

**Section 4**  
**Non-Price Determinants of Demand**

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**Chapter 9**  
**Smoking Cessation**

## Chapter 9

# Smoking Cessation

Smoking cessation can have an immediate impact on the economic and public health consequences of tobacco use. This chapter examines current evidence for cessation support and best practices and their implementation in countries around the world. Specifically, the chapter discusses the following topics:

- Health and economic benefits of cessation
- Current interventions for smoking cessation, including pharmacological and behavioral interventions, tobacco quitlines, Web- and mobile-based cessation services, and the integration of cessation treatments into health care systems
- Factors that affect demand for cessation support, including cost and accessibility of cessation support services and products, the price of tobacco products, and consumer awareness
- Effects of tobacco control measures, such as taxation, smoke-free policies, and information and mass media interventions, on cessation.

Evidence from high-income countries clearly demonstrates the effectiveness and cost-effectiveness of interventions to promote and support cessation. Less evidence is available on the effectiveness and cost-effectiveness of cessation interventions in low- and middle-income countries. Demand for cessation services in low- and middle income countries exists, but in many of these countries cessation services are of limited availability or accessibility, or are unaffordable for most of the population.

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## Introduction

This chapter explores the potential health and economic impacts of smoking cessation, and reviews the cost-effectiveness of individual- and population-level smoking cessation interventions. The implications of the literature for increasing cessation rates, particularly in low- and middle-income countries (LMICs), are discussed. This chapter focuses exclusively on cessation of cigarette use because of the limited research on cessation of other tobacco products.

Although prevention of tobacco use is a critical component of global tobacco control efforts, the health and economic benefits of prevention will not be evident for several decades. Only large increases in population-level smoking cessation will significantly reduce the global burden of tobacco use in the near term.<sup>1,2</sup> In urging countries to ratify the World Health Organization (WHO) Framework Convention on Tobacco Control (WHO FCTC), WHO's Director-General noted that persuading current smokers to quit "is the only way we can substantially reduce smoking-related deaths over the next 40 years."<sup>3</sup>

Widespread cessation of smoking in many high-income countries (HICs) has produced steady declines in smoking prevalence over the past four decades. In HICs, a significant proportion of smokers try to quit each year.<sup>2,4</sup> For example, nationally representative data from the United States show that in 2010, 69% of adult current smokers reported wanting to quit completely, and 52% had made a quit attempt lasting more than 24 hours within the past year.<sup>5</sup> The International Tobacco Control Policy Evaluation (ITC) Project determined that 36.1% of male smokers in Canada, 38.6% in Australia, and 24.0% in the United Kingdom of Great Britain and Northern Ireland made quit attempts during 2010.<sup>6</sup> Success rates, however, are modest—only a very small proportion of smokers quit successfully each year. In the United States, approximately 6% of smokers achieve long-term (>1 year) abstinence each year.<sup>5</sup> Moreover, smoking cessation in HICs has occurred disproportionately among those with more education, better health status, skilled jobs, and higher household incomes, effectively shifting the burden of tobacco-related disease to a subset of vulnerable populations with the fewest resources.<sup>2,7-9</sup>

Smoking cessation rates are typically lower in LMICs where, among other things, cessation services are less accessible than in HICs. Smokers in LMICs who used effective cessation services had similar or even higher quit rates compared to smokers in HICs.<sup>10,11</sup> In a study of 18 countries, former smokers make up an estimated 3%–18% of the population in LMICs, versus over 20% in most HICs.<sup>12</sup> In the People's Republic of China, only 22.2% of male smokers made a quit attempt during the last year, one of the lowest rates observed across the 19 LMICs participating in the ITC Project.<sup>6</sup> If current trends continue, an estimated one-third of Chinese men currently under the age of 20 can be expected to die prematurely from smoking.<sup>13,14</sup> These studies show the formidable challenges countries face when attempting to boost population quit rates, as well as the enormous opportunities that are within reach.

## Health Benefits of Smoking Cessation

Chapter 2 describes the serious negative health consequences of cigarette smoking. Among smokers, the rate of death from any cause is approximately three times that of people who have never smoked, and the average smoker loses at least one decade of life expectancy.<sup>15</sup> Smoking cessation on a population scale would produce substantial health gains and greatly reduce the global burden of tobacco-related illness and death. It has been estimated that reducing global adult smoking rates by one-third by 2025 would avert more than 200 million tobacco-related deaths during the rest of the century.<sup>16</sup>

Quitting smoking, at any age, confers substantial health benefits. The health benefits of cessation begin within minutes and continue to accrue as long as an individual remains abstinent.<sup>17,18</sup> Over the long term, former smokers can expect increased life expectancy and improved quality of life. Those who quit before age 40 avoid most of the excess risk of smoking-related morbidity and mortality, and their pattern of survival resembles that of individuals who have never smoked.<sup>15,19–21</sup>

Benefits of quitting include reduced risk of cardiovascular disease and death, improved lung function, reduced risk of lung infection, and reduced risk of lung and other cancers.<sup>22–24</sup> Quitting smoking can also improve the risk profile of other chronic diseases, such as diabetes and osteoporosis. Women who quit before or during pregnancy (especially early in pregnancy) can reduce the serious risks of smoking to their babies, including premature birth, certain birth defects, and sudden infant death syndrome.<sup>17,25</sup>

Evidence is accumulating to suggest that smoking cessation may also confer mental health benefits. Cross-sectional and longitudinal studies examining the relationship between smoking cessation and subjective well-being have found that successful quitters report higher levels of subjective well-being than continuing smokers.<sup>26–29</sup> In a systematic review of 26 longitudinal studies that measured changes in mental health status pre- and post-cessation, smoking cessation was consistently associated with reductions in depression, anxiety, and stress, and improved positive mood and quality of life compared with continued smoking.<sup>30</sup> In a retrospective analysis of suicide rates and state-level tobacco control policies, Gruzca and colleagues<sup>31</sup> found significant protective effects of cigarette excise taxes and smoke-free laws on the risk of suicide. They estimated that a 1 U.S. dollar (US\$) increase in cigarette excise taxes in the United States would result in a 10.5% relative reduction in suicide risk, or roughly 4,000 fewer suicides per year in the United States.

## Economic Benefits of Smoking Cessation

The economic benefits of smoking cessation are characterized as costs to an individual, family, or economy that are eliminated or reduced because a smoker stops buying and smoking cigarettes. As described in detail in chapter 16, tobacco use is strongly linked to poverty; tobacco use and its negative health consequences are experienced disproportionately by people of low income and low educational attainment. The poor are much more likely than the rich to become ill and die prematurely from tobacco-related illnesses.<sup>32,33</sup> In HICs, this unequal burden of tobacco use is a major contributor to widening socioeconomic disparities in population-level health.<sup>34</sup>

In some low-income countries, the poorest households spend 10%–15% of their income on tobacco.<sup>32</sup> Similarly, in HICs, people with the fewest resources bear the highest cost burden. For example, in New York City, low-income smokers (<US\$ 30,000/yr) spent nearly one-quarter (23.6%) of their annual household income on cigarettes, relative to more affluent smokers (>US\$ 60,000/yr), who spent just 2.2% of their earnings on cigarettes.<sup>35</sup> These expenditures represent profound opportunity costs—that is, money that could be spent on household essentials such as food, shelter, or education, is instead spent on tobacco. For example, a study conducted in Bangladesh estimated that if all the nation’s poor stopped using tobacco and redirected the expenditures to food, 10.5 million fewer Bangladeshis would suffer from malnutrition; if parents who used tobacco quit and redirected the expenditures to food, the number of Bangladeshi children who die from malnutrition each year would be halved.<sup>36</sup>

In addition to the cost of purchasing cigarettes, individuals and families also bear the cost of lost productivity—lost wages and contributions to household activities—as a result of illnesses and death

caused by smoking. Low-income smokers in both high- and low-income countries are often uninsured or underinsured and may have minimal access to formal health care. Thus, the direct costs of their illnesses caused by smoking fall almost entirely on the individual or family, representing significant expenses and opportunity costs.<sup>37</sup> In the United States, each smoker incurs an estimated additional US\$ 1,623 in excess medical expenditures and US\$ 1,760 in lost productivity annually.<sup>38</sup> Just as the poorest countries bear the largest burden of tobacco use, the poorest people in the poorest countries bear a disproportionate burden from smoking.<sup>32</sup> These groups stand to realize the greatest relative gains from smoking cessation.

The individual costs of tobacco use also translate to broad social costs.<sup>39</sup> Lost labor output due to illnesses and premature death caused by tobacco use decreases overall productivity. In countries with more comprehensive health care and insurance systems, the entire system shares the direct health care costs attributable to tobacco use, thus inflating health care costs for those enrolled in health care plans. Each of these costs is potentially avoidable if tobacco use is reduced or eliminated.<sup>40</sup>

Cessation has direct economic benefits at the population and individual levels. An analysis of smoking-attributable medical expenditures in the United States concluded that if smokers quit before experiencing any symptoms of smoking-related disease, approximately 70% of their excess medical care costs could be avoided.<sup>41</sup> According to figures from the U.S. Public Health Service, the cost per quality-adjusted life-year (QALY) saved by implementing its clinical practice guideline for cessation ranges from US\$ 1,108 to US\$ 4,542, compared with an annual cost of hypertension screening among 40-year-old men of US\$ 23,335.<sup>42,43</sup> Solberg and colleagues<sup>44</sup> estimated that repeated annual tobacco use screening and brief intervention over the lifetime of smokers would result in 2.47 million QALYs saved, at a cost savings of US\$ 500 per smoker receiving the service. Tobacco cessation support interventions are also cost-effective relative to other commonly used disease prevention interventions, such as Pap smears and medical treatments for hypercholesterolemia.<sup>43</sup> Maciosek and colleagues<sup>45</sup> evaluated the relative health impact and cost-effectiveness of 30 evidence-based clinical preventive services recommended by the Preventive Services Task Force (U.S.), and concluded that tobacco use screening and brief interventions ranked among the top 3 clinical preventive services, along with immunizing children and discussing aspirin use with adults at high risk of cardiovascular disease.

