

## Original Article

## Health risks of tobacco use and awareness of graphic health warnings: findings from a community study in urban Patna

Shishir Kumar<sup>1</sup> , Shivani Agrawal\*<sup>1</sup> , Nidhi Prasad<sup>1</sup> , Navin Mishra<sup>2</sup> , Sanjay Kumar<sup>1</sup> 

<sup>1</sup> Department of Community Medicine, Indira Gandhi Institute of Medical Sciences, Patna.

<sup>2</sup> Department of Dentistry, Indira Gandhi Institute of Medical Sciences, Patna.

**Corresponding author and reprints: Shishir Kumar**, Additional Professor (Biostatistics), Department of Community Medicine, Indira Gandhi Institute of Medical Sciences, Patna.

**Email:** [shishirpunia@gmail.com](mailto:shishirpunia@gmail.com)

**Received:** 10 Dec 2024

**Accepted:** 26 May 2025

**Published:** 30 Sep 2025

### Abstract

**Background:** Tobacco consumption remains a foremost cause of preventable illness and death worldwide. A study analyzing NFHS-5 and GATS-2 data indicates that men's tobacco usage in urban areas declined from 38.9% to 25.4% between NFHS-4 and NFHS-5, while women's usage decreased from 4.4% to 3.3%. These findings suggest a positive trend in reducing tobacco consumption in urban regions. To evaluate the patterns of using tobacco and assess the awareness of graphic health warnings among tobacco users in urban Patna, focusing on their understanding of health risks associated with tobacco.

**Methods:** 224 tobacco users in the urban Patna community participated in this 12-month cross-sectional study. Purposive sampling was used to choose the participants, and a pre-designed, pre-tested questionnaire was used for the interviews. PSP software was used to analyze the data using frequency and percentages.

**Results:** Mean age of the participants was  $38.12 \pm 12.087$ . Out of 224 participants, majority of the participants use smokeless tobacco form. 89.2% participants said pictorial + written warnings are more understandable but 86.5% did not know which kind of warning has more impact on smokers.

**Conclusion:** Despite growing awareness of health risks, tobacco use remains prevalent due to various socioeconomic and cultural factors, highlighting the need for more effective public health interventions.

**Keywords:** Awareness; Graphic health warnings; Pattern; Smoker; Tobacco.

**Cite this article as:** Kumar Sh, Agrawal Sh, Prasad N, Mishra N, Kumar S. Tobacco Use Patterns and Awareness of Health Risks: Findings from a Community Study in Urban India. *Soc Determinants Health*. 2025;11(1):1-7. DOI: <http://dx.doi.org/10.22037/SDH.v11i1.46963>

### Introduction

Worldwide, tobacco use remains one of the top causes of avoidable illness and mortality prompting health authorities to implement various measures aimed at reducing smoking rates and tobacco consumption. Smoking-related diseases lead to roughly 1.35 million deaths worldwide each year.<sup>1</sup> In an effort to tackle this severe health issue, India has adopted several tobacco control policies, with one of the most

influential being the addition of graphic health warnings on tobacco packaging.

Pictorial health warnings on tobacco goods serve as a vital public health tool, effectively communicating the severe risks coupled with tobacco use. Research indicates that these visual warnings can significantly enhance awareness and motivate smokers to quit, ultimately contributing to reduced tobacco consumption.<sup>2</sup> India's Cigarettes and Other

Tobacco Products Act (COTPA) of 2003 was a groundbreaking law that required tobacco products to carry these visual health warnings.

In 2006, the first set of visual warnings was implemented, with subsequent updates in 2011 and again in 2018, where the size of the warnings was increased to cover 85% of the front and back of the packaging.<sup>3</sup> This significant expansion in the size and impact of the warnings reflects a growing recognition of the effectiveness of visual communication in conveying health risks.

