International Journal of Community Medicine and Public Health
Chanda S et al. Int J Community Med Public Health. 2026 Jun;13(6):3199-3210
http://www.ijcmph.com

pISSN 2394-6032 | eISSN 2394-6040

DOI: https://dx.doi.org/10.18203/2394-6040.ijcmph20261818

Review Article

Effectiveness and wear-out effect of health warning labels on cigarette packets in India: a comprehensive review

Sudarshan Chanda*, Samir Sarkar

Department of Business Administration, Guwahati University, Guwahati, Assam, India

Received: 05 March 2026
Accepted: 30 April 2026

***Correspondence:**
Sudarshan Chanda,
E-mail: sudarshanchanda@live.com

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ABSTRACT

India is home to 182 million tobacco users, with tobacco consumption contributing to over 1.35 million deaths annually. Health warning labels on cigarette packets represent a critical public health intervention under the Cigarettes and Other Tobacco Products Act (COTPA) 2003. Understanding their effectiveness and potential wear-out effects is essential for evidence-based tobacco control policy. This comprehensive review synthesizes evidence from national surveys (GATS 2010 and 2016-2017), published research on pictorial health warning labels, tobacco control policies, and consumer behavioral studies. The review examines the effectiveness of health warning labels, wear-out effects, cognitive and behavioral reactions, pricing impacts, and mass communication strategies in the Indian context, aligned with WHO Framework Convention on Tobacco Control (FCTC) guidelines. GATS 2016-2017 demonstrated that 61.9% of adult cigarette smokers, 53.8% of bidi smokers, and 46.2% of smokeless tobacco users considered quitting primarily due to warning labels. Tobacco use declined from 34.6% (2009-2010) to 28.6% (2016-2017), with an 18% decrease among youth aged 15-24 years. However, 71.2% of respondents believed current pictorial warnings were insufficient in size and positioning. Research demonstrates that pictorial warnings with graphic imagery generate stronger cognitive and affective responses than text-only warnings, but effects may diminish over time without refreshing images. Health warning labels on cigarette packets in India demonstrate significant effectiveness in motivating quit attempts and reducing tobacco consumption. However, evidence suggests potential wear-out effects necessitating periodic rotation of warning images. India's tobacco control policies partially align with WHO FCTC recommendations but require strengthening in warning label size, tax increases, and comprehensive advertising bans.

Keywords: Health warning labels, Tobacco control, Cigarette packets, India, Wear-out effect, COTPA

INTRODUCTION

Tobacco use represents one of the most significant public health challenges globally, with India bearing a disproportionate burden. Of the 1.1 billion people who smoke worldwide, 182 million (16.6%) reside in India.[1] Tobacco consumption continues to grow in India at 2-3% per annum, contributing to over 1.35 million deaths annually.[2] Tobacco use in India exhibits greater diversity than most countries, with only 20% of total tobacco consumption occurring in cigarette form, while the remainder comprises bidis, smokeless tobacco (khaini, gutka, pan masala), and other traditional forms.[3] National representative surveys demonstrate increasing tobacco consumption over the past two decades, particularly cigarette smoking among young adult men aged 15-29 years.[4] Despite documented health risks, consumer knowledge remains inadequate. Few smokers know that 70% of smoking deaths occur during productive middle age (30-69 years) or that average years of life lost from smoking equals 10 years. Only approximately 44% of smokers recognize smoking as a stroke risk factor.[5] In

response to this public health crisis, the Indian Parliament passed the Cigarettes and Other Tobacco Products Act (COTPA) 2003 to proscribe advertisement and regulate trading, supply, production, and distribution of cigarettes and other tobacco products.[6] A cornerstone of this legislation mandates health warning labels on tobacco product packaging. These warnings serve as a critical de-marketing tool, attempting to dissuade consumers from tobacco consumption by highlighting harmful health effects.

Health warning labels function as point-of-sale interventions reaching consumers at the critical moment of product use. The effectiveness of these warnings, potential wear-out effects from repeated exposure, and their alignment with World Health Organization Framework Convention on Tobacco Control (WHO FCTC) guidelines remain subjects of ongoing investigation. This comprehensive review examines the current evidence on health warning label effectiveness in India, evaluates compliance with WHO FCTC recommendations, analyzes cognitive and behavioral reactions of smokers and non-smokers, assesses wear-out effects, and explores the integrated impact of pricing and mass communication strategies on tobacco control.

TOBACCO CONTROL POLICY IN INDIA AND WHO FCTC ALIGNMENT

Evolution of tobacco control legislation

India's first national anti-tobacco legislation, the Cigarettes Act of 1975, mandated health warnings on cigarette packets and advertisements, prescribing the warning "Cigarette smoking is injurious to health" in the same language as package branding, with minimum text height of 3mm.[7] While representing a significant step, this Act did not apply to non-cigarette tobacco products, creating substantial regulatory gaps.