Return on investment calculations offer another lens through which to view the economic value of smoking cessation interventions. A compelling example comes from the experience of the U.S. state of Massachusetts. In 2006, Massachusetts began offering comprehensive tobacco cessation services for low-income adults as a covered benefit under the state's Medicaid insurance program. In the first 2.5 years, the smoking rate among Medicaid beneficiaries declined by 26%,<sup>46</sup> and there was a significant decrease in cardiovascular-related hospitalizations among benefit users.<sup>47</sup> Researchers estimated the return on investment of the cessation benefit by examining the cost of the program benefit relative to the reduction in cardiovascular hospitalizations and concluded that every dollar Massachusetts invested in cessation coverage yielded US\$ 3.12 in savings for cardiovascular-related hospital admissions alone.<sup>48</sup> Similarly, Lightwood and Glantz<sup>49</sup> estimated that in the United States, a 10% relative reduction in smoking prevalence along with a 10% relative reduction in consumption per remaining smoker would result in health care expenditure savings of US\$ 63 billion the following year. Smoking cessation support is particularly cost-effective for special populations, such as pregnant women and hospitalized patients, for whom successful tobacco abstinence reduces general medical costs in the short term and decreases the number of future hospitalizations and long-term health problems.<sup>50–54</sup>

Most of the evidence on the cost-effectiveness of smoking cessation support comes from research undertaken in HICs. The cost-effectiveness of smoking cessation support is also expected to increase in LMICs, given that the relative costs of smoking in LMICs are increasing.

## Current Interventions and Programs for Smoking Cessation

Tobacco dependence is a chronic, relapsing disorder, and cessation often requires repeated interventions and multiple quit attempts.<sup>43</sup> A significant proportion of smokers who quit do so on their own without formal cessation assistance.<sup>55</sup> However, nicotine is highly addictive, and many smokers find quitting extremely difficult.

Article 14 of the WHO FCTC requires Parties to adopt and implement effective measures to promote tobacco cessation and ensure adequate treatment for tobacco dependence.<sup>56</sup> The Article 14 guidelines recommend a number of specific actions that Parties should take to successfully design and implement a comprehensive national cessation strategy. Recommended actions include a combination of population-level and individual-level approaches to helping smokers quit.

- Population-level approaches include integration of tobacco use screening and brief intervention into health care systems; establishment of cessation services such as tobacco quitlines; and Web- and mobile phone-based cessation interventions.
- Individual-level approaches include provision of direct cessation support (e.g., pharmacological therapies, behavioral support) to individual smokers.

The evidence supporting population-level and individual-level interventions for smoking cessation is described in this section. Also included is a brief discussion of other tobacco control measures that can increase the impact of cessation treatment strategies when implemented in conjunction with them. These measures are described in greater detail elsewhere: taxation in chapter 5, comprehensive smoke-free policies in chapter 6, and anti-tobacco mass media campaigns and health warning labels in chapter 8.

Interventions for smoking cessation increase the probability of long-term, sustained abstinence among all smokers attempting to quit.<sup>43</sup> Table 9.1 summarizes effectiveness data for these smoking cessation interventions, including information from the latest Cochrane Reviews.

**Table 9.1 Effectiveness of Treatments for Tobacco Dependence After 6 to 12 Months**

Category	Type of intervention	Comparison	Risk ratio* (95% confidence interval)
Self-help	Self-help print materials	No intervention	1.19 (1.04–1.37) <sup>178</sup>
	Internet (interactive/tailored website)	Usual care or written self-help	1.48 (1.11–2.78) <sup>179</sup>
	Mobile device (mostly texting)	Usual care	1.71 (1.47–1.99) <sup>180</sup>
Health professional interventions	Advice from physician	Brief advice vs. no advice	1.66 (1.42–1.94) <sup>181</sup>
		Intensive advice vs. no advice	1.84 (1.60–2.13) <sup>181</sup>
		Intensive vs. minimal advice	1.37 (1.20–1.56) <sup>181</sup>
	Advice from nurse	Usual care	1.29 (1.20–1.39) <sup>182</sup>
Counseling	Individual behavioral counseling	Minimal behavioral intervention	1.39 (1.24–1.57) <sup>183</sup>
	Group behavior therapy	Self-help	1.98 (1.60–2.46) <sup>184</sup>
	Telephone counseling, multiple sessions	Self-help or minimal intervention	1.37 (1.26–1.50) <sup>92</sup>
Incentives	Reward- and deposit-based interventions	Usual care	1.42 (1.19–1.69) <sup>185</sup>
Pharmacological therapies (nicotine replacement therapy)	Nicotine replacement therapy†	Placebo or non-NRT control	1.60 (1.53–1.68) <sup>57</sup>
	Nicotine gum	Placebo or non-NRT control	1.49 (1.40–1.60) <sup>57</sup>
	Nicotine patch	Placebo or non-NRT control	1.64 (1.52–1.78) <sup>57</sup>
	Nicotine lozenge/oral tablets	Placebo or non-NRT control	1.95 (1.61–2.36) <sup>57</sup>
	Nicotine inhaler	Placebo or non-NRT control	1.90 (1.36–2.67) <sup>57</sup>
	Nicotine nasal spray	Placebo or non-NRT control	2.02 (1.49–2.73) <sup>57</sup>
Pharmacological therapies (other)	Bupropion	Placebo or alternative therapeutic control	1.82 (1.6–2.06) <sup>66</sup>
	Varenicline	Placebo or alternative therapeutic control	2.88 (2.4–3.47) <sup>66</sup>

\*For all studies, risk ratios represent the risk of abstinence relative to control.

†Any type of nicotine replacement therapy including gum, patch, lozenge/oral tablets, inhaler, and nasal spray.

Note: NRT = nicotine replacement therapy.



## Pharmacological Therapies

This section examines the current economic and clinical evidence surrounding pharmacological therapies as cessation aids. Evidence-based pharmacological therapies for smoking cessation include nicotine replacement therapy (NRT)—such as the transdermal patch, gum, tablets, lozenges, inhalers, and nasal sprays—and non-nicotine pharmacological therapies, such as bupropion and varenicline. These medications may be used alone, or in certain combinations, to increase the likelihood of achieving smoking abstinence.<sup>43</sup>

### *Nicotine Replacement Therapy*

A large body of research, conducted mainly in HICs, provides strong evidence of the effectiveness of NRT, which uses controlled doses of nicotine to help patients manage symptoms of withdrawal. In clinical trials, abstinence rates at 6 to 12 months of treatment are typically 50%–70% higher compared to placebo.<sup>57</sup> When NRT is used in combination with behavioral support, abstinence rates are even higher compared with placebo or no treatment.<sup>43</sup> Although most studies have been conducted in HICs, it is reasonable to expect similar effectiveness in LMICs when these medicines are used as recommended. Outside of clinical trials, a large proportion of those who try NRT use less than the recommended doses and for shorter periods than recommended.<sup>58,59</sup> More research is needed to determine the effectiveness of NRT when used in a non-research setting and among lower income populations.

In most HICs, three forms of NRT—gum, lozenge, and transdermal patch—are widely available, often without a prescription. NRT is also available in tablet, inhaler, and nasal spray forms, but the availability of these products for over-the-counter (OTC) purchase, which reduces barriers to their use, varies by country. In 2014, 139 out of 195 countries and territories sold NRT, and 51 of the 53 countries where NRT was not available were LMICs.<sup>60</sup> LMICs were also more likely to require a prescription for NRT: 16 of the 17 countries requiring an NRT prescription were LMICs. NRT gum and transdermal patches appear on the 16th WHO Model List of Essential Medicines because of public health need, high-quality evidence of effectiveness and acceptable safety, and cost-effectiveness.<sup>61</sup> The selection of NRT as an essential medicine represents a key step toward access to quality, safe, effective, and affordable therapies to treat tobacco use and addiction in countries around the world.

Several studies have examined the cost-effectiveness of NRT. Ranson and colleagues<sup>62</sup> modeled the cost-effectiveness of NRT across low-, middle-, and high-income countries. Under conservative assumptions, this study found that worldwide, NRT would cost between US\$ 358 and US\$ 1,917 per disability-adjusted life-year (DALY) saved. The cost per DALY saved was lower in LMICs (US\$ 280–\$ 870) than in HICs (US\$ 750–\$ 7,206). Shroufi and colleagues,<sup>63</sup> in a systematic review of interventions for preventing cardiovascular disease in LMICs, also found that NRT was cost-effective, but to a lesser degree than population-based tobacco control interventions. Cornuz and colleagues<sup>64</sup> found that across six North American and European countries, NRT increased quit rates, and the incremental cost for NRT ranged from US\$ 1,758 to US\$ 5,759 per life-year saved for men and from US\$ 2,657 to US\$ 8,700 per life-year saved for women. In Australia, the cost per DALY saved was slightly higher: US\$ 12,920 (\$17,000 in Australian dollars).<sup>65</sup> Despite the variations in cost per life-year or life-year saved, the research consensus shows that NRT is generally cost-effective for men and women in low-, middle-, and high-income countries.