In rural areas, 61% males and 13% females were using some type of tobacco in contrast to 50% males and 7% females in urban areas (National Family Health Survey-3 2005-2006).<sup>4</sup> Tobacco use in urban India is influenced by socio-economic factors, peer pressure, and cultural norms, along with easy accessibility and insufficient awareness about health risks. Additionally, stress, addiction, and targeted marketing contribute to higher consumption rates.<sup>1</sup> There is also lack of data from urban Patna on effect of graphic health warnings. Such pictorial warnings are especially crucial in countries with lower literacy rates, as they can communicate risks more effectively than text alone. Research by Scollo and Winstanley showed that a person smoking 20 cigarettes a day would encounter these health warnings about 7,000 times per year.<sup>5</sup> The striking and intense images on tobacco packaging serve as a cautionary alert for both smokers and non-smokers, highlighting the dangers associated with tobacco consumption. By making these warnings highly visible, tobacco users are more inclined to acknowledge the health risks and understand the potential consequences of smoking.<sup>6</sup>

The study aims to evaluate the patterns of tobacco use and assess the awareness of graphic health warnings among tobacco users in urban Patna, focusing on their understanding of health risks associated with tobacco.

## Methods

### *Study Design:*

This descriptive, cross-sectional, interview based questionnaire study, was conducted in urban Patna community from May 2023 to April 2024 among 224 tobacco users.

### *Study population:*

Subjects who were residing in the urban areas of Shastri Nagar in Patna.

### *Sample size:*

$$\text{Formula: } n = \frac{\left( z_{1-\frac{\alpha}{2}}^2 \right) (1-p)p}{\xi^2 p}$$

Where,

p : Expected proportion = 0.30<sup>7</sup>

ξ : Relative precision = 20%

1- α/2 : Desired Confidence level = 95%

In this study the sample consist of 224 tobacco users residing in the selected community.

### *Sampling Method:*

Participants were recruited through purposive sampling technique.

### *Inclusion criteria and Exclusion criteria:*

Subjects suffering from diagnosable medical/psychiatric disorder were excluded from the study. Individuals of 10 years and above who use tobacco, live in the study area, are present during data collection, and agree to participate were included.

### *Ethics approval:*

Study started after getting approval from the Institutional Human Ethics Committee and the Dean of Research (Letter No./807/IEC/IGIMS/2022).

### *Data collection procedure:*

The aim of carrying out the research was communicated to each participant individually prior to starting the data collection process, ensuring complete confidentiality. Subjects were chosen at

random via visits to their homes. Before starting data collection, pilot study was conducted to validate the semi-structured, pre-tested, pre-coded questionnaire which included socio-demographic characteristics, pattern of tobacco habits and their knowledge about pictorial health warnings on tobacco packets. Consent was taken from parents/guardian in case of minor subjects.

#### **Bias:**

A potential bias in studies on tobacco consumption may arise from underreporting due to social desirability bias, where individuals may not accurately disclose their tobacco use in surveys.

#### **Statistical analysis used:**

The questionnaire data was studied using the PSPP software (Free Software Foundation, Boston, Massachusetts)

(<https://www.gnu.org/software/pspp/>).

Frequencies and percentages were calculated to examine the socio-demographic information, tobacco usage patterns, and participants' understanding of graphic health warnings on tobacco packets. A P-value of <0.05 was considered statistically significant.

## **Results**

### **Table 1: Socio-demographic characteristics of Respondents in the study**

Among 224 participants, 99.6% were males. The mean age of the participants was  $38.12 \pm 12.087$ . About one-third participants (37.5%) had higher secondary education and had family income between Rs. 25,001 to 50,000. Nearly half (46.9%) of the participants were in service, followed by small business (22.8%). (Table 1)

Table 1: Socio-demographic characteristics of Respondents in the study

Predictors	Frequency (%) (N=224)	
	Mean Age $\pm$ SD	
		$38.12 \pm 12.087$
Age (in years)	$\leq 24$	28 (12.5)
	25 – 34	74 (33.0)
	35 – 44	56 (25.0)
	45 – 54	40 (17.9)
	>54	26(11.6)
Gender	Male	223 (99.6)
	Female	01 (0.4)
Education	No Formal Education	08 (3.6)
	Primary Education	26 (11.6)
	Secondary Education	47 (21.0)
	Higher Secondary	84 (37.5)
	Graduate & Above	59 (26.3)
Occupation	Day labour	21 (9.4)
	Service	105 (46.9)
	Small business	51 (22.8)
	Unemployed	13 (5.8)
	Student	28 (12.5)
	Others	06 (2.7)
Income (in Indian Rupees)	$\leq 25000$	67 (29.9)
	25001 – 50000	84 (37.5)
	50001 – 75000	39 (17.4)
	75001 – 100000	22 (9.8)
	>100000	12 (5.4)