The comprehensive COTPA 2003 addressed these limitations by extending regulations to all tobacco products. Key provisions include prohibition of tobacco product advertisements, regulation of trade and commerce, mandatory health warnings, prohibition of smoking in public places, prohibition of sale to and by minors, and prohibition of tobacco product sale near educational institutions.[6] The Act marked India's commitment following ratification of the WHO FCTC in 2004.

Pictorial warning implementation timeline

Following the enactment of the Cigarettes and Other Tobacco Products Act (COTPA), 2003, India progressively strengthened its health warning regulations for tobacco products. In May 2009, pictorial health warnings covering 40% of the principal display area were mandated on all tobacco products. This was further reinforced in December 2011 with the introduction of rotating graphic health warning labels (GHWLs). Later, in April 2016, a proposal to increase the warning coverage to 85% of the display area was introduced; however, following industry lobbying and parliamentary review, the requirement was ultimately retained at 40%.[8]

Implementation of GHWLs in India reflects complex interplay between government, cigarette companies, and local tobacco producers. Joint lobbying by national level tobacco companies and local producers blocked GHWLs for decades and delayed implementation of effective warnings after 2007 mandates. Tobacco control activists utilized public interest lawsuits and the Right to Information Act to secure government implementation.[9]

Comparison with WHO FCTC guidelines

Article 11 of the WHO Framework Convention on Tobacco Control (FCTC) recommends that health warnings on tobacco packaging should be large, clear, visible, and legible, covering at least 50% of the principal display areas, with a preference for 50% or more coverage. However, India’s current requirement of 40% coverage falls short of this recommendation. Despite this gap, analysis of India’s compliance shows several strengths, including the implementation of pictorial health warnings across all categories of tobacco products, the use of rotating warning images to reduce habituation, the provision of warnings in multiple languages to reflect the country’s linguistic diversity, and the inclusion of warning content that clearly depicts serious health consequences of tobacco use. However, significant gaps and barriers continue to persist in the implementation of tobacco control measures in India. The current warning size of 40% remains below the WHO FCTC recommendation of a minimum of 50%. In addition, tobacco industry interference continues to influence policy implementation, while enforcement of existing regulations remains inadequate in several settings. There is also limited adoption of Article 5.3 guidelines, which are intended to protect public health policies from tobacco industry interference. Furthermore, taxation levels on tobacco products remain below WHO-recommended standards, further weakening the overall effectiveness of tobacco control efforts.[11] As of 2021, only 23% of India's states have implemented Article 5.3 guidelines, with enforcement gaps and persistent tobacco industry tactics weakening tobacco control measures.[12] The competition between multinational cigarette companies and local tobacco producers creates unique dynamics, with government pressure on multinationals indirectly facilitating enforcement on local tobacco forms.

EFFECTIVENESS OF HEALTH WARNING LABELS ON CIGARETTE PACKETS

Evidence from global adult tobacco survey

The Global Adult Tobacco Survey (GATS) provides the most comprehensive national data on tobacco use and the

effectiveness of tobacco control measures in India. The GATS 2016–2017 survey, conducted across 30 states and covering 74,037 individuals, demonstrated a significant impact of health warning labels on tobacco consumption and cessation intent. Overall tobacco use declined from 34.6% in 2009–2010 to 28.6% in 2016–2017. Tobacco consumption among individuals aged 15–24 years also decreased by 18%. In addition, 61.9% of adults reported considering quitting cigarette smoking due to warning signs on tobacco packaging, while 53.8% of bidi smokers and 46.2% of smokeless tobacco users similarly reported considering quitting as a result of exposure to health warning labels. These findings demonstrate substantial effectiveness of warning labels in motivating quit intentions across different tobacco product categories. The pronounced impact on youth (15-24 years) is particularly significant, as preventing smoking initiation in this vulnerable age group yields maximum public health benefits.

Impact of warning size and design

Research consistently demonstrates that larger pictorial warnings with graphic imagery generate stronger responses than text-only or smaller warnings. A cross-sectional study investigating awareness and attitudes toward pictorial warnings among 1,064 individuals aged 15 years and above found that 71.2% believed the size and position of pictorial warnings on tobacco products were insufficient to understand harmful effects of tobacco.[13] Notably, 51.3% of respondents reported never encountering anti-tobacco messages or pictorial warnings, indicating gaps in warning visibility and consumer exposure. International evidence from Thailand, where warnings increased from text-only to large pictorial format, demonstrated marked increases in smoker awareness and cognitive-behavioral reactions following warning label changes.[14] Smokers reported awareness and cognitive-behavioral reactions increased significantly and sustained at follow-up. By contrast, Malaysia, maintaining text-only warnings during the same period, showed no significant change. These findings provide strong support for introducing and periodically refreshing pictorial warning labels, particularly in low- and middle-income countries with lower literacy rates and limited health information availability.

Framing effects: gain versus loss messages

Research on message framing reveals important nuances in warning label effectiveness. A study investigating gain-framed versus loss-framed messaging for pictorial cigarette warning labels among young adult smokers found differential impacts based on smokers' baseline self-efficacy and perceived risks.[15] Among smokers with low baseline efficacy beliefs, gain-framed messages emphasizing benefits of quitting prompted greater motivation to quit by enhancing efficacy beliefs. Among smokers with high perceived risks, gain-framed messages emphasizing cessation benefits proved superior to loss-framed messages focusing on risks. These results suggest that population-level pictorial warnings benefit from graphic imagery depicting smoking-related health risks combined with strategic mix of gain- and loss-framed message text.