The cost of NRT varies worldwide and is often a barrier to its use. Nearly half of all HICs (24 of 55) cover all or part of the costs of NRT through public and private health insurance plans.<sup>60</sup> In contrast,

most LMICs do not help cover the cost of NRT, leaving the cost burden to individuals. Of the 86 LMICs offering NRT, 59 (69%) do not cover any of the cost of NRT.<sup>60</sup>

### ***Non-Nicotine Pharmacological Therapies***

Two types of non-nicotine pharmacological therapies, bupropion and varenicline, have demonstrated efficacy for improving cessation outcomes. These therapies can aid smoking cessation by reducing the rewarding effects of nicotine and relieving symptoms of nicotine withdrawal. Clinical evidence provides strong support for the efficacy of both bupropion and varenicline in increasing smoking abstinence.<sup>66,67</sup> In clinical trials, varenicline increased the odds of successful long-term cessation between two- and threefold compared with unaided quit attempts.<sup>66</sup> Bupropion and varenicline have both been approved by the Food and Drug Administration (FDA), an agency of the U.S. Department of Health and Human Services, for cessation treatment.

Economic analyses from HICs suggest that varenicline is a cost-effective option for cessation. A direct comparison among a cohort of U.S. smokers found that varenicline was far more cost-effective than NRT, bupropion, and unaided cessation.<sup>68</sup> In a review of 20 studies that examined the cost-effectiveness of smoking cessation treatment options in HICs, varenicline appeared to be the most cost-effective option. Faulkner<sup>69</sup> reviewed the cost-effectiveness evidence for varenicline and concluded that although the initial treatment cost typically exceeds that of other pharmacological therapies for smoking cessation, varenicline's superiority in promoting long-term abstinence makes it a cost-effective treatment in the long run. No data exist on the cost-effectiveness of either bupropion or varenicline for smoking cessation in LMICs.

The requirement for physician monitoring of patients taking bupropion and varenicline may make widespread use of these medications a challenge. Even if the clinical complexities of these medications are resolved, cost may also be a barrier, even in HICs, especially if these medications are not covered by national or private health insurance plans. Cost may also be a barrier in LMICs and for low-income individuals living in any country.

### ***Behavioral Interventions***

Effective behavioral interventions for treatment of tobacco use range from broad-reach approaches, such as quitlines and brief advice, to more intensive multicomponent programs, such as intensive individual and group behavioral support. Behavioral counseling focuses on practical skills training (e.g., problem-solving, refusal skills) and providing social support within the treatment setting. Tailoring behavioral treatments to address unique cessation barriers associated with a variety of special populations, such as pregnant women and individuals with comorbid psychiatric disorders, has been found to improve the effectiveness of behavioral interventions among these subgroups.

### ***Tobacco Use Screening and Brief Interventions***

The health care system is a key channel for delivering treatment to tobacco users.<sup>43,70,71</sup> Brief clinical interventions, delivered as part of routine health care, are an important evidence-based intervention for cessation. Brief interventions have been found effective across all populations in the United States, including adolescents, pregnant women, older smokers, smokers with medical comorbidities or mental illness, racial/ethnic minorities, people who are willing and unwilling to make a quit attempt soon, and

former smokers who are at risk of relapse.<sup>43</sup> Emerging evidence suggests that brief interventions might also be effective in LMICs with suitably developed systems of primary care.<sup>10,72</sup>

Brief interventions often follow the “5As” model:<sup>43</sup>

- *Ask* patients about tobacco use
- *Advise* tobacco users to quit
- *Assess* willingness to make a quit attempt
- *Assist* quitting efforts through counseling and/or pharmacological therapies
- *Arrange* follow-up contact.

Two models have emerged to ensure adequate delivery of smoking cessation advice in general practice settings. In the first model, allied health professionals provide the bulk of detailed assistance to patients in the practice, limiting the physician’s role to motivating action and dealing with prescription medication. In countries where physicians play a small role in primary care, smoking cessation counseling could be provided by nurses, pharmacists, or other health care workers, if they are sufficiently trained and directed to offer such services. For example, brief smoking cessation counseling could be combined with other preventive health care services, such as tuberculosis prevention programs, that are provided by trained lay health workers. In LMICs, where many people have limited experience with receiving health information through printed materials and other means, the role of face-to-face contact with health workers is likely to remain critical in encouraging and supporting smoking cessation.

In the second model, clinicians encourage referral out of general practice settings to other programs (e.g., telephone quitline services). In this model, clinicians must still be trained and provided appropriate institutional incentives to ask about tobacco use and advise patients to quit. By referring patients to more intensive treatment programs, however, clinicians can transfer the bulk of assessment and assistance, the two most time-consuming tasks of the 5As framework, to others. This model is difficult to implement in settings in which telephone access is limited, but the extensive and increasing penetration of cellular phone service is making it possible to provide counseling support even in low-income countries and among low-income populations.

With few studies on the 5As in low-income countries<sup>73</sup> and on alternatives to the 5As approach,<sup>74</sup> more research is needed on the delivery of brief interventions for smoking cessation in the general practice setting in LMICs. As with other methods of treating tobacco dependence, the bulk of the evidence on the cost-effectiveness of brief interventions comes from HICs. A study of U.S. smokers showed that the cost-effectiveness ratio for brief physician advice with people quitting smoking ranged between US\$ 705 and US\$ 988 per year of life for men and between US\$ 1,204 and US\$ 2,058 per year of life for women.<sup>75</sup> Similarly, Cromwell and colleagues<sup>42</sup> showed that physician-led brief counseling in the United States resulted in incremental cost-effectiveness ratios of US\$ 2,587 per life saved and US\$ 1,915 per QALY saved. In an examination of the cost-effectiveness of brief counseling in the United Kingdom, Bauld and colleagues<sup>76</sup> found that pharmacy-led brief counseling resulted in a cost-effectiveness ratio of US\$ 5,202 (2,600 British pounds) per QALY saved. Each of these studies clearly shows that even with modest gains in long-term abstinence, the cost-effectiveness of brief counseling from physicians or other health care providers falls well within accepted cost-effectiveness standards for preventive practices.

Brief interventions are significantly more likely to be delivered when tobacco assessment is part of the standard patient intake protocol and clinicians are expected or incentivized to provide such interventions or refer patients to available and affordable services. The use of health information systems such as electronic health records, computerized decision support systems, and electronic prescribing has been found to increase documentation of smoking status and referrals to cessation counseling in health care settings in HICs.<sup>77</sup> Financial incentives that reward clinicians for performance of cessation treatment activities have also been shown to improve treatment delivery within health care systems in HICs.<sup>78–80</sup> Across many health care settings, clinicians are frequently pressed for time and/or lack skills in cessation counseling.<sup>81–85</sup> These constraints are likely to be more serious in LMICs, where patient visits to clinics tend to be for acute illness or injury, rather than for routine and preventive care, and where physician time is more limited than in HICs.

### *Intensive Behavioral Interventions*

Multisession individual or group counseling interventions can have a measurable impact on cessation. There is a strong dose–response relationship between the intensity of tobacco dependence counseling and its effectiveness. Although brief counseling interventions (3 minutes or less) are effective, more intensive counseling (four or more sessions lasting more than 10 minutes) can more than double abstinence rates compared with no contact.<sup>43</sup> An example of intensive counseling, the Maudsley model in the United Kingdom, includes six weekly sessions of support with a behavioral specialist as well as pharmacological therapies and other configurations, such as ongoing drop-in groups that do not require an appointment.<sup>86</sup>

Cultural targeting of intensive counseling has been shown to improve outcomes among African American smokers.<sup>87</sup> The relative effectiveness of cultural targeting may translate across cultures. The counseling interventions identified in the 2008 guidelines from the U.S. Public Health Service<sup>43</sup> effectively improved quit rates in every population group in which they were evaluated. However, little research has been conducted on whether tailoring such treatment is culturally relevant in the context of most LMICs. Promoting cessation can be expected to be very different in contexts in which people have limited awareness of tobacco harms and few former smokers as role models, and such differences will likely affect treatment outcomes. Beyond the challenges of treatment design, the costs of behavioral interventions are not covered even in many HICs. In low-income countries, such services—generic or targeted—are rare.<sup>88</sup>

### *Tobacco Quitlines*

Tobacco quitlines provide telephone-based behavioral counseling and support to tobacco users who want to quit. Quitlines can reduce barriers to cessation treatment in that they are telephone based, and smokers can access them at a time and location that is convenient to them and usually at no cost. Quitline counseling protocols may be adapted for specific populations, or tailored for individual users. Evidence indicates that quitlines can expand the use of evidence-based cessation services in populations that historically have had the most limited access to and use of these treatments.<sup>89–91</sup>

A strong evidence base supports the efficacy of quitlines for smoking cessation. The 2013 Cochrane Review<sup>92</sup> found a 1.37 relative risk (RR) (95% confidence interval [CI] 1.26–1.50) for at least 6 months abstinence for people who received multiple sessions of callback counseling compared with people who tried to quit without counseling assistance. The 2008 update of the U.S. Public Health Service guideline found that the odds ratio (OR) for quitlines versus minimal or no counseling or self-help

was 1.6 (95% CI 1.4–1.8).<sup>43</sup> Quitlines have the greatest potential impact when they are part of a comprehensive tobacco control effort, reach large numbers of people, and bridge the clinical and public health approaches to smoking cessation.<sup>43,92</sup>

In 2014 approximately one-third of all countries offered national toll-free telephone quitlines staffed with live counselors.<sup>71</sup> HICs were far more likely than LMICs to have implemented a national toll-free quitline; in 2014, only 9% of low-income countries reported having a national toll-free quitline.<sup>71</sup> However, even in HICs, the actual proportion of smokers who use quitlines remains low, leaving substantial room for improving their promotion, use, and reach.