**Table 2: Pattern of tobacco use and knowledge of tobacco products with respect to age of participants**

On enquiring about the pattern of tobacco use along with knowledge of pictorial health warnings with respect to age, significant association was seen among age of the participants and their pattern of tobacco intake ( $p= 0.000$ ). Majority of the participants use smokeless form of tobacco.

99.5% participants among all age groups said tobacco is harmful to multiple organs. 60.2% participants were not aware whether tobacco lead to early signs of aging and 61.6% were unaware about smoking effects on impotency and infertility. Majority (89.3%) participants could understand pictorial + written warnings better but 86.5% did not know which kind of warning has more impact on smokers as shown in table 2.

Table 2: Pattern of tobacco use and knowledge of tobacco products with respect to age of participants

Predictors	Age (in years)			p-value* ( $\chi^2$ test)
	≤34 No. (%)	35-44 No. (%)	>44 No. (%)	
Form of tobacco used				
Cigarette	49 (21.9)	17 (7.6)	7 (3.1)	0.000
Smokeless tobacco	30 (13.4)	28 (12.5)	51 (22.8)	
Multiple forms	23 (10.3)	11 (4.9)	8 (3.6)	
Time since tobacco intake				
<5 year	73 (32.6)	7 (3.1)	00 (00)	0.000
5-10 years	25 (11.2)	25 (11.2)	6 (2.7)	
>10 years	4 (1.8)	24 (10.7)	60 (26.8)	
Frequency of tobacco use				
<5 times/day	73 (32.6)	22 (9.8)	16 (7.1)	0.000
5-10 times/day	27 (12.1)	31 (13.8)	33 (14.7)	
>10 times/day	2 (0.9)	3 (1.3)	17 (7.6)	
More harmful tobacco product				
Bidi	10 (4.5)	7 (3.1)	3 (1.3)	0.002
Betle leaves	12 (5.4)	3 (1.3)	1 (0.4)	
Pan masala	3 (1.3)	3 (1.3)	2 (0.9)	
Gutka/Cigarette	14 (6.2)	7 (3.1)	25 (11.2)	
Smokeless tobacco	11 (4.9)	2 (0.9)	3 (1.3)	
Can't Say	52 (23.2)	34 (15.2)	32 (14.3)	
Are you aware that tobacco is harmful to?				
Heart	00 (00)	00 (00)	1 (0.4)	0.300
Multiple organs	102 (45.5)	56 (25.0)	65 (29.0)	
Can tobacco lead to early signs of aging?				
No	14 (6.2)	5 (2.2)	5 (2.2)	0.033
Yes	19 (8.5)	20 (8.9)	26 (11.6)	
Don't Know	69 (30.8)	31 (13.8)	35 (15.6)	
Can smoking tobacco lead to impotency and infertility?				
No	31 (13.8)	17 (7.6)	15 (6.7)	0.315
Yes	8 (3.6)	4 (1.8)	11 (4.9)	
Don't Know	63 (28.1)	35 (15.6)	40 (17.9)	
Can passive smoking during pregnancy lead to health hazards?				
No	7 (3.1)	5 (2.2)	3 (1.3)	0.840
Yes	50 (22.3)	25 (11.2)	35 (15.6)	
Don't Know	45 (20.1)	26 (11.6)	28 (12.5)	
Which kind of warning was more understandable?				
Pictorial warnings	7 (3.1)	6 (2.7)	11 (4.9)	0.134
Pictorial + Written	95 (42.4)	50 (22.3)	55 (24.6)	
Which has more impact on smoker?				
Single- sided warning	3 (1.3)	00 (00)	1 (0.4)	0.589
Double-sided warning	14 (6.2)	6 (2.7)	6 (2.7)	
Don't Know	85 (37.9)	50 (22.3)	59 (26.3)	

\* $p<0.05$ , consider as statistically significant.