Cognitive and affective reactions

Warning labels generate impact through emotionally charged cognitive and affective responses. Effective warnings must capture attention (salience), generate emotional reactions (affective responses), stimulate thinking about health risks (cognitive responses), and motivate behavioral change.[16] Research examining adult smokers' reactions to pictorial health warning labels has identified multiple dimensions of response. These include affective reactions, such as fear, disgust, and concern triggered by graphic imagery; cognitive reactions, including increased awareness and contemplation of health risks as well as strengthened beliefs about the harms of smoking; and behavioral intentions, such as increased motivation to quit, reduction in smoking frequency, and avoidance behaviors like covering warning labels or using cigarette cases to obscure them.[17]

Compared to smokers consuming only factory-made cigarettes, roll-your-own cigarette smokers reported lower warning salience but greater cognitive reactions to new pictorial warnings, suggesting differential processing based on smoking patterns and product types.[18]

WEAR-OUT EFFECTS OF HEALTH WARNING LABELS

Theoretical framework

Wear-out effects, also termed habituation or desensitization, refer to diminished response to stimuli following repeated exposure. In advertising contexts, wear-out manifests as declining effectiveness of advertisements over time as audiences become familiar with message content. The concept applies critically to health warning labels, as smokers encounter warnings repeatedly with each cigarette pack purchase and use. The psychology of habituation suggests that novel, vivid, or emotionally arousing stimuli initially capture attention and elicit strong responses; however, with repeated exposure without variation, individuals tend to show reduced attention to warnings, diminished emotional responses, decreased cognitive processing of the warning messages, and a corresponding reduction in the overall impact on behavioral intentions.[19]

Evidence of wear-out in tobacco warnings

Direct evidence of wear-out effects emerges from longitudinal studies and natural experiments examining warning label changes. The Thailand experience provides compelling evidence: following introduction of new pictorial warnings, significant increases in awareness and

cognitive-behavioral reactions occurred, with effects sustained at next follow-up after introduction of second set of rotated images.[14] This pattern suggests that refreshing pictorial images helps sustain warning effectiveness and potentially counteracts habituation. A systematic review of pictorial cigarette pack warning experiments identified 68 studies conducted between 2000 and 2016 across 22 countries.[20] The review found great variability in constructs and measures used, with many single-item measures of unknown psychometric properties. Only 4% of studies assessed actual smoking behavior. Notably, 54% of studies mentioned theory informing the research, but few examined longitudinal effectiveness or habituation effects systematically.

Mechanisms preventing wear-out

Evidence suggests that several strategies may help prevent or reduce the wear-out effects of tobacco health warnings. One key approach is the rotation of warning images, where periodic introduction of new pictorial warnings with varied graphic content helps maintain novelty and emotional impact; for example, Thailand's use of rotating warnings has demonstrated the effectiveness of this strategy. Another approach is increasing warning size, as larger warnings are harder to ignore or become habituated to, thereby sustaining their attention-capturing capacity even with repeated exposure; in India, a proposed increase to 85% coverage was intended to address this issue, although it faced political resistance during implementation.

In addition, the use of more vivid and emotionally evocative graphic content can generate stronger initial reactions and may be more resistant to habituation over time. Finally, message variation—rotating warnings that depict different health consequences such as lung cancer, heart disease, stroke, impotence, and cosmetic effects—helps maintain novelty while reinforcing the wide range of harms associated with smoking.

Current status in India

India's implementation of rotating graphic health warning labels (GHWLs) beginning in December 2011 reflects an acknowledgment of the importance of preventing wear-out effects. However, research indicates several potential limitations in this approach. The frequency of rotation may be insufficient to fully prevent habituation over time, and the relatively small warning size of 40% may reduce sustained effectiveness compared to larger warning formats used in other countries. Additionally, there is limited longitudinal research specifically evaluating the long-term effectiveness of Indian warning labels. Anecdotal evidence from smokers further suggests diminishing impact over time, with some reporting that they "do not even notice them anymore."The reported finding that 51.3% of respondents never encountered anti-tobacco messages suggests either inadequate warning visibility or consumer inattention, both consistent with habituation processes.[13]

COGNITIVE AND BEHAVIORAL REACTIONS OF SMOKERS AND NON-SMOKERS

Differential responses by smoking status

Health warning labels target both current smokers (encouraging cessation) and non-smokers (preventing initiation). Research indicates differential processing and responses between these groups.