Services from tobacco quitlines are generally less expensive to provide than face-to-face services, but in many LMICs, the cost of calls may be a significant barrier. Operators of tobacco quitlines are predominantly governments and nongovernmental organizations.<sup>39</sup> Evidence from HICs provides strong support for the cost-effectiveness of quitlines.<sup>89</sup> The Community Preventive Services Task Force (U.S.) reviewed six studies on the cost-effectiveness of telephone counseling and found the median cost per QALY was US\$ 2,012 (values ranged from US\$ 439/QALY to US\$ 2,627/QALY).<sup>89</sup> In a randomized trial of the American Cancer Society's telephone counseling services, McAlister and colleagues<sup>93</sup> estimated that the cost per successful quit (12-month abstinence) was approximately US\$ 1,300. A cost-effectiveness analysis of the New Zealand national quitline estimated that the unit cost of securing and supporting a quit attempt for the full year in 2014-2015 was US\$ 202.46, with an annual return on investment of US\$ 63 per quit.<sup>94</sup> An analysis of Thailand's national quitline data estimated an average cost per quitter of US\$ 253, and US\$ 32 per life-year saved.<sup>11</sup>

### *Web- and Mobile-Based Cessation Services*

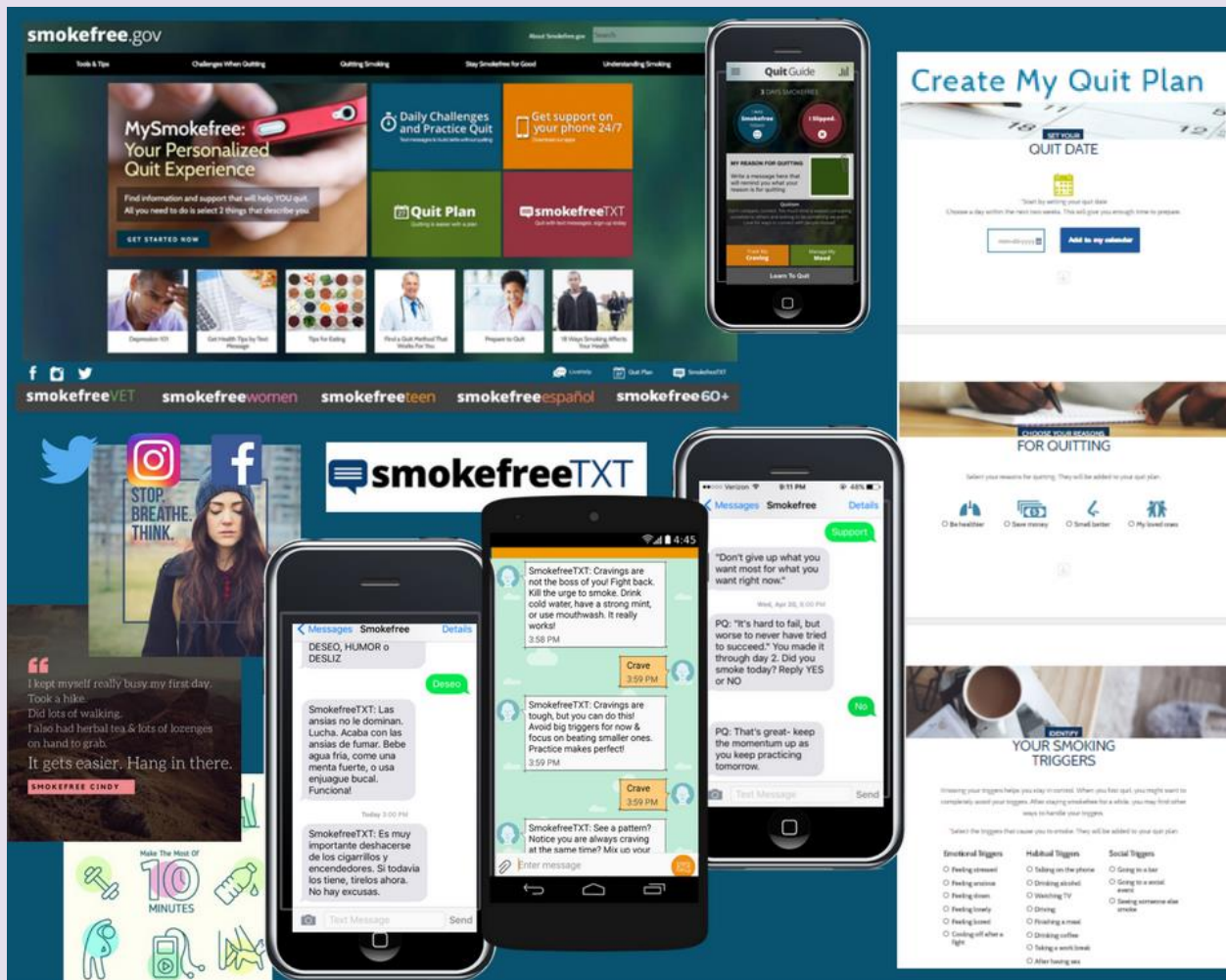
The emergence and diffusion of Web- and mobile-based technology has given rise to new and innovative approaches for promoting tobacco cessation, such as through cell phone text messaging and Internet-based behavioral support. These approaches have great potential to impact smoking prevalence, given their broad reach and accessibility.

Quitlines around the world are developing a range of smoking cessation counseling services for use via the Internet.<sup>32</sup> Many stand-alone Internet-based smoking cessation interventions are also emerging in countries such as Iceland, Ireland, and Panama.<sup>70</sup> Strong evidence from a meta-analysis of Web- and computer-based smoking cessation programs indicates that these services can significantly improve smoking cessation outcomes compared with no treatment.<sup>95</sup> Munoz and colleagues<sup>96</sup> studied Internet-based cessation programs in both Spanish and English among four groups. Each group in this randomized controlled trial received a static smoking cessation guide and increasing levels of counseling intensity. Seven-day abstinence rates were approximately 20% across all four groups, suggesting that even a low-intensity Internet-based cessation intervention can be significantly more effective than no treatment. In countries where populations have wide access to computers and the Internet, these strategies represent promising and cost-effective additions to broader national services for tobacco cessation. However, in countries where populations have limited computer access or slow Internet connections, such approaches may have limited utility.

Similarly, the penetration of mobile phone networks in many LMICs may facilitate cost-effective alternatives or adjuncts to traditional provider-based cessation interventions.<sup>97</sup> Text messages (Short Message Service) can be used to deliver health behavior change interventions, including smoking

cessation messages, across a variety of contexts.<sup>98</sup> With text messaging, messages can be tailored to individuals, delivered instantaneously, and accessed at any time. In addition, text messaging is appealing to populations such as young adults, who have not typically shown interest in calling quitlines.<sup>99</sup> Because of the novelty of text messaging services, few economic studies on them are available, but early results suggest that Web and mobile interventions hold promise as a cost-effective and scalable mode of delivery for smoking cessation.<sup>100–102</sup>

**Box 9.1: The National Cancer Institute’s Smokefree.gov Initiative**



Source: National Cancer Institute 2016.<sup>186</sup>

The Smokefree.gov Initiative (SFGI) developed by the National Cancer Institute (NCI) of the National Institutes of Health (NIH), an agency of the U.S. Department of Health and Human Services, provides Web- and mobile-based quit smoking resources to the public, including targeted resources for subpopulations with unique information needs and/or higher smoking rates. The SFGI offers a variety of websites, mobile applications, text messaging-based programs, and social media accounts to help teen and adult smokers quit.

The Smokefree.gov website (<https://smokefree.gov>) anchors the SFGI and provides smokers with evidence-based cessation advice and support, including information about effective quit methods and barriers to quitting. The website serves as an entry point for all SFGI resources, as well as NCI's telephone and online smoking cessation counseling services (<https://smokefree.gov/tools-tips/speak-expert>).

The Smokefree Women website (<http://women.smokefree.gov>) provides women of reproductive age with evidence-based smoking cessation information. This website was designed to address the concerns of women trying to quit smoking (e.g., weight management, diet and physical activity, pregnancy and parenting).

The Smokefree Teen website (<http://teen.smokefree.gov>) offers teens evidence-based cessation support and includes decisional values clarification, information on different tobacco products, and information for specific groups of teens.

The Smokefree Español website (<https://espanol.smokefree.gov>) provides evidence-based smoking cessation content that has been culturally adapted for Spanish-language smokers.

The Smokefree 60+ website (<https://60plus.smokefree.gov>) offers evidence-based cessation advice and support as well as information on smoking and health topics often important to older adults.

The Smokefree Veterans website (<https://smokefree.gov/veterans>) provides evidence-based smoking cessation information designed to assist military veterans in achieving their health goals.