**Table 3: Pattern of tobacco use and knowledge of tobacco products with respect to income of participants.**

Among participants having <50000 Indian Rs. (573.45 USD) Income, 37.1% used smokeless form of tobacco and 26.3% used tobacco for >10 years. 89.2% participants said pictorial + written warnings are more

understandable but they were not sure which kind of health warning has more impact on smokers. Significant association was seen between income of the participants and other variables depicted in table 3. 40.6% use tobacco for 5-10 times per day and 99.6% responded that tobacco is harmful to multiple organs.

Table 3: Pattern of tobacco use and knowledge of tobacco products with respect to income of participants.

Predictors	Income (in Indian Rupees and in USD)			p-value* ( $\chi^2$ test)
	<= 50000 (573.45 USD) N (%)	50001 – 75000 (573.45 – 860.20 USD) N (%)	>75000 (> 860.20 USD) N (%)	
Form of tobacco used				
Cigarette	43 (19.2)	16 (7.1)	14 (6.2)	0.117
Smokeless tobacco	83 (37.1)	14 (6.2)	12 (5.4)	
Multiple forms	28 (11.2)	9 (4.0)	8 (3.6)	
Time since tobacco intake				
<5 year	53 (23.7)	15 (6.7)	12 (5.4)	0.948
5-10 years	39 (17.4)	10 (4.5)	7 (3.1)	
>10 years	59 (26.3)	14 (6.2)	15 (6.7)	
Frequency of tobacco use				
<5 times/day	72 (32.1)	21 (9.4)	18 (8.0)	0.945
5-10 times/day	64 (28.6)	14 (6.2)	13 (5.8)	
>10 times/day	15 (6.7)	4 (1.8)	3 (1.3)	
More harmful tobacco product				
Bidi	17 (7.6)	2 (0.9)	1 (0.4)	0.013
Beetle leaves with tobacco	6 (2.7)	5 (2.2)	5 (2.2)	
Pan masala	4 (1.8)	1 (0.1)	3 (1.3)	
Gutka/Cigarette	35 (15.6)	5 (2.2)	6 (2.7)	
Smokeless tobacco	7 (3.1)	7 (3.1)	2 (0.9)	
Can't Say	82 (36.6)	19 (8.5)	17 (7.6)	
Are you aware that tobacco is harmful to?				
Heart	1 (0.4)	00 (00)	00 (00)	0.784
Multiple organs	150 (67.0)	39 (17.4)	34 (15.2)	
Can tobacco lead to early signs of aging?				
No	17 (7.6)	6 (2.7)	1 (0.4)	0.039
Yes	38 (17.0)	10 (4.5)	17 (7.6)	
Don't Know	96 (42.9)	23 (10.3)	16 (7.1)	
Can smoking tobacco lead to impotency and infertility?				
No	42 (18.8)	11 (4.9)	10 (4.5)	0.997
Yes	15 (6.7)	4 (1.8)	4 (1.8)	
Don't Know	94 (42.0)	24 (10.7)	20 (8.9)	
Can passive smoking during pregnancy lead to health hazards?				
No	15 (6.7)	00 (00)	00 (00)	0.000
Yes	54 (24.1)	28 (12.5)	28 (12.5)	
Don't Know	82 (36.6)	11 (4.9)	6 (2.7)	
Which kind of warning was more understandable?				
Pictorial warnings	19 (8.5)	2 (0.9)	3 (1.3)	0.377
Pictorial + Written	132 (58.9)	37 (16.5)	31 (13.8)	
Which has more impact on smoker?				
Single- sided warning	2 (0.9)	1 (0.4)	1 (0.4)	0.911
Double-sided warning	19 (8.5)	4 (1.8)	3 (1.3)	
Don't Know	130 (58.0)	34 (15.2)	30 (13.4)	

\* $p < 0.05$ , consider as statistically significant.