Smokers' reactions: Current smokers often exhibit defensive processing of warning messages, employing cognitive strategies to minimize perceived risks or reduce cognitive dissonance.[21] Common reactions to health warning messages on tobacco products include several psychological defense mechanisms. These may involve rationalization, where individuals downplay personal risk by believing they do not smoke enough to develop serious health problems such as cancer. Denial is also common, with some smokers dismissing the health effects as exaggerated. Avoidance behaviors may occur, such as using cigarette cases to conceal warning labels or deliberately not looking at them. Additionally, counter-arguing may be observed, where individuals question the validity of the evidence or cite conflicting information to reduce the impact of the warnings. Despite defensive processing, evidence demonstrates that pictorial warnings penetrate these defenses more effectively than text-only warnings. GATS 2016-2017 findings that 61.9% of cigarette smokers considered quitting due to warnings suggest substantial impact despite psychological resistance.[1]

Non-smokers' reactions: Non-smokers, lacking investment in tobacco use, process warning messages with less defensive motivation.

Research indicates that exposure to tobacco health warnings is associated with greater acceptance of warning message content, stronger reinforcement of anti-smoking attitudes, enhanced resistance to smoking initiation, and increased support for tobacco control policies. In particular, the 18% decrease in tobacco consumption among individuals aged 15–24 years between GATS-I and GATS-II suggests notable effectiveness in preventing initiation among youth, who represent the primary target group for primary prevention efforts.[1]

Theoretical explanations

Several psychological theories explain differential reactions to warning labels and their effectiveness in changing behavior. The Theory of Planned Behavior (TPB) suggests that behavior is driven by intentions, which are shaped by attitudes toward the behavior, subjective norms, and perceived behavioral control. In this context, warning labels can influence attitudes by

emphasizing negative health consequences, shape subjective norms by signaling that certain behaviors are socially discouraged, and affect perceived behavioral control by providing information or resources that support quitting or behavior change. The Extended Parallel Process Model (EPPM) proposes that effective fear-based warnings must balance threat and efficacy: they should increase perceived severity and susceptibility to a risk while also strengthening beliefs in response efficacy and self-efficacy, such as the benefits of quitting and the individual's ability to do so. The Elaboration Likelihood Model (ELM) further explains persuasion by distinguishing between central and peripheral routes of processing; pictorial warning labels can operate on both levels by using graphic images to capture attention and evoke emotional reactions through the peripheral route, while also presenting factual health information that encourages deeper, more thoughtful processing through the central route.

Socioeconomic and demographic factors

Warning label responses vary significantly by socioeconomic and demographic characteristics:

Age: Younger individuals demonstrate greater susceptibility to warning label influence, as smoking behaviors are less entrenched and identity formation is ongoing. The finding that 37% of smokers initiated before age 18 highlights the critical importance of reaching youth with effective warnings.[25]

Education: Lower education levels correlate with reduced literacy and comprehension of text warnings but greater responsiveness to pictorial warnings. India's literacy challenges make pictorial formats particularly crucial.

Socioeconomic status: Research indicates that advertisements highlighting health harms have greater impact on smokers belonging to lower socioeconomic segments.[26] However, economically disadvantaged populations face greater barriers to cessation, including higher stress levels, reduced access to cessation resources, and tobacco industry targeting.

Gender: Males smoke tobacco significantly more than females in India (smoking prevalence in women at ages 15-69 was only 2.7% in 2010).[4] However, smokeless tobacco use is more common among women. Warning effectiveness may vary by gender due to differential product use patterns and culturally-specific concerns.

IMPACT OF PRICE ON TOBACCO CONSUMPTION BEHAVIOR

Price elasticity of tobacco demand

Economic research consistently demonstrates inverse relationships between tobacco product prices and consumption. Price elasticity studies in India find that a 10% increase in tobacco prices reduces bidi consumption by 9.1% and cigarette consumption by 2.6%.[1] These elasticities indicate that price increases, particularly through taxation, represent effective tobacco control tools.

The relatively lower price elasticity of cigarettes (-0.26) compared to bidis (-0.91) reflects several underlying factors. Cigarette consumers typically belong to higher-income groups, making them less sensitive to price changes. In contrast, bidis are predominantly consumed by economically disadvantaged populations, for whom price plays a much more significant role, and thus demand is more responsive to price changes. Additionally, the availability of lower-priced cigarette brands offers consumers within the cigarette category alternative options to switch to when prices rise, further reducing overall price sensitivity for cigarettes compared to bidis.

Theoretical models of price effects

Two complementary theoretical frameworks explain price impacts on smoking behavior:

Rational addiction model: Becker and Murphy's 1988 rational addiction model proposes that consumers recognize addictive consumption consequences but continue due to perceived present gains outweighing future addiction costs.[27] As direct financial costs of tobacco consumption increase, they accumulate to tipping points where quitting becomes the rational choice. This model predicts that price increases motivate quit attempts, particularly among economically constrained consumers.

Theory of planned behavior: From TPB perspective, price increases influence perceived behavioral control as tobacco becomes less affordable, quitting appears more feasible and necessary. Price increases may also shift subjective norms as fewer people can afford smoking, reducing social acceptability.