SmokefreeTXT (<https://smokefree.gov/Smokefree-Text-Messaging-Programs>) offers text messaging-based smoking cessation support to smokers trying to quit. Smokers can choose from a variety of text messaging programs, depending on their particular cessation needs (e.g., adult smokers, pregnant women, Spanish speakers, military veterans, teens, etc.).

The SFGI supports two free smoking cessation smartphone apps (<https://smokefree.gov/tools-tips/apps>). QuitGuide for adults and quitSTART for teens are designed to help users prepare to quit smoking and build the skills needed to become and stay smoke-free. These tools offer personalized cessation support by allowing users to track their cravings and moods, tag specific locations and times of day that trigger tobacco use, request on-demand help, and monitor their progress towards smoke-free milestones.

## Studies Assessing the Utility of Electronic Nicotine Delivery Systems for Cessation

Electronic nicotine delivery systems (ENDS) are battery-powered devices designed to heat a liquid, which typically contains nicotine, into an aerosol for inhalation by the user. Since their appearance on the global market around 2007, ENDS have gained popularity, and anecdotal reports indicate that some ENDS users have quit smoking using these products.<sup>103</sup> However, the evidence regarding the effectiveness of ENDS as a cessation aid is scant and of low certainty, making it difficult to draw credible inferences as of this writing.

A single randomized trial<sup>104</sup> found that ENDS had low efficacy for quitting, similar to that observed in this study for the nicotine patch. Most observational studies of the relationship between ENDS use and smoking cessation/reduction, employing both cross-sectional and longitudinal designs, have found either no cessation benefit or a diminished cessation benefit associated with ENDS use.<sup>105–113</sup> Two studies have found a cessation benefit associated with ENDS under specific conditions related to frequency of use and type of ENDS product.<sup>114,115</sup> A review of tobacco smoking cessation interventions by the U.S. Preventive Services Task Force concluded that there is insufficient evidence to recommend ENDS as a cessation tool for adolescents or adults, including pregnant women.<sup>116</sup>

One meta-analysis of six studies, including two randomized controlled trials, two cross-sectional studies, and two longitudinal studies, concluded that ENDS use was associated with increased quitting and reduced cigarette consumption among continuing smokers.<sup>117</sup> In contrast, two meta-analyses—one including 15 cohort studies, 3 cross-sectional studies, and 2 clinical trials,<sup>118</sup> and the other examining the existing 8 observational longitudinal studies with the highest Grading of Recommendations Assessment, Development and Evaluation (GRADE) quality<sup>119</sup>—concluded that the use of ENDS reduces the chances of quitting smoking.

In conclusion, the evidence is insufficient to determine whether ENDS are an effective smoking cessation tool.

### **Demand-Side Factors Related to Smoking Cessation Treatment**

Despite the existence of efficacious treatments for smoking cessation, the public health benefit of these treatments has been limited. Relatively few smokers who attempt to quit utilize available smoking cessation resources such as behavioral treatments, pharmacological therapies, or tobacco quitlines. If consumer demand for evidence-based tobacco cessation products and services were to increase, many more people would attempt to quit and would succeed. Therefore, it is essential to increase the demand for evidence-based treatments as well as their use and reach, and to ensure that these treatments are affordable, accessible, and easy to use.

Demand for tobacco cessation products and services varies across countries; level of economic development appears to be a factor influencing demand.<sup>120</sup> Although data on the demand for cessation services in LMICs is quite limited, it is thought that the demand for such services is generally lower in LMICs than in HICs, because there is less public awareness of the health consequences of smoking; there are fewer former smokers to serve as role models, fewer limits on smoking in workplaces and public places, and weaker social norms against tobacco use; and tobacco products are often very affordable. In contrast, the cost of cessation treatment is high.<sup>121</sup> Limited existing demand for cessation treatment services in low-income countries represents a substantial barrier to widespread use of treatment. But interest may increase in these countries in the coming years as a result of continued capacity building and implementation of the WHO FCTC's Article 14 guidelines.

### **Impact of Price on Demand for Smoking Cessation Treatment**

Economic theory predicts that price of pharmacological therapies is an important determinant of their use, and empirical evidence from HICs indicates a strong inverse relationship between the use of pharmacological therapies for smoking cessation and their cost. The following sections discuss seminal papers that explore this relationship.

#### ***Economic Studies***

In the first study on the economic determinants of NRT use, Tauras and Chaloupka<sup>122</sup> estimated the effects of price on the demand for product-specific NRT. This study is based on demand equations using pooled cross-sectional, time-series, scanner-based data from 50 major metropolitan markets in the United States between the second quarter of 1996 and the third quarter of 1999. Estimates from the demand equations implied that decreases in the price of NRT lead to substantial increases in per capita sales of NRT products. Own-price elasticity of demand measures the responsiveness of consumer demand for NRT products to changes in the price of the products. The average own-price elasticities



of demand for Nicoderm CQ<sup>®</sup> (transdermal patch) and Nicorette<sup>®</sup> (gum) were  $-2.33$  and  $-2.46$ , respectively, suggesting that a 10% decrease in the real price increases demand by approximately 23% for Nicoderm CQ<sup>®</sup> and 24% for Nicorette<sup>®</sup>. These estimates are based on average elasticities across products within a brand. Therefore, the derived elasticity estimates in this study likely exceed the overall NRT price elasticity (in absolute value) because of substitutability between NRT products within and across brands.

In a follow-up study, Tauras and colleagues<sup>123</sup> used a longer data series (1996–2002) to examine the demand for NRT products by focusing on the interrelationship between them. The study found that product-specific own-price elasticities of demand ranged from  $-0.77$  to  $-3.74$  for Nicoderm CQ<sup>®</sup>,  $-2.56$  to  $-4.65$  for Nicorette<sup>®</sup>, and  $-1.82$  to  $-1.97$  for Nicoderm<sup>®</sup>. Tauras and colleagues also looked at the cross-price elasticity of demand for other NRT products, which is the percentage change in quantity of NRT demanded for a 1% change in the average price of all other NRT products. They found that the cross-price elasticity of demand for other NRT products ranged from 0.08 to 2.59. The authors concluded that a positive and significant relationship exists between the demand for any given NRT product and the average price of all other NRT products, implying that different NRT products can often be seen as substitutes for each other at an economic level.

### *Randomized Experimental Design Studies*

Several studies have used randomized designs to examine how employer and health insurer coverage of NRT influences NRT usage and related outcomes.

Hughes and colleagues<sup>124</sup> conducted a controlled experiment in which 106 smokers were randomly assigned to pay different prices for nicotine gum. The study concluded that smokers who pay less out of pocket are more likely to obtain the gum, use it for longer periods, and increase the number of units of gum they buy.

Schauffler and colleagues<sup>125</sup> assessed the impact of health insurance coverage of tobacco dependence treatments using a randomized controlled trial of smokers who were enrolled in health maintenance organizations in California. The study randomly assigned 1,204 smokers to either a control group, which received a self-help kit containing a video and pamphlet, or a treatment group, which received the self-help kit and fully covered benefits to obtain OTC NRTs and participate in a group behavioral cessation program with no cost sharing. The quit rates after one year were 18% for the treatment group and 13% for the control group, with an estimated adjusted OR of 1.6 (95% CI 1.1–2.4). Compared with the control group, the treatment group had significantly higher rates of quit attempts (OR 1.4; 95% CI 1.1–1.8) and use of NRT (OR 2.3; 95% CI 1.6–3.2).

### *Other Studies*

Several non-experimental design studies have examined the impact of employer and health insurer coverage on NRT usage and related outcomes. For example, Cox and McKenna<sup>126</sup> found that military personnel who were provided nicotine gum free of charge were significantly more likely to use the gum, use the gum for a longer period of time, and have more success in abstaining from smoking for one year than those who had to purchase nicotine gum at a local pharmacy. Johnson and colleagues<sup>127</sup> studied the effect of health insurance copayments for nicotine gum on the number of pieces of gum consumed, finding an inverse relationship between out-of-pocket cost and both the probability of using nicotine gum and the duration of gum use.

Curry and colleagues<sup>128</sup> examined the impact of health insurance cost-sharing plans on the use of behavioral modification therapies and NRTs. This study found that a higher proportion of enrollees utilized smoking cessation services when health insurance policies covered the full cost of using both behavioral modification therapies and NRTs. The rate of smoking cessation was higher among smokers whose coverage required a copayment than among smokers who were enrolled in a full-coverage insurance policy, which the authors speculate could reflect higher motivation to quit among those willing to pay for cessation services versus those who received them at no cost. Despite the slightly lower cessation rate when no copay was required, participation in the full-coverage insurance programs still resulted in a larger proportion of smokers who quit, because of increased use of cessation services.

In a study conducted in the United Kingdom, West and colleagues<sup>129</sup> investigated how making smoking cessation products available outside pharmacies and reimbursing consumers for them affected utilization of these products. The study found that reimbursing for pharmacological therapies for smoking cessation led to large increases in their use. Making bupropion and NRT products reimbursable increased the number of treatment weeks purchased by more than 80,000 per month per medicine. The proportion of smokers who used NRT and other pharmacological therapies to aid smoking cessation more than doubled after the United Kingdom changed its policy to reimburse for smoking cessation medicine.

These studies suggest that the costs of pharmacological therapies for smoking cessation are strong determinants of their use, and that lower out-of-pocket costs lead to significant increases in the use of these medicines.

