do not contain or burn tobacco. Instead, they refer to battery-powered atomizers producing a vapor for inhalation from disposable cartridges containing humectants such as propylene glycol, flavors, and nicotine [3].

EPIDEMIOLOGICAL PATTERNS

Even though understanding about the epidemiology of bidi use is improving, knowledge about the use of e-cigarettes is grossly inadequate and inconclusive. The Global Adult Tobacco Survey India—one of the largest tobacco-use surveys cosponsored by the Government of India—indicated that more than one-third (35%) of adults in India use tobacco [4]. Of all the prevalent smoking forms of tobacco, bidi is the most popular product in India. About 9% of Indian adults smoke bidis, with use relatively more common in the rural areas

both in India and Bangladesh [4,5]. It is interesting to note that e-cigarettes were first patented in China in 2007, and a recent survey in the United States shows that almost 1 million Americans have ever used e-cigarettes and the rate has quadrupled in recent years [6]. Such a growing popularity of products that are of unknown safety claims is a wake-up call for the tobacco-control community worldwide.

A very small fraction of bidis is produced for U.S. markets. During the late 1990s, a growing appeal of the bidi was observed among young people to whom it was promoted as herbal bidi available in exciting flavors [7]. The user profile, reasons for use, and marketing strategies are very different in the United States compared with South Asia. An earliest convenience sample of 642 adolescents in Massachusetts during 1999 found that 40% had smoked bidis at least once during their lifetimes and 16% were current users. Highest use was noted among Hispanic students [7]. A significant increase in bidi use was reported among Hispanic students between 2002 and 2004 [8]. More recent survey data collected in 2009 has indicated current use by 1.6% and 2.4% of middle-school and high-school students, respectively (with any tobacco product use by 8.2% and 23.9%, respectively). Gender difference is less marked in the United States (where 2.1% of female and 2.7% of male high-school students report current use) than in South Asia, where use among women is very low [9]. Urban students are more likely to smoke bidis than suburban and rural students are [10]. In the United States, two-thirds of adult bidi users are under 25 years old. This reflects experimentation among adolescents and has raised questions on the possible role of bidis as “gateway” products to regular

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cigarette use [11]. Higher nicotine delivery makes bidis more addictive and, being cheaper, also augments the initiation of tobacco addiction.

Another area of increasing concern is the gradual takeoff of bidi smoking among adolescents. A bicentric study in Delhi and Chennai has shown that Indian children in sixth grade may be using tobacco at higher rates than those in eighth grade—thus strongly signaling that more and more young youths are taking to this addictive behavior [12]. Current bidi-smoking prevalence among Indian youths in grades 8–10 in the Global Youth Tobacco Survey (2000–2004) was 2.3% in 26 states of India and increased to 3.5% in 2006 (2006) in 30 states. Bidi smoking was nearly 4× higher among boys (5.1%) than girls (1.3%) nationwide [2,13].

HEALTH EFFECTS

Adverse effects of tobacco use on human health are well established [14]. Compared with cigarettes, bidis have much less tobacco but content can vary from 0.15 g to 0.25 g [2]. Bidis sold in India and other South Asian markets are mostly unflavored and without a filter. In the United States and other Western markets, they tend to be flavored in varieties such as vanilla, strawberry, orange, and lime and can be provided with a filter. Such marketing strategies remind us of “candy” flavored cigarettes, which were banned not so long in the United States, and a similar legislation for menthol cigarettes is certainly looming large. Bidis have been found to produce approximately 3× the amount of carbon monoxide and contain approximately 3× the amount of nicotine and approximately 5× the amount of tar than cigarettes [15].

Similar to cigarette use, bidi use has been shown to cause cardiovascular diseases, oral cancers, lung cancers, and other health problems [2]. The large case–control INTERHEART (A Study of Risk Factors for First Myocardial Infarction in 52 Countries and Over 27,000 Subjects) study [16] assessed the risk of acute myocardial infarction in 52 countries and reported that bidi use was significantly associated with acute myocardial infarction (odds ratios [OR]: 2.89, 95% confidence interval [CI]: 2.11–3.96) compared with nonusers of any tobacco products and also clearly showing a dose–response relationship. Rastogi *et al.* [17] showed a dose–response relationship of similar magnitude for acute myocardial infarction among both bidi and cigarette smokers compared with never smokers. In a large cohort study from Mumbai, India,

incident oral cancer in bidi smokers (relative risk [RR]: 3.55; 95% CI: 2.40–5.24) was 42% higher than in cigarette smokers (RR: 2.50; 95% CI: 1.65–3.78) [18]. A meta-analysis by Rahman *et al.* [19] found statistically significant OR of 3.1 for risk of oral cancer for bidi smokers as compared with never smokers. Bidi use has contributed to India having the dubious distinction of being the oral cancer “capital” of the world. Bidi use has also shown to be associated with a greater risk of developing tuberculosis [20].

E-cigarettes have no documented evidence of the quantity of “free nicotine” delivered from such devices. Limited evidence regarding adverse health effects of electronic cigarettes is available to date [21,22]. Testing of such products is also not quality-controlled or well reported. Varying levels of nicotine are reported, even in products sold under the same label [23]. A recent study demonstrated that cotinine levels in ENDS users were similar to the levels observed in cigarette smokers but higher than those usually observed in nicotine replacement therapy users [24].