Temporal dynamics of price effects

Research examining nicotine replacement therapy sales following cigarette price increases reveals important temporal patterns.[28] Price increases in tobacco encourage individuals to attempt quitting, with effects peaking approximately one month after price changes but returning to baseline by three months. Several mechanisms explain this pattern. An initial price increase creates a shock that generates motivation and urgency for smokers to attempt quitting. However, those who successfully quit no longer require nicotine replacement products or continued cigarette purchases, which reduces overall demand over time. In addition, consumers tend to adapt to the new price structure, leading to habituation and a decline in the salience of price as a motivating factor for behavior change. For individuals who attempt but fail to quit, repeated unsuccessful efforts may

ultimately result in acceptance of higher prices while continuing to smoke.

These findings suggest that the period following price increases represents a critical window of opportunity to maximize cessation support and anti-tobacco messaging.

Current taxation levels and revenue potential

Cigarette taxes in India include 58% tax and 31% excise duty but remain below optimal levels recommended by WHO (taxation should exceed 75% of retail price).[29] Increasing tax rates on bidis from 9% to 40% of retail price and on cigarettes from 38% to 78% of retail price could save 18.9 million lives among Indians alive today while providing government with additional 183.2 billion in tax revenue.[1]

Despite these potential benefits, tobacco industry arguments that increased taxation is inefficient and unwarranted persist. However, this position ignores market failures related to inadequate risk information and addiction underestimation, particularly among young smokers.

EFFECTIVENESS OF MASS COMMUNICATION IN TOBACCO CONTROL

Evidence from anti-smoking campaigns

Mass media campaigns represent critical components of comprehensive tobacco control strategies. Research demonstrates that anti-smoking campaigns effectively stimulate quitting behavior among adults when employing specific design principles.[30] Effective campaigns are characterized by several key features that enhance their impact on smoking behavior. They often use graphic metaphors or personal testimonials to vividly communicate the adverse health effects of smoking, making the risks more tangible and relatable. Such campaigns also include emotionally powerful and vivid content designed to evoke strong feelings and inspire quit attempts.

Additionally, they target multiple domains simultaneously, including cognitive aspects by increasing knowledge about health harms, affective aspects by generating fear and concern, and social aspects by reinforcing perceptions of social disapproval. Finally, their effectiveness is strengthened by sustained duration and adequate frequency of exposure, ensuring that messages remain salient over time and repeatedly reinforce the intended behavior change.

The 2014 Tips Campaign in the United States demonstrated substantial impact: following two nine-week campaign phases, over 1.8 million smokers attempted to quit and approximately 104,000 successfully renounced smoking.[31] Such sincere social marketing efforts yield measurable public health outcomes.

Media channel effectiveness

Research comparing various mass communication channels for anti-smoking messages reveals differential effectiveness. Cinema and movie theaters emerged as the most effective medium, with 68% of respondents recalling anti-smoking advertisements screened in cinema halls.[32] The effectiveness of this approach stems from several reinforcing factors. Audiences in cinemas are typically captive and cannot easily skip or avoid the messages, which ensures full exposure. The large screen format also enhances visual impact, making the warnings more attention-grabbing and memorable. Additionally, cinemas often reach youth and young adults, who represent a key demographic due to their high cinema attendance and increased vulnerability to initiating risky behaviors. Finally, the mandatory display of health warnings before movie screenings guarantees consistent and repeated exposure, strengthening message retention and potential behavior change.

Although television advertising reaches broad audiences, it often shows relatively low recall, estimated at around 6%, due to several limiting factors. Viewers can easily avoid exposure by changing channels or muting the sound during commercial breaks, which reduces message absorption. In addition, advertisements compete for attention with ongoing programming, making it difficult for viewers to fully engage with the content. The increasing use of recorded or on-demand viewing also allows audiences to fast-forward through advertisements altogether, further diminishing exposure and recall of the messages.

Internet and radio demonstrate moderate effectiveness, with recall levels of approximately 14% and 12% respectively, but their impact is limited by several factors. A key constraint is self-selection in content consumption, as users actively choose what they want to engage with, which reduces unintended exposure to messages. In the case of internet advertising, banner blindness and the use of ad-blocking or avoidance strategies further diminish attention to promotional content. Together, these factors reduce the likelihood that audiences consistently notice, process, and retain the intended messages.

Fear appeals and emotional content

Research on fear appeal effectiveness reveals complex relationships. Studies found that fear appeals require combination with self-efficacy messages and discouraging content, as pure fear messages may provoke avoidance reactions.[33] Optimal messaging requires a careful balance of several key components to be effective. It should establish sufficient threat perception by clearly communicating both the severity of the risk and an individual's susceptibility to it. At the same time, it must include strong efficacy information by reinforcing response efficacy (belief that the recommended action will work) and self-efficacy (belief in one's ability to

perform the action). In addition, messages should provide clear and practical action recommendations, such as specific steps for quitting and information on where to seek help or support. Finally, the tone of the message should remain supportive rather than judgmental, as this encourages receptivity and reduces resistance to behavior change.