## **Other Demand-Side Factors**

### ***Taxes on Tobacco Products***

As discussed in detail in chapter 4, higher tobacco taxes and prices reduce tobacco use by motivating current users to quit, preventing young people from initiating tobacco use, and reducing the frequency and intensity of consumption among those who continue to use tobacco. People in LMICs respond more to tax increases than individuals in HICs. In general, price elasticity estimates for LMICs are at least as high and often higher than the estimates for HICs.<sup>130</sup>

Several econometric studies have examined the impact of higher cigarette prices on the demand for smoking cessation pharmacological therapies. In their assessment of the determinants of demand for NRT products in the United States, Tauras and Chaloupka<sup>122</sup> found a positive and significant relationship between the real price of cigarettes and the demand for NRT products. The average cross-price elasticities of demand, relating percentage change in demand to a 1% increase in the price of cigarettes, were 0.77 for Nicoderm CQ<sup>®</sup> and 0.76 for Nicorette<sup>®</sup>. Such positive and significant cross-price elasticities demonstrate that NRT products and cigarettes are economic substitutes in consumption and indicate that increases in the price of cigarettes will increase the use of NRT products. In a follow-up study, Tauras and colleagues<sup>123</sup> measured the economic interrelationship between cigarettes and NRT products in the United States. Their findings confirmed the positive impact of cigarette prices on demand for NRT. The estimated cross-price elasticity of product-specific NRT demand for cigarettes ranged from 0.34 to 1.48. These estimates imply a price-based relationship for demand for cigarettes versus NRT products, with a 10% increase in the price of cigarettes leading to a 3.4%–14.8% increase in use of NRT products.

Population-level data from the United States show that tax increases prompt smokers to seek help in quitting. On April 1, 2009, the U.S. federal cigarette excise tax increased from US\$ 0.39 to US\$ 1.01 per pack. In an analysis using pooled data from 16 state quitlines, Bush and colleagues<sup>131</sup> found that calls to the quitlines increased by 23.5% in the months leading up to and following the tax increase. Similarly, Brown and Karson<sup>132</sup> examined monthly call data to state quitlines over a 5-year period between 2005 and 2010, and concluded that a 10% increase in cigarette taxes is associated with an approximately 0.31% increase in the number of calls in the month before the tax takes effect and a 0.33% increase in calls in the month after the tax increase. Promoting quitline services via paid media or through special promotions (e.g., free NRT) in conjunction with tax increases can ensure that the opportunity to engage smokers in cessation efforts is fully leveraged, which can enhance the quitlines' cessation benefits.<sup>133,134</sup>

### *Comprehensive Smoke-Free Policies*

As discussed in detail in chapter 6, comprehensive smoke-free policies not only reduce exposure to secondhand smoke, they also lead to significant reductions in cigarette consumption, induce quit attempts among smokers, and increase the likelihood of successful cessation. The WHO FCTC requires Parties to the treaty to implement comprehensive smoke-free policies, and many have already done so.

Several studies have examined the relationship between the enactment of smoke-free laws and calls to quitlines. Cummings and colleagues<sup>135</sup> found a significant increase in calls to the New York State Smokers' Quitline following enactment of the state's comprehensive smoke-free law, a cigarette tax increase, and the distribution of free NRT patches. Quit rates varied according to the amount of NRT received. The highest quit rates (35%) occurred among those who received a 6-week supply of NRT, and the lowest rates (21%) occurred among those who received a 1-week supply.

Wilson and colleagues<sup>136</sup> investigated the impact of the smoke-free law enacted in New Zealand in December 2004 on calls to the national quitline. They found that quitline call rates more than doubled in the 6 months following introduction of the smoke-free law. In their analysis, the authors controlled for other potential influences on the volume of quitline calls, including quitline advertising expenditures, advertising expenditures associated with ongoing smoke-free media campaigns, and print media coverage of smoking-related issues in major New Zealand newspapers.

In another study, Chan and colleagues<sup>137</sup> examined the impact of smoke-free legislation in China, Hong Kong Special Administrative Region on calls to a quitline, finding strong evidence that the smoking ban increased utilization of the quitline. The impact was temporary, however, as the number of calls decreased within 6 months.

Allwright<sup>138</sup> found that in the run-up to Ireland's comprehensive smoke-free policy banning smoking in all enclosed workplaces, including restaurants and pubs, the number of calls to the quitlines increased substantially. This study noted preliminary figures suggesting that sales of NRT and requests to physicians for cessation help also increased.

Other studies have also found increased use of pharmacological therapies and clinical cessation services after smoking bans have been implemented. For example, a study by Galeone and colleagues<sup>139</sup> found that after Italy banned smoking in enclosed public places on January 10, 2005, the use of NRT products increased by 10.1% for January–September 2005 compared with the same period in 2004. Grassi and colleagues<sup>140</sup> found that Italy's indoor smoking ban improved the efficacy of smoking cessation treatments. The smoking ban reduced the odds of continued smoking by 52% at 12 months among those

who attended group counseling sessions for 6 weeks and were provided with 7 weeks of daily pharmacological therapy, and by 41% at 12 months among those who attended only the 6 weeks of group counseling. In the months following the introduction of smoke-free legislation in the United Kingdom in 2007, local National Health Service Stop Smoking Services in England saw an increase in demand of around 20%.<sup>141</sup>

### *Anti-Tobacco Mass Media Campaigns*

As discussed in detail in chapter 8, well-funded anti-tobacco mass media campaigns, especially when implemented as part of a comprehensive tobacco control program, can increase cessation rates and reduce tobacco use among adults and youth. Disseminating anti-tobacco information often has the greatest impact in LMICs, where baseline levels of consumer information (i.e., knowledge about the health risks of tobacco use, awareness of cessation treatments) are generally low. Anti-tobacco mass media campaigns can also increase the use of smoking cessation quitlines and smoking cessation treatments, and foster nonsmoking social norms.

In 2012, the Centers for Disease Control and Prevention (CDC), an agency of the U.S. Department of Health and Human Services, launched the first federally funded nationwide anti-smoking mass media campaign in the United States. The campaign, “Tips From Former Smokers” (Tips) (also discussed in chapter 8), was responsible for a 12% relative increase in population-level quit attempts, resulting in an estimated 100,000 smokers quitting permanently.<sup>142</sup> The 2012 campaign increased the number of calls to a national portal to state quitlines by 132%, for an estimated 207,519 additional calls, compared with the corresponding period in 2011. The campaign also increased the number of unique visitors to the NCI’s smoking cessation website (<http://www.smokefree.gov>) by 428%, for an estimated 510,571 additional unique visitors, compared with the corresponding period in 2011.<sup>143</sup> With a campaign cost of roughly US\$ 48 million, Tips spent approximately US\$ 480 per quitter, US\$ 2,819 per premature death averted, US\$ 393 per life-year saved, and US\$ 268 per QALY gained.<sup>144</sup> In a follow-up evaluation of the 2013 Tips campaign, McAfee and colleagues<sup>145</sup> found that increasing the dose of television ads in selected media markets, relative to the standard dose, further increased quit attempts among smokers, especially African Americans.

Farrelly and colleagues<sup>146</sup> examined the effect of anti-smoking television, radio, and print advertising on calls to the New York State Smokers’ Quitline. This study found a positive and significant effect of anti-smoking advertising expenditures on call volumes to the quitline. Television advertising had the largest effect, but because of relatively high costs, television advertising was not the most cost-effective way to increase calls to the quitline. Evidence from simulations suggests that an increase of US\$ 1,000 in television, radio, and print advertising can increase call volumes to quitlines by 0.1%, 5.7%, and 2.8%, respectively.

Owen<sup>147</sup> examined the effect of an anti-smoking advertising campaign on calls to England’s Quitline. The study found that the advertising campaign conducted by England’s Health Education Authority was extremely successful in generating calls; more than two-fifths of all calls to the quitline in 1 year were made during the 3-month advertising campaign. Approximately 60% of callers claimed advertising was the reason they were aware of the quitline.

Miller and colleagues<sup>148</sup> investigated the relationship between calls to the Australian Quitline service and the extent of advertising that was conducted as part of the first nationally coordinated mass media anti-smoking campaign. This study found that weekly call volume was strongly related to anti-smoking advertising. When the advertisement specifically promoted the quitline, call volumes increased even further. Nearly 1 in 25 adult smokers in Australia called the quitline during the first year of the national campaign. Of the cohort of smokers at baseline, 28% reported at a one-year follow-up that they had quit smoking; 5% reported that they had quit for the entire year.

Using data from Australia for June 1995–December 2006, Wakefield and colleagues<sup>149</sup> examined the effects of NRT advertising and tobacco control advertising on NRT sales. The study found that tobacco control advertising had a strong immediate effect on NRT sales. NRT advertising also had a similar positive effect on NRT sales, albeit with a 2-month delay.

