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# Pictorial health warnings on cigarette packs and the impact on women

## Advertências gráficas nos maços de cigarro e o impacto entre mulheres

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### ABSTRACT

**OBJECTIVE:** To analyze the association between the pictorial graphic health warnings on cigarette packs and their impact on intention to quit smoking among women.

**METHODS:** Population-based cross-sectional study among 265 women daily smokers in the State of Paraná in 2010. The sample size was calculated using cluster sampling. Participants were asked whether they had seen any pictorial graphic health warnings in the past 30 days, whether these warnings made them think about quitting, and intensity of these thoughts. The data was analyzed using logistic regression and the independent variables included age, educational attainment, whether they had children, whether they had attempted to quit smoking in the past 12 months, age of smoking initiation, number of cigarettes smoked per day, their town of residence, and how soon after waking do they smoke their first cigarette.

**RESULTS:** Participants (91.7%) reported seeing the pictorial graphic health warnings in the past 30 days. Women with elementary education or below and women with some/complete high school education were more likely to think about quitting smoking after seeing the pictorial graphic health warnings than women with higher education (OR = 4.85;  $p = 0.0028$  and OR = 2.91;  $p = 0.05$ , respectively). Women who attempted to quit smoking in the past 12 months were more likely to think about quitting than women who had not (OR = 2.49;  $p = 0.001$ ). Quit attempts within the last 12 months were associated with intensity of these thoughts (OR = 2.2;  $p = 0.03$ ).

**CONCLUSIONS:** Results show an association between pictorial graphic health warnings and intent to quit smoking among women with warnings having a greater impact among women with less education and who had attempted to quit smoking within the past year. Tobacco control strategies should be implemented across all groups of women regardless of their educational attainment.

**DESCRIPTORS:** Women. Tobacco-Derived Products Publicity. Health Knowledge, Attitudes, Practice. Smoking Cessation, psychology. Cross-Sectional Studies.

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## RESUMO

**OBJETIVO:** Analisar a associação entre as advertências gráficas nos maços de cigarro e seu impacto na intenção de parar de fumar entre mulheres.

**MÉTODOS:** Estudo transversal de base populacional com 265 mulheres do estado do Paraná que fumaram diariamente no ano de 2010. O tamanho da amostra foi calculado por amostragem probabilística por cluster. As participantes foram questionadas se haviam visto as advertências gráficas nos maços de cigarro nos últimos 30 dias, se as advertências as fizeram pensar em cessar o uso do cigarro e em que intensidade. Os dados foram analisados usando regressão logística, e as variáveis independentes incluíram idade, anos de estudo, presença de filhos, tentativa de parar de fumar nos últimos 12 meses, idade quando começou a fumar, número de cigarros fumados por dia, cidade de residência e quanto tempo depois de acordar elas fumam o primeiro cigarro.

**RESULTADOS:** Mais de 90,7% das participantes relataram ter visto as advertências nos últimos 30 dias. Mulheres que estudaram até o ensino fundamental ou médio apresentaram maior probabilidade de pensar em cessar de fumar depois de verem as advertências gráficas nos maços de cigarro do que mulheres com ensino superior (OR = 4,85;  $p = 0,0028$  e OR = 2,91;  $p = 0,05$ , respectivamente). Mulheres que tentaram parar de fumar nos últimos 12 meses tiveram maior probabilidade de cessar de fumar do que as que não tentaram (OR = 2,49;  $p = 0,001$ ). Nos últimos 12 meses, as tentativas de parar de fumar nos últimos 12 meses associaram-se à intensidade desses pensamentos (OR = 2,2;  $p = 0,03$ ).

**CONCLUSÕES:** Advertências gráficas nos maços de cigarro associaram-se à intenção de parar de fumar entre mulheres, sobretudo entre aquelas com menos anos de estudo e as que tentaram parar de fumar nos últimos 12 meses. Estratégias para o controle do tabaco devem ser implementadas para todas as mulheres, independentemente do nível de escolaridade.

**DESCRIPTORIOS:** Mulheres. Publicidade de Produtos Derivados do Tabaco. Conhecimentos, Atitudes e Prática em Saúde. Abandono do Hábito de Fumar, psicologia. Estudos Transversais.