## Discussion

In the present study, 99.6% were males and were of 17–66 years, having mean age  $38.12 \pm 12.087$  which was more or less similar in a study by Dahiya et al.<sup>8</sup> Nearly half (46.9%) of them were in service and 37.5% were having income of Rs. 25001 – 50000. Similar finding was seen in other studies.<sup>9,10</sup>

In our study, majority of the participants used smokeless form of tobacco in contrast to another study.<sup>9</sup> In a study by Naik et al.<sup>11</sup> 81.2% did not believe smokeless tobacco to be highly hazardous. 39.3% use tobacco since >10 years and 49.5% smoke < 5 times a day among all age groups, Dahiya et al.<sup>8</sup> also revealed similar result where 31.1% participants use tobacco since 5-10 years and 37.5% smoke <5times per day. Majority of the participants (52.7%) of this study were not sure which tobacco product is more harmful in contrast to other finding<sup>8</sup> where bidi smoking was considered more harmful followed by cigarette.

Our study showed that surprisingly, only 0.4% participants among all age groups said tobacco is harmful to heart, 61.6% were unaware about smoking effects on impotency and infertility and nearly half (49.1%) responded pregnancy-related passive smoking poses health risks. Contrast results were seen in another study<sup>12</sup> where 66% were aware that smoking causes heart disease and 68% knew that smoking can lead to impotency and infertility and 96.7% said passive smoking during pregnancy can lead to health hazard. Majority (89.3%) participants could understand pictorial + written warnings better in the present study whereas Gupta et al.<sup>7</sup> showed 54% participants could understand both pictorial + written. In this study, 11.7% said double sided representation has more impact on smokers but Dahiya et al.<sup>8</sup> revealed 58.8% participants answered that double sided representation had more impact on smokers.

It is widely recognized that images leave a stronger impression on the mind than text. Warning labels on items containing tobacco should be large, clearly visible, readable, and occupy at least 50% of the main display, according to the WHO Framework Convention on Tobacco Control.<sup>13</sup> According to Government of India (GoI) guidelines, these warnings should occupy a minimum of 40% of the display area.<sup>14</sup> Recently, in India there has been a discussion on expanding the size of pictorial health warnings to 85%, a change supported by numerous national and international NGOs.<sup>15,16</sup>

## Conclusion

In conclusion, the study highlights the significant health risks associated with tobacco use in Urban Patna, emphasizing the urgent need for increased public awareness. Despite the presence of graphic health warnings, many individuals remain unaware of the severe consequences of tobacco consumption. Strengthening educational campaigns and enforcing stricter regulations can play a vital role in reducing tobacco use and improving public health outcomes. It is essential to continue addressing the gap in awareness to foster a healthier community.

**Limitation:** The study is limited to tobacco users in age group 10 years and above, residing in selected urban area of Patna, Bihar.

## Acknowledgment

None.

## Authors' contribution

The authors confirm their contribution to the paper: Study conception and design: SK, SA, NP, NM and SK; data collection: SK, SA, and NP; statistical analysis: SK, SA, and NM. Manuscript preparation: SK, SA, NP, NM and SK. All authors reviewed the results and approved the final version of the manuscript. Further, all co-authors take full responsibility for the integrity and accuracy of all aspects of the work.

### ***Ethical considerations***

The study started after receiving approval (Letter No./890/IEC/IGIMS/2023) from the Institutional Human Ethics Committee and the Dean of Research at the Indira Gandhi Institute of Medical Sciences, Patna.

### ***Funding***

No funding was received for this study.