### *Health Warning Labels*

As discussed in detail in chapter 8, large pictorial health warning labels are effective in increasing smokers' awareness of the health consequences of smoking, stimulating their interest in quitting, and reducing smoking prevalence. Article 11 of the WHO FCTC recommends using, on a rotating basis, pictorial warning messages that are large, clear, and visible, and cover 50% or more of the principal display areas of the package.<sup>32</sup> Smokers who perceive greater health risks from smoking are more likely to form intentions to quit and engage in cessation efforts.<sup>71,150</sup> Health warnings may also be an important tool for reducing disparities in smoking prevalence.<sup>151</sup>

Data from the Global Adult Tobacco Survey (GATS) collected in 14 countries between 2008 and 2010 showed that among smokers who noticed a package warning, the percentage who thought about quitting because of the warning was greater than 50% in six GATS countries (Bangladesh, Brazil, India, Thailand, Ukraine, and Viet Nam) and greater than 25% for men and women in all countries except one (Poland).<sup>152</sup> In the Canadian National Population Health Survey for 1998–2008, introduction of pictorial warning labels was shown to have a statistically significant effect on smoking prevalence and quit attempts, and significantly decreased the odds of being a smoker.<sup>153</sup>

Providing direct information about cessation services on tobacco packaging has been shown to raise awareness of cessation resources and increase consumer demand for them. In a number of countries, promoting tobacco quitlines on cigarette packages has resulted in increased call volume from smokers seeking help to quit.<sup>154</sup> In 2012, Australia introduced plain (standardized) packaging of tobacco, increased the size of the pictorial health warnings on the packages, and introduced new warnings. In a time series analysis controlling for the influence of other factors such as anti-tobacco advertising and price increases, Young and colleagues<sup>155</sup> found a 78% increase in the number of calls to the national cessation quitline, coinciding with the implementation of plain packaging.

### *Pharmaceutical Industry Marketing*

The demand for cessation assistance may be influenced by consumers' awareness of effective cessation methods and their perceived benefits.<sup>156</sup> Several studies have examined the impact of pharmaceutical industry advertising on the use of pharmacological therapies for smoking cessation. For example, Tauras and colleagues<sup>123</sup> examined the impact of NRT advertising on NRT sales. The study used pooled cross-sectional, time series, scanner-based data on prices and sales from 50 major metropolitan markets in the United States between the second quarter of 1996 and the third quarter of 1999 linked to market-level

measures of exposure to NRT advertising. Estimates from this study indicated that increased advertising of Nicoderm CQ<sup>®</sup> transdermal patches and Nicotrol<sup>®</sup> transdermal patches increased per capita sales of established Nicoderm CQ<sup>®</sup> and Nicotrol<sup>®</sup> products. However, increased advertising of Nicorette<sup>®</sup> polacrilex (gum) did not significantly increase sales of established Nicorette<sup>®</sup> products.

Avery and colleagues<sup>157</sup> examined how exposure to pharmaceutical magazine advertisements for smoking cessation products affected smoking cessation and use of cessation products. Using multiple waves of data from the Simmons National Consumer Survey in the United States between 1995 and 1999, the study concluded that exposure to more advertisements for smoking cessation products significantly increased the use of smoking cessation pharmacological therapies, the probability of making quit attempts, and the likelihood of successfully quitting. Moreover, the study found that advertisements for smoking cessation products also significantly increased “cold turkey” quit attempts, suggesting spillover effects of smoking cessation product advertisements to quitting without pharmacotherapy. The study also found that advertisements by the tobacco industry reduced smoking cessation, whereas smoking-related news articles increased cessation.

### Supply-Side or Regulatory Factors

Pharmacological therapies for smoking cessation are subject to country-specific pharmaceutical laws and regulations that influence consumers’ access to these products in a variety of ways. Pharmacological therapies for smoking cessation must undergo approval before they can be sold to consumers, which may raise barriers to market entry. In addition, unlike tobacco products, which are typically available for general sale in a wide variety of venues, many countries place restrictions on the types of venues in which medications for smoking cessation can be sold. Cigarettes can be sold by the pack, carton, or (in many countries) even as single stick; in contrast, NRT products are generally sold in 1-, 2-, or more-week supplies, requiring a greater out-of-pocket expense than cigarettes.<sup>58</sup> Where prescriptions are required for cessation medications, they represent another potential barrier to use.<sup>158,159</sup> In addition, many governments prevent manufacturers of medications, including smoking cessation medications, from advertising directly to consumers,<sup>159</sup> leading to decreased consumer awareness about these products. Finally, the health warning labels included with NRT products in most countries are long and often confusing to users.

In contrast, tobacco products are generally subject to far less regulation. As Novotny and colleagues<sup>159</sup> have argued, if pharmaceutical safety standards were applied to tobacco products, these would have to be completely removed from the market, or strictly regulated, because they are so harmful to users.

### Impact of Supply (Availability) on Demand for Cessation Treatment

Studies from HICs show that deregulating pharmacological therapies for smoking cessation—that is, making sales of such products OTC—increases the demand for these products. Shiffman and colleagues<sup>160</sup> estimated that the use of OTC NRT products increased by 152% compared with previous NRT prescription sales, and that between 114,000 and 304,000 12-month incremental quits resulted from 1 year of OTC availability, compared with an expected 40,000 successful quits with prescription-only NRT. Using data from the California Tobacco Surveys of 1992, 1996, and 1999, Pierce and Gilpin<sup>161</sup> found that NRT use among quitters increased by 50.5% between 1992 and 1999; the authors argued that much of the increase could be attributed to the OTC availability of NRT products. Similarly, Reed and colleagues’<sup>162</sup> analysis of the 1996 California Tobacco Survey concluded that making NRT products available OTC resulted in an immediate increase in quit attempts and smoking abstinence with

the use of nicotine patches and gums. Hyland and colleagues<sup>163</sup> used data from a prospective cohort of 1,639 adult smokers surveyed in 1993 and resurveyed in 2001 as part of NCI's Community Intervention Trial for Smoking Cessation; they found that use of NRT increased by approximately 60% after these products became available OTC.

A few econometric studies have examined how OTC availability of NRT affects cigarette demand. Using scanner-based sales data for the United States from 1994 to 2002, Chaloupka and Tauras<sup>164</sup> found that OTC availability of NRT products had a negative and statistically significant effect on the demand for cigarettes. The estimated elasticity of cigarette demand with respect to NRT sales was  $-0.059$ , implying that a doubling of NRT use will decrease the demand for cigarettes by approximately 6%. This elasticity is substantially larger than that estimated by Hu and colleagues<sup>165</sup> in the only previous econometric analysis of the impact of NRT availability and use on demand for cigarettes.

### Adoption and Implementation of Cessation Interventions: Challenges and Opportunities

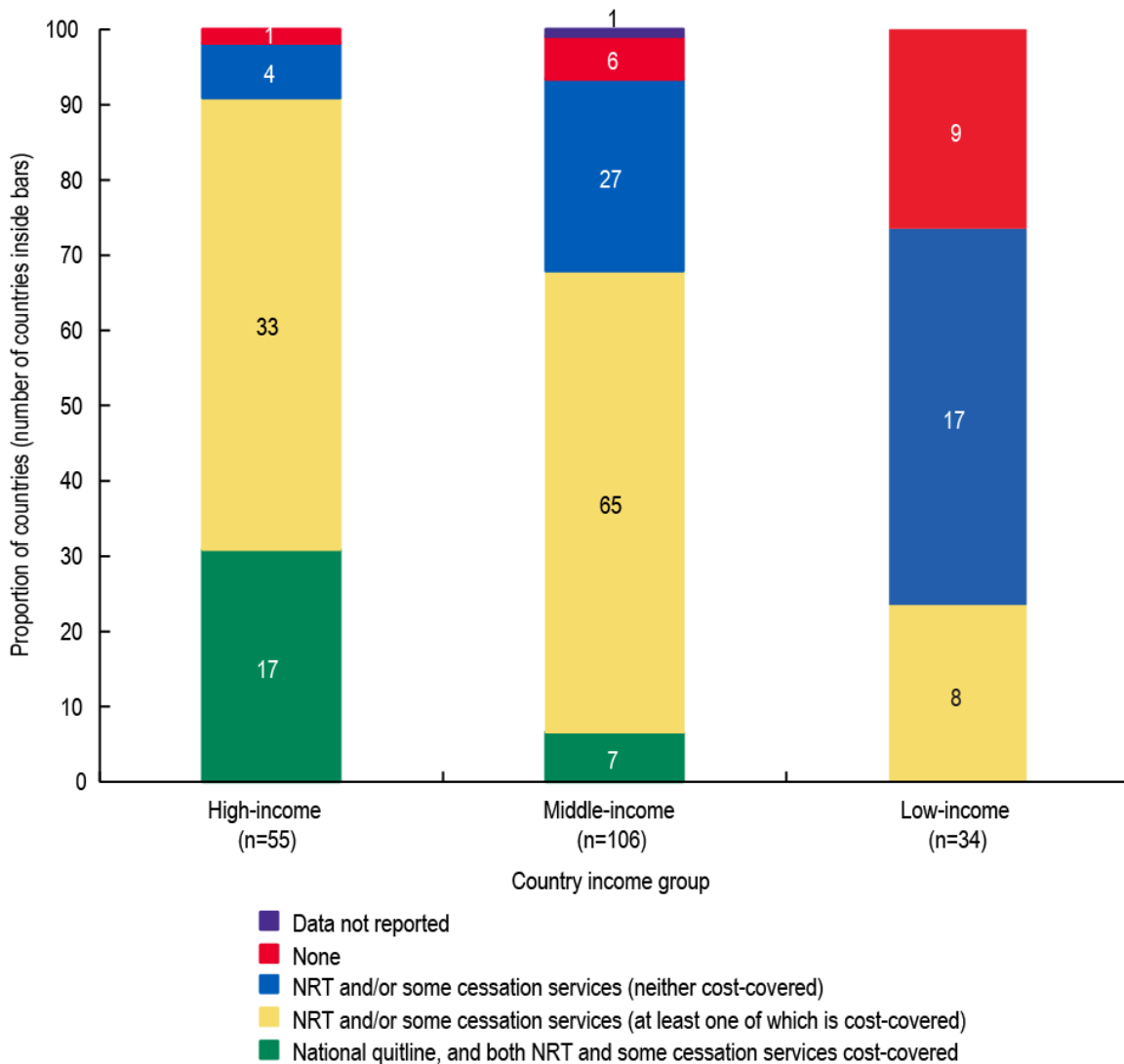
The provision of cessation services is strongly associated with country income status. Figure 9.1 presents an overview of the coverage of the cost of cessation treatment stratified by level of economic development. Only 24 (12%) of 195 countries—all HICs or middle-income countries—provide comprehensive, cost-covered tobacco cessation services.<sup>71</sup> Many more countries cover the costs of some forms of cessation services. Low-income countries have the lowest rates of service provision: only 23% of low-income countries cover the cost of NRT or other cessation services, and only 9% support a toll-free quitline.<sup>71</sup>

Even when the cost of treatment is covered, restrictions in the form of copayments, annual limits, prior authorization requirements, duration limits on treatment, and lack of coverage for combined treatments often limit the extent to which people use such coverage.<sup>166</sup> In the United States, the Patient Protection and Affordable Care Act of 2010 has increased access to cost-covered treatment by requiring most health insurance plans to cover tobacco cessation services with no patient cost-sharing (i.e., copay)<sup>167</sup>; however, the scope of covered services can vary greatly by type of insurance, insurance provider, and state.