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## INTRODUCTION

The implementation of tobacco product regulations based on rigorous research has been shown to be an effective and sustainable approach to tobacco control at the population level. Brazil has been one of the leading examples on the impact of evidence-based regulatory policies, as its smoking prevalence decreased from 34.8% in 1989 to 18.2% in 2008.<sup>a</sup> The Brazilian government has implemented comprehensive tobacco control legislation since the establishment of the *Agência Nacional de Vigilância Sanitária* (ANVISA) (equivalent of the U.S. Food and Drug Administration)

in 1999. Some examples include: limiting the level of tar, nicotine, and carbon monoxide allowed in cigarettes to 10 mg, 1 mg, and 10 mg respectively; banning the use of “light”, ultra light” on cigarette packs; inserting health warnings and graphic pictures on the hazards of tobacco use on cigarette packs and at Points of Sale; and restricting the use of additives that “are intentionally added to tobacco products in order to mask nicotine’s bad taste, disguise the unpleasant smell, reduce the visible portion of smoke, and decrease smoke irritability for non-smokers”.<sup>b</sup>

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<sup>a</sup> Instituto Nacional de Câncer; Organização Pan-Americana da Saúde. Pesquisa especial de tabagismo – PETab: relatório Brasil. Rio de Janeiro; 2011 [cited 2012 Oct 9]. Available from: [http://bvsms.saude.gov.br/bvs/publicacoes/inca/PET\\_ab\\_2011.pdf](http://bvsms.saude.gov.br/bvs/publicacoes/inca/PET_ab_2011.pdf)

<sup>b</sup> Agência Nacional de Vigilância Sanitária (Anvisa). Cigarros com sabor deverão ser retirados do mercado brasileiro. Brasília (DF): 2012. [cited 2013 Jun 20]. Available from: [http://portal.anvisa.gov.br/wps/portal/anvisa/anvisa/busca/\\_/ltp/p/c5/04\\_SB8K8xLLM9MSSzPy8xBz9CP0os3jvQA9PdwMDI0v\\_EAsXA0-TkCAPS29nfzdDQ6B8pFm8AQ7gaADS7ezu6GFi7gPkmzk5G3i6m\\_qZmQb6Gxj4Q3XjIDcixm48puPXHQ7yK37bQj4\\_ObnkZ-bqI-QGxoaYZBIAgC5fbbW/?1dmy&urile=wcm%3apath%3a//Anvisa/Portal/Anvisa/Sala de Imprensa/Assunto de Interesse/Noticias/Cigarros com sabor deverao ser retirados do mercado brasileiro](http://portal.anvisa.gov.br/wps/portal/anvisa/anvisa/busca/_/ltp/p/c5/04_SB8K8xLLM9MSSzPy8xBz9CP0os3jvQA9PdwMDI0v_EAsXA0-TkCAPS29nfzdDQ6B8pFm8AQ7gaADS7ezu6GFi7gPkmzk5G3i6m_qZmQb6Gxj4Q3XjIDcixm48puPXHQ7yK37bQj4_ObnkZ-bqI-QGxoaYZBIAgC5fbbW/?1dmy&urile=wcm%3apath%3a//Anvisa/Portal/Anvisa/Sala%20de%20Imprensa/Assunto%20de%20Interesse/Noticias/Cigarros%20com%20sabor%20deverao%20ser%20retirados%20do%20mercado%20brasileiro)

Article 12 of the World Health Organization Framework Convention on Tobacco Control (WHO FCTC) advocates education, communication, training, and public awareness "... on the health risks including the addictive characteristics of tobacco consumption and exposure to tobacco smoke".<sup>c</sup> One such educational effort is defined under the WHO FCTC Article 11 that addresses packaging and labeling of tobacco products: "Each unit packet and package of tobacco products and any outside packaging and labeling of such products also carry health warnings describing the harmful effects of tobacco use, and may include other appropriate messages." (Article 11, 1b).<sup>c</sup>

Pictorial health warnings (PHW), have been effective in informing the population about health risks associated with tobacco use.<sup>6,12</sup> The most relevant impact of PHW is to increase cognition about quitting, such as the frequency of attending to, thinking and talking about PHW, and quitting intentions.<sup>4</sup> Cigarette smokers who read and/or viewed, discussed or thought about the PHW were more likely to have quit, made an attempt to quit, or reduced their smoking than smokers who had not been exposed to PHW.<sup>14</sup>

Brazil is the second largest tobacco producer in the world. However, it has also been one of the major leaders in tobacco control efforts worldwide<sup>10</sup> and was one of the first countries to implement health warnings on cigarette packs. Tobacco companies have been required by law to insert pictures accompanied by health warnings since 2001, covering 100.0% of the major faces of cigarette packs.<sup>3,8</sup> All packs display the phone number for the quit line. The country developed a second group of warnings in 2004 and a third group of warnings was created in 2009 with stronger messages and gruesome images that have shown significant cognitive and behavioral impact on quitting intention.<sup>13</sup> Little is known about the impact of the PHW on the intention to quit smoking among women both worldwide and in Brazil.