Advertisements that de-market smoking with extremely moving and vivid content prove particularly effective in inspiring quit attempts, with exposure to emotional or graphic advertisements creating greater impact than neutral messages.[34]

Integration with policy measures

Mass media campaigns demonstrate maximum effectiveness when implemented alongside complementary policy measures. Their impact is strengthened when combined with increased tobacco taxation and pricing, which discourages consumption through financial deterrence. Comprehensive smoke-free legislation further supports behavior change by reducing opportunities for smoking and reinforcing social norms against it. Strong health warning labels on packaging continuously remind users of the risks at the point of use, while tobacco product sales restrictions limit accessibility and initiation. In addition, the availability of accessible cessation support services enhances the likelihood of successful quitting by providing individuals with practical help and guidance.

This integrated approach creates reinforcing effects are warnings on packages remind consumers of campaign messages, price increases create motivation leveraged by campaign content, and smoke-free laws generate social norm changes promoted in campaigns.

FACTORS MOTIVATING SMOKING INITIATION AND CESSATION

Age of smoking initiation

Research demonstrates strong associations between age and smoking habit development. Analysis reveals that 37% of respondents-initiated smoking below age 18 (largely during schooling years), 42% between ages 19-25 (technical and professional education period), and only 21% at age 25 and above.[25] Early initiation of smoking is particularly significant because it is strongly associated with more severe long-term outcomes. Individuals who begin smoking at a younger age are more likely to become heavier smokers and develop greater levels of nicotine addiction. A longer duration of smoking also leads to greater cumulative health damage over time. In addition, those who start smoking early tend to have lower success rates when attempting to quit later in life. This vulnerability is further heightened by the fact that adolescent brain development increases susceptibility to addiction. These findings highlight the critical importance of preventing smoking initiation during school years through targeted interventions, health education, and strict marketing restrictions.

Peer influence and social factors

Social factors emerge as predominant drivers of smoking initiation. Research indicates 59% of students cited friends and classmates as main reasons for taking up smoking, while 27% attributed initiation to advertisements and enjoyment.[25] Only 7% accepted personal responsibility without external attribution. This pattern reflects the developmental psychology of adolescence and young adulthood, where identity formation is strongly influenced by peer group affiliation. During this stage, individuals are particularly susceptible to peer pressure and have a heightened desire for social acceptance, which can shape risk-taking behaviors. Smoking is often perceived as a symbol of maturity, independence, and social belonging, making it more appealing in certain social contexts. These behaviors are further reinforced in social situations such as gatherings, parties, and alcohol consumption, where smoking is more likely to be initiated and normalized.

Notably, 74% of college students in one study started consuming cigarettes out of curiosity, with only 11% citing external pressure.[36] This suggests complex interplay between personal factors (curiosity, sensation-seeking) and social contexts providing smoking opportunities.

Stress and psychological factors

College students and young adults who smoke report higher perceived stress than non-smoking peers. Young people increasingly use smoking as coping strategy for life stress, with 49.3% of college student smokers identifying academic stress as smoking motivator.[37] Exam stress correlates with significant increases in cigarette consumption.

Research examining smoking motivations among 300 college students found: 77.08% felt attracted by experiencing new sensations; 10.42% smoked in anxiety-inducing situations; 30% smoked when nervous; 37% consumed cigarettes when stressed; 38% smoked in social gatherings with friends; and 45% smoked when drinking alcohol.[36]

These findings indicate cigarette consumption depends more on individual desires and psychological states than cultural practices alone, suggesting cessation interventions should address stress management and coping skill development.

Motivations to quit smoking

Understanding cessation motivations requires differentiating between motivation to quit and successful

quitting, as different psychological, individual, and environmental factors influence each process.[38] Quit motivation is influenced by several reinforcing factors that encourage individuals to stop tobacco use. Health concerns, particularly the onset of disease or diagnosis of smoking-related conditions, often serve as a strong trigger for quitting. The financial burden associated with regular tobacco expenditure can also increase motivation to stop. In addition, social disapproval and the enforcement of smoke-free policies contribute to reducing smoking acceptability in public and social settings. Life events such as pregnancy and increased family responsibilities further strengthen the desire to quit due to concern for personal and family well-being. Exposure to anti-smoking messages and public health campaigns plays a role in raising awareness and reinforcing risks, while advice from healthcare providers along with accessible cessation support services provides both encouragement and practical assistance for successful quitting.

Quit attempts often fail due to a combination of biological, psychological, and environmental factors. The severity of nicotine addiction makes cessation particularly challenging, as individuals experience strong dependence on the substance. Withdrawal symptoms and cravings further complicate the quitting process, often leading to relapse. Stress and psychological dependence on smoking as a coping mechanism also play a significant role in continued use. In addition, social and environmental cues, such as being around other smokers, can trigger the urge to smoke. A lack of adequate cessation support reduces the likelihood of sustained quitting, while co-occurring substance use, particularly alcohol consumption, can further weaken self-control and increase the risk of relapse.

DISCUSSION

This comprehensive review synthesizes evidence on health warning label effectiveness in India, revealing both significant achievements and persistent challenges in tobacco control. The findings demonstrate that pictorial health warning labels constitute effective public health interventions, motivating substantial proportions of smokers to consider quitting and contributing to overall tobacco use decline.