### ***Conflicts of interest***

There are no conflicts of interest

### **References:**

1. *Global Adult Tobacco Survey India*, Ministry of Health and Family Welfare, Government of India 2016-17. Retrieved from GATS India Report. [Cited date: 2024 Dec 06] Available from: <https://ntcp.mohfw.gov.in/assets/document/surveys-reports-publications/Global-Adult-Tobacco-Survey-Second-Round-India-2016-2017.pdf>
2. World Health Organization. Tobacco control 2021: Pictorial health warnings. [Cited date: 2024 Dec 06] Retrieved from <https://www.who.int/publications/i/item/9789240010338>
3. Ministry of Health and Family Welfare. *Cigarettes and Other Tobacco Products (Packaging and Labelling) Amendment Rules*. Government of India 2018. Retrieved from Ministry of Health and Family Welfare. [Cited date: 2024 Dec 06] Available from <https://mohfw.gov.in/acts-rules-and-standards-health-sector/notifications/archives>
4. International Institute for Population Sciences (IIPS) and Macro International. National Family Health Survey (NFHS-3), 2005-06. Vol. I. Mumbai IIPS; 2007:588.
5. Ratih SP, Susanna D. Perceived effectiveness of pictorial health warnings on changes in smoking behaviour in Asia: a literature review. *BMC Public Health* 2018;18:1165.
6. Mudey A, Shukla A, Choudhari SG, Joshi A. Does the Graphic Health Warning on Tobacco Products Have an Influence on Tobacco Consumers in India? A Scoping Review. *Cureus*. 2023;15(4):e38304.
7. Gupta VK, Parasramka P, Mishra G, Kumar S, Malhotra S, Kankane N, et al. Evaluation of awareness regarding pictorial warning on tobacco packets and its effect on cessation among tobacco users in Lucknow. *Natl J Maxillofac Surg* 2022;13:72-77
8. Dahiya P, Kamal R, Gupta R, Bhatt S, Didhra G, Bansal V. Assessment of awareness about pictorial warnings on tobacco products in tobacco users in Paonta Sahib, Himachal Pradesh, India. *Arch Med Health Sci* 2017;5:39-43
9. Mia MT, Talukder MMA, Ali MM, & Ismael M. Effects of Graphic Health Warning on Tobacco Packs: A Cross-Sectional Study among Low Socioeconomic Group in Bangladesh. *Journal of smoking cessation* 2021;1354885.
10. Sharma SK, Jelly P, Thakur K, Gupta M. Effect of magnification and changes in tobacco pictorial warning on asceticism of tobacco use: An exploratory survey. *J Family Med Prim Care* 2020;9:6051-6060.
11. Naik BN, Rao UR R, Verma M, Nirala SK, Pandey S, Singh CM. Awareness and Attitude Towards Tobacco Products and Tobacco Industry and Perception about Government's Role in Tobacco Control among the Adult Rural Population: A Cross-sectional Study in the Indian State of Bihar. *Addiction & Health* 2024;16(2):83-92.
12. Raman P, Pitty R. Tobacco Awareness with Socioeconomic Status and Pictorial Warning in Tobacco Cessation: An Exploratory Institutional Survey in a Semi-urban Population. *J Contemp Dent Pract*. 2020;21(10):1122-1129. PMID: 33686033.
13. Reddy KS, Gupta PC. Report on Tobacco Control in India. New Delhi, India: Ministry of Health and Family Welfare, Government of India; 2004:397. [Cited date: 2024 Dec 06] [http://www.who.int/fctc/reporting/Anne6\\_Report\\_on\\_Tobacco\\_Control\\_in\\_India\\_2004](http://www.who.int/fctc/reporting/Anne6_Report_on_Tobacco_Control_in_India_2004)
14. Guidelines for Law Enforcers for Effective Implementation of Tobacco Control Laws. Ministry of Health and Family Welfare, Government of India 2013.
15. WHO Urges PM Narendra Modi to Implement Increased Warnings on Tobacco Products. [Cited date: 2024 Dec 06] <https://economictimes.indiatimes.com/industry/healthcare/biotech/healthcare/who-urges-pm-narendra-modi-to-implement-increased-warnings-on-tobacco-products/articleshow/47124934.cms>
16. Tobacco Growers Wary of Larger Pictorial Warnings. [Cited date: 2024 Dec 06] <https://www.thehindu.com/news/national/karnataka/tobacco-growers-wary-of-larger-pictorial-warning/article7196369.ece>