An understanding of women and tobacco-related issues, as well as the need for the development of gender-relevant tobacco control efforts, has been highlighted as priorities in landmark guiding documents published in the last few years. It may significantly impact tobacco control efforts among women in developing countries such as Brazil. Women, tobacco and gender issues are one of the priorities to be addressed under WHO FCTC as one of its guiding principles states, "the need to take measures to address gender-specific risks when developing tobacco control strategies."<sup>d</sup>

The objective of this study is to analyze the association between the graphic warnings on cigarette packs and their impact on intention to quit smoking in women.

## METHODS

A population-based cross-sectional study of 265 adult women living in seven towns (Cambé, Cascavel, Curitiba, Irati, Londrina, Maringá) in the state of Paraná, Southern Brazil, representing all regions within the state in 2010. These towns were diverse regarding population size ranging from 56,288 inhabitants in Irati to 1.7 million in Curitiba.<sup>e</sup> Participants were recruited using a cluster sampling approach involving four phases: (1) Identification of census tracts within the urban areas of each town. Within these census tracts, areas that were populated by at least 70% permanent residential houses (houses that are built with durable materials) were selected; (2) Exclusion of census tracts with < 20 permanent residential houses; (3) Random selection of 15 census tracts (clusters) per town; and (4) Identification of a geographical center point within each census tract with the aim of obtaining 20 interviews per census tract. Once the central point was identified, this was the first house to be approached. We followed a sequence of a house to the right, a house to the left, and in front until 20 interviews were completed. If more than one woman was eligible in a particular household, we chose the one with the closest month birthday.

The data was collected through face-to-face interviews. The interview was adapted from the Global Adult Tobacco Survey (GATS), which follows a global model for the systematic monitoring of tobacco in a number of countries, including Brazil.<sup>15</sup> The data were collected using Computer Assisted Personal Interviews (CAPI) technology, which used a digital questionnaire on a portable computer.

The study sample was comprised of 2,153 women, approximately 300 participants/town. We included only daily cigarette smokers (265 participants) and questions relevant to PHW. Power calculations estimated 2,100 valid and completed interviews, with probabilistic selection and sample error of 2.0% and 6.0% for each segment. The error margins were calculated from an estimate of the population from each town, based on census information available from the Brazilian Institute of Geography and Statistics (IBGE).<sup>6</sup> The confidence interval was 95% and the estimated degree of homogeneity of opinions of the population (split) was of 50.0% x 50.0%, as the studied population was considered heterogeneous.

<sup>c</sup> World Health Organization. WHO Framework Convention on Tobacco Control. Geneva; 2003 [cited 2012 Oct 3]. Available from: [http://www.who.int/tobacco/framework/WHO\\_FCTC\\_english.pdf](http://www.who.int/tobacco/framework/WHO_FCTC_english.pdf)

<sup>d</sup> World Health Organization. WHO report on the global tobacco epidemic, 2008: the MPOWER package. Geneva; 2008. [cited 2012 Oct 9]. Available from: [http://www.who.int/tobacco/mpower/mpower\\_report\\_full\\_2008.pdf](http://www.who.int/tobacco/mpower/mpower_report_full_2008.pdf)

<sup>e</sup> Instituto Brasileiro de Geografia e Estatística. Pesquisa Nacional por Amostra de Domicílios: tabagismo 2008. Rio de Janeiro; 2010 [cited 2013 Oct 31]. Available from: <http://www.ibge.gov.br/home/estatistica/populacao/trabalhoerendimento/pnad2008/suplementos/tabagismo/default.shtm>

The independent variables included: participants age, whether they had children, whether they had attempted to quit smoking in the past 12 months, age of smoking initiation, number of cigarettes smoked per day, their town of residence, and how soon after waking they smoke their first cigarette. We collapsed education (elementary school or below; some high school or high school graduate; some college or higher), occupation (professional/technical; administrative; working class; homemaker; retired; student) and marital status (single; married/living together; separated/divorced/widowed). We calculated individual monthly income by dividing the monthly family income by the number of people supported by this income.

The dependent variables included the answers to three questions: (1) During the last thirty days, have you seen any photo or advertisement about the dangers of smoking on cigarette packages (yes/no)?; (2) (If "Yes") During the last thirty days, did the photos and advertisements on the cigarette packages lead you to think about quitting smoking (yes/no)? (3) (If "Yes") To what extent did the pictures and advertisements on the cigarette packages lead you to think about quitting smoking (made me think a little/made me think a lot).

Analyses were restricted to those persons who indicated that they currently smoked daily. Frequencies and means were calculated to summarize characteristics of the sample. We first assessed whether smokers saw the health warnings on cigarette packs. Subsequent analyses were restricted to those daily smokers