PUBLIC HEALTH POLICY OPTIONS

Over the past 20 years, tobacco control has seen successful developments mainly driven by robust science coupled with strong public health advocacy, such as indoor smoking restriction, advertising bans, taxation, and education. Such developments should provide opportunities to exert considerable influence on controlling noncigarette smoking products in ways that benefit public health. The most successful of such developments, however, is the introduction of the first international public health treaty—the WHO Framework Convention on Tobacco Control (FCTC)—in 2003. The FCTC, although aiming for reducing health effects of all forms of tobacco products through policy interventions, has largely focused on the effects and regulation of cigarette smoking. This is particularly problematic in populations where manufactured cigarettes do not dominate, such as India.

Article 8 of the FCTC recommends 100% bans in worksites, restaurants, and bars. Bidis are mainly consumed in open market places or inside homes or small roadside coffee shops. Enforcement of a 100% smoke-free policy under such circumstances must be a herculean task. The next best alternative should be strong health warnings, preferably pictorial health warnings, as recommended in Article 11 of the FCTC. Evidence has consistently shown that picto-

rial health warnings have contributed to increased knowledge of specific health effects of smoking in a number of countries [25]. Nevertheless, very few European and Western countries have adopted pictorial health warnings on cigarette packs to date. A study conducted in India [26] reported bidi products were not compliant with packaging and labeling rules specified by the Cigarettes and Other Tobacco Products (Prohibition of Advertising, Regulation of Trade, Commerce, Supply, and Distribution) Act, 2003. This highlights the need for more stringent implementation of the Cigarettes and Other Tobacco Products Act's guidelines to combat the ever-growing tobacco menace.

Articles 9 and 10 of the FCTC deal with tobacco product regulations. Even though the United States has not ratified FCTC, the regulatory authority provided to the U.S. Food and Drug Administration (FDA) in 2009 provides a mechanism to achieve some of the same ends and may help create precedents for other countries in terms of tobacco product regulation. However, the prospects for regulating products, such as bidis, are less clear. Data on the characteristics of noncigarette smoked products are sparse, and so further research is necessary before implementing regulation of such tobacco products. However, decentralized production and cottage industries such as bidi making (rolling of bidis mostly occur inside homes) may prove hurdles to the full implementation of such regulations. Bidi making is largely a family run livelihood involving children, particularly in India. The Indian government has developed legislation and policies aimed at monitoring working conditions and providing social security benefits for the welfare of bidi laborers. However, the reality is policies and legislation has done little to improve the working conditions and livelihoods of bidi workers in India. Worker protection is severely limited by the fragmented nature of the bidi industry.

Taxation is the single most cost-effective anti-smoking preventive tool. The pricing policies are also affected by the affordability of the product: that is, its "real price" in the context of income growth and inflation [27]. Taxes can vary significantly for noncigarette tobacco products. In India, cigarettes are taxed at a rate over 60× higher than that for bidis. Taxes on bidis should be increased to narrow the price difference between cigarettes and bidis. In India, the current taxation system on bidis allows the industry to avoid paying taxes, as manufacturers producing less than 2 million bidis a year are exempt from excise duties. To evade taxes, large fac-

tory owners fragment production into home-based units to maximize their profits. There are three main concerns or misconceptions regarding increasing taxes on tobacco products in general: (1) a loss to the state exchequer; (2) cross-border trading; and (3) substitution for cheaper and more harmful tobacco products. An economic analysis has found that raising the excise duty on bidis to a point where their price equals that of the lowest-priced cigarettes would not reduce excise revenue, but would help curb tobacco use [28].

Tobacco use is a health developmental issue [29]. Therefore, implementation of poverty eradication programs by governmental agencies can be an immediate alternative solution for bidi workers. In India, health developmental programs such as the Integrated Child Development Scheme and the Sarva Siksha Abhiyan programs can be implemented in bidi-rolling areas to encourage bidi workers to send their children to schools. In India, there should be immediate enforcement of the provisions under the Bidi and Cigar Workers (Condition of Employment) Act, 1966; Bonded Labour System (Abolition Act), 1976; Child Labour Act, 1986; Bidi Workers Welfare Fund Act, 1976; and the Bidi Welfare Cess Act, 1976, to improve the overall working conditions of the bidi workers and give them their rightful benefits. Creation of alternative livelihoods for workers connected with the bidi industry is another necessary policy for the sake of justice and human rights and is required by the FCTC. Bidi workers can also be linked to vocational training institutes according to local market needs.

In contrast to bidi assembly, which is mainly an unorganized sector, ENDS companies are sophisticated and better organized. The e-cigarette social community popularly known as "vapers," is a fast-growing online phenomenon [30]. The U.S. FDA in April 2011 announced the intention of regulating e-cigarettes as tobacco products only when the FDA failed to regulate them as drug-delivery devices in its initial attempt [31]. However, the tobacco companies have yet to make any "therapeutic" claims of electronic cigarettes. Evidence of both safety and cessation benefits are lacking, and, therefore, ENDS may become "bridge products" [31] for use in places where smoking is prohibited, including aircrafts, or as attractive starter products for former and never smokers. Over the past 5 years, there has been exponential expansion of interest in tobacco harm reduction [32]. No one knows exactly what long-term benefits/harms

one would get from e-cigarettes, whereas the harms of bidis are well established. But, we all know the truth: Abstinence is the best policy.

CONCLUSIONS

Noncigarette smoking products are widely available; their use varies nationally and regionally; and they are popular despite the fact that they, in the case of bidis, are equally hazardous as cigarettes. A market is also emerging for nicotine

delivery systems not directly dependent on tobacco (e.g., ENDS). The full implementation of FCTC, with a special focus on noncigarette tobacco products, along with a leadership role of the U.S. FDA may herald a new era for controlling noncigarette smoking products.

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