### Involvement of the Health Care System

Health care systems can be frontline channels for delivering cessation treatment.<sup>43</sup> Countries can reduce barriers to the delivery of cessation treatment by integrating brief tobacco interventions (i.e., brief advice) into primary care settings and other clinical settings, which has the potential to reach large numbers of smokers efficiently and at a relatively low cost.<sup>168</sup> WHO recommends that all countries provide at least brief cessation advice in primary health care settings, counseling through quitlines, and access to low-cost pharmacological therapies.<sup>32</sup> Additionally, WHO has provided guidelines for the management of tobacco use in pregnancy.<sup>168</sup>

Figure 9.1 Smoking Cessation Treatment: Cost Coverage, by Country Income Group, 2015



Notes: NRT = nicotine replacement therapy. Country income group classification based on World Bank Analytical Classifications for 2013.  
Source: World Health Organization 2015.<sup>71</sup>

### Tobacco Quitlines and Web- and Mobile-Based Cessation Services

As noted previously, quitlines have significant potential to expand access to cessation services. In addition, evidence is accumulating that Web and mobile technologies (e.g., Internet-based counseling, text messaging programs) can be effectively leveraged to promote cessation as part of a national health strategy.<sup>40</sup> However, quitlines and other digital health technologies vary widely in their sophistication, reach, and level of services provided. Setting minimum standards for quitlines, such as access to counselors and protocols for training telephone counselors,<sup>169</sup> would help ensure appropriate implementation. Despite the dramatically increased penetration of cell phones and cell phone technologies in many LMICs, access to telephones and the potential cost of cell phone calls remain barriers. The comparatively low cost of text messages and their high penetration coupled with ease of service delivery could make mobile message cessation services a viable alternative for reaching underserved populations.



## Expanding Capacity

Diverse health care providers can help promote and provide tobacco cessation services. For example, the nursing profession is a large potential resource for cessation support.<sup>170</sup> Health professionals can also be important role models and opinion leaders in promoting cessation<sup>171</sup>; however, in many LMICs, tobacco use by health professionals is high, which can undermine their effectiveness as treatment providers.<sup>172</sup>

Creating economies of scale and reducing the unit costs of interventions may be possible if services such as quitlines can be coordinated at larger regional and national levels and if awareness and demand for these services increase. Considerable discussion has been devoted to strategically promoting tobacco dependence treatment in the context of other policy initiatives, including conducting media campaigns, restricting smoking in indoor environments, adopting pictorial warning labels, and increasing taxation.<sup>32</sup>

## A Human Rights Approach to Treatment

Meier has proposed a human rights approach to cessation treatment, noting that “an individual’s right to health is recognized as a fundamental international human right.”<sup>173,p.16</sup> He further notes that “the right to health has been interpreted to include, at a minimum, basic provisions of health care necessary to save lives,” and argues that this should encompass the right to tobacco dependence treatment.<sup>173,p.20-21</sup>

Typically, tobacco users become nicotine dependent long before adulthood and find that they cannot quit.<sup>174,175</sup> Increased excise taxes tend to go to general revenue rather than to tobacco control initiatives, and cessation services tend to be greatly underfunded. Despite the positive impact that increased price has on overall quitting, individuals who continue to smoke, especially those in LMICs, face a mounting economic burden but little or no access to treatment.<sup>32</sup> As previously mentioned, none of the 24 countries (out of a total of 195 countries) that provide comprehensive, cost-covered tobacco cessation services are low-income countries.<sup>71</sup>

## Cultural Competence and Sensitivity

Cultural awareness and sensitivity are critical to the effective implementation and dissemination of tobacco dependence treatment. For example, some cultures (e.g., some Native American tribes) have strong traditions of using tobacco for ceremonial purposes. In other cultures, tobacco is offered on social occasions and is an accepted part of hospitality. Cessation interventions must recognize and address common misconceptions, such as the belief that the shock of withdrawal is harmful to the body (India) or that certain brands of cigarettes are suitable for the body (Indonesia).<sup>176</sup> Quitting tobacco use may be considerably more challenging in countries where there are relatively few former smokers to serve as role models, where even physicians have high rates of smoking and minimal awareness or concern about tobacco harms, and where health care systems are minimal or rudimentary.

## Summary

Tobacco dependence is a chronic, relapsing disorder that often requires repeated interventions and multiple attempts to quit. Most smokers will make many attempts to quit over a lifetime, and governments can support these efforts by making cessation resources readily available to all smokers who need them.

Research from HICs clearly demonstrates the effectiveness and cost-effectiveness of interventions to promote and support cessation, including the use of pharmacological and behavioral treatments, promotion of cessation by health care professionals, and integration of cessation treatments into health

care systems. Less evidence exists surrounding the adoption and implementation of cessation interventions in lower income countries. Policy interventions, such as tax increases, health warning labels, and smoke-free laws, can also stimulate interest in quitting and demand for treatment. Coordinating promotion of cessation programs and services with implementation of population-level policy interventions can increase the penetration and impact of such programs and services. Emerging low-cost technologies (i.e., mobile phones) and systems-level interventions (e.g., using electronic health record technology to aid in the identification of tobacco users, prompt clinicians to intervene, and guide intervention via evidence-based treatment algorithms) can facilitate successful implementation of cessation treatment worldwide.

Article 14 of the WHO FCTC obliges Parties to promote the cessation of tobacco use and adequate treatment for tobacco dependence. The implementation rate of Article 14 is strongly associated with country income status. Low-income countries have the lowest rates of service provision, but implementation of cessation services is often incomplete even in high-income countries.<sup>71</sup> Cost is a substantial barrier to the use of pharmacological therapies and other cessation services, particularly in LMICs, but also in HICs. Overall, the demand for smoking cessation treatment services is likely to be lower in LMICs than in HICs because of a lower awareness of the health consequences of smoking in LMICs, as well as fewer former smokers as role models, fewer limits on and weaker social norms against smoking, and the higher price of cessation treatment relative to tobacco products.

### Research Needs

Most research on the efficacy and cost-effectiveness of cessation interventions has been conducted in high-income countries and has focused on cigarettes—by far the most common tobacco product used in these countries. This discussion of research needs generally focuses on cigarettes, although other tobacco products (e.g., bidis, smokeless tobacco, waterpipe tobacco) account for a significant proportion of tobacco consumption in certain regions of the world, and deserve attention in their own right. Research is needed to evaluate adoption and implementation of interventions to reduce tobacco consumption and promote cessation in LMICs, where uptake of cessation interventions is lower. Economic analyses are needed to help LMICs determine the cost and effectiveness of offering various forms of cessation treatment and prioritize more cost-effective options. Implementation research is needed to determine how LMICs might use existing infrastructure to achieve the best possible reach as quickly as possible, at the lowest cost possible. Studies are needed, for example, on strategies for providing low-cost pharmacological therapies for smoking cessation in LMICs, perhaps through bulk purchases at the country or regional level or by making pharmacological therapies freely available. In addition, research is needed to help LMICs develop cessation strategies and treatment guidelines that are culturally sensitive and to increase demand for treatment among smokers. Research initiatives, such as the NIH's International Tobacco and Health Research and Capacity Building Program, can help build research capacity by supporting international research collaborations between investigators in the United States and scientists/institutions that are pursuing research on tobacco control and prevention in LMICs.<sup>177</sup>

## Conclusions

1. Rates of tobacco cessation among current tobacco users will need to increase in order to significantly reduce the health consequences of tobacco use worldwide, in both the short and mid term.
2. Tobacco control policies, such as increased taxation, anti-smoking media campaigns, and comprehensive smoke-free policies, increase the demand for tobacco dependence treatment and the rates of subsequent cessation.
3. Research from high-income countries demonstrates that a number of effective and cost-effective tobacco dependence treatments can increase the likelihood of successful cessation. Relatively little evidence is available on the effectiveness and cost-effectiveness of tobacco dependence treatments in low- and middle-income countries and on the transferability of effective interventions from high-income countries to low- and middle-income countries.
4. Demand for cessation support exists in low- and middle-income countries, but in most of these countries, cessation services and products are often of limited availability or accessibility, or are unaffordable for most of the population.

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