Effectiveness of current warning labels

GATS 2016-2017 data provide compelling evidence of health warning label impact in India. The finding that 61.9% of cigarette smokers, 53.8% of bidi smokers, and 46.2% of smokeless tobacco users considered quitting due to warning labels demonstrates substantial effectiveness across tobacco product categories.[1] The overall tobacco use decline from 34.6% to 28.6% between 2009-2010 and 2016-2017, with particularly pronounced 18% decrease among 15-24-year-olds, suggests that COTPA implementation (including pictorial warnings) contributed to positive public health outcomes.

However, the finding that 71.2% of respondents believe current warnings are insufficient in size and positioning indicates room for improvement.[13] India's 40% coverage requirement falls short of WHO FCTC recommendations (minimum 50%, ideally 50% or more). The proposed increase to 85% coverage faced political resistance driven by tobacco industry lobbying, illustrating persistent challenges in strengthening tobacco control measures against commercial interests.

International evidence from Thailand demonstrates that transitioning from text-only to large pictorial warnings creates marked increases in awareness and cognitive-behavioral reactions, with effects sustained through periodic image rotation.[14] This evidence strongly supports India adopting larger warning requirements and systematic image rotation protocols to maximize warning effectiveness.

Wear-out effects and prevention strategies

Evidence suggests wear-out effects represent genuine concerns requiring proactive mitigation strategies. The psychological mechanisms of habituation predict that repeated exposure to identical warnings will diminish attention, emotional responses, and behavioral impact over time. India's implementation of rotating GHWLs demonstrates policy recognition of this challenge. However, current rotation frequency and warning size may prove insufficient to prevent habituation adequately.

Research indicating that 51.3% of respondents never encountered anti-tobacco messages suggests either inadequate warning visibility or consumer inattention, both consistent with habituation processes.[13] Optimal prevention of wear-out in health warnings requires a combination of design and implementation strategies that maintain message salience over time. This includes rotating warnings more frequently, ideally every 6–12 months rather than at longer intervals, to prevent audiences from becoming accustomed to the same messages. Increasing the size of warnings can also enhance their visibility and make them harder to ignore or habituate to. Greater variety in warning content is important for addressing a broad range of health consequences, which helps sustain attention and emotional impact. Complementary mass media campaigns further reinforce the messages conveyed on packaging, strengthening overall public health communication. In addition, ongoing research and monitoring are essential to track warning effectiveness over time and identify early signs of habituation, allowing for timely adjustments.

Price and taxation policies

Price elasticity evidence demonstrates that taxation represents highly effective tobacco control tool. The finding that 10% price increases reduce bidi consumption by 9.1% and cigarette consumption by 2.6% indicates

substantial price responsiveness, particularly for economically disadvantaged populations primarily consuming bidis.[1]

Current taxation levels in India remain suboptimal compared to WHO recommendations. Increasing tax rates to recommended levels could save 18.9 million lives while generating substantial government revenue for health programs and tobacco control initiatives.[1] The temporal pattern, where price effects peak at one month and diminish by three months, suggests that price increases should be substantial rather than incremental in order to generate sustained motivation to quit. These increases are more effective when coordinated with enhanced cessation support services during the critical post-increase period, when individuals are most likely to attempt quitting. Additionally, mass media campaigns can reinforce price-related motivations by encouraging quitting and highlighting the benefits of cessation. Regular implementation of price increases is also important to counter inflation-related erosion of tax impact and to maintain their long-term effectiveness in reducing tobacco consumption.

Mass communication integration

Evidence demonstrates that mass communication campaigns effectively complement warning labels when employing appropriate design principles. The most effective campaigns target cognitive, affective, and social domains simultaneously, use emotional and graphic content, and maintain sustained presence over extended periods.[30]

Cinema emerges as particularly effective medium in India, with 68% recall rates compared to 6% for television.[32] This finding suggests tobacco control resources should prioritize cinema advertising, particularly given primary cinema-going demographic (youth and young adults) represents critical target population for prevention. Integration of mass communication with warning labels creates synergistic effects that enhance overall public health impact. Mass media campaigns can prime attention to package warnings by delivering complementary messages that make individuals more receptive to them. They also reinforce specific health consequences depicted on warning labels, strengthening message retention and understanding. In addition, such campaigns can provide information on cessation resources and support services, encouraging quit attempts. By repeatedly exposing audiences to anti-smoking messages, they help create shifts in social norms that support quitting behavior. Furthermore, mass communication plays an important role in countering tobacco industry marketing and the normalization of smoking, thereby strengthening the overall effectiveness of warning labels.

The finding that 51.3% of respondents never encountered anti-tobacco messages indicates substantial gaps in campaign reach requiring urgent attention.[13] Comprehensive mass communication strategies must ensure adequate frequency and diverse channel utilization to achieve population-level exposure.

WHO FCTC alignment and policy recommendations

India's tobacco control policy framework demonstrates partial alignment with WHO FCTC requirements but reveals significant implementation gaps. Strengths include comprehensive legislation (COTPA 2003), pictorial warning implementation across all tobacco products, and rotating warning images. However, several critical gaps continue to persist. Warning sizes remain below WHO FCTC minimum recommendations, limiting their visibility and impact. Taxation levels are also inadequate, falling far short of the recommended target of 75% of the retail price, which reduces their effectiveness in discouraging consumption. Enforcement of existing regulations is often insufficient, weakening compliance with tobacco control measures. In addition, persistent tobacco industry interference in policy development continues to hinder the implementation of strong tobacco control strategies. The limited adoption of Article 5.3 guidelines across states further exacerbates this issue by allowing industry influence in public health policymaking. Finally, there is inadequate availability of cessation support services, which restricts access to essential assistance for individuals attempting to quit.

Strengthening India’s tobacco control requires a comprehensive, multi-pronged strategy aligned with WHO FCTC recommendations. This includes increasing the size of health warnings on tobacco products to at least 50% coverage, and ideally higher, while overcoming industry resistance through evidence-based policy advocacy. It also involves significantly enhancing taxation by raising taxes on all tobacco products to exceed 75% of the retail price, along with implementing regular inflation-adjusted increases to reduce affordability. Effective implementation of Article 5.3 guidelines across all states and union territories is essential to protect public health policies from tobacco industry interference. Additionally, establishing systematic protocols for rotating warning images every 6–12 months can help maintain their impact and prevent public habituation.

Further measures include expanding comprehensive mass communication campaigns with adequate funding, particularly through cinema and digital platforms, to ensure wide population exposure to anti-tobacco messaging. Strengthening cessation support is also critical, including increased access to counseling services, nicotine replacement therapy, and toll-free quitlines, with special focus on economically disadvantaged groups. Research and monitoring systems should be implemented to track warning effectiveness, behavioural wear-out, and tobacco use patterns to support continuous, evidence-based policy refinement. Finally, enforcement of existing

COTPA provisions must be strengthened, ensuring strict compliance with smoke-free laws, sales restrictions, and advertising bans to further reduce tobacco consumption.

Study limitations

This review acknowledges several limitations. First, reliance primarily on GATS data and published research limits examination of recent developments beyond 2016-2017. Second, the lack of experimental or quasi-experimental studies specifically examining wear-out effects in Indian context constrains definitive conclusions about habituation timelines. Third, most reviewed research employs cross-sectional designs limiting causal inference. Fourth, publication bias may over represent statistically significant findings while underrepresenting null results. Finally, the complexity of tobacco control as multi-component intervention makes isolating specific warning label effects challenging.

CONCLUSION

Health warning labels on cigarette packets in India demonstrate significant effectiveness in motivating quit attempts and contributing to tobacco use decline, particularly among youth populations. Evidence indicates that pictorial warnings with graphic imagery generate stronger cognitive and affective responses than text-only alternatives, effectively penetrating defensive processing strategies that smokers employ. The substantial proportions of smokers considering quitting due to package warnings (61.9% of cigarette smokers, 53.8% of bidi smokers) demonstrate meaningful public health impact.

However, current warning implementation reveals areas requiring strengthening. Warning size (40% coverage) falls short of WHO FCTC minimum recommendations (50%), and evidence suggests potential wear-out effects necessitating more frequent image rotation. The finding that 71.2% of respondents believe warnings are insufficient in size and positioning indicates consumer perception aligns with policy recommendations for enhanced requirements.

India's tobacco control policy framework, anchored by COTPA 2003, provides solid foundation but demonstrates implementation gaps in areas including warning size, taxation levels, Article 5.3 adoption, and enforcement consistency. Tobacco industry interference persists as significant barrier to policy strengthening, requiring robust protections through comprehensive Article 5.3 implementation.

Optimal tobacco control in India requires integrated approaches combining strengthened warning requirements (larger size, frequent rotation, culturally-tailored content) with increased taxation (targeting 75% of retail price), comprehensive mass communication campaigns (emphasizing cinema and digital channels), enhanced cessation support services, and rigorous enforcement of existing regulations. Price policies demonstrate substantial effectiveness (9.1% bidi consumption reduction per 10% price increase) and warrant greater utilization while addressing potential equity concerns.

Future research should prioritize longitudinal studies examining wear-out effects over time, experimental research comparing warning sizes and designs in Indian context, investigation of culturally-specific message framing effectiveness, analysis of interaction effects between warnings, pricing, and mass communication, and evaluation of cessation support interventions tailored to Indian socioeconomic and cultural contexts.

The declining tobacco use rates, particularly pronounced decrease among youth, demonstrate that comprehensive tobacco control can succeed in India despite challenges. Continued strengthening of evidence-based interventions including effective health warning labels offers substantial potential to reduce India's tobacco-related disease burden, saving millions of lives and advancing public health objectives aligned with WHO FCTC commitments.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: Not required

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Cite this article as: Chanda S, Sarkar S. Effectiveness and wear-out effect of health warning labels on cigarette packets in India: a comprehensive review. Int J Community Med Public Health 2026;13:3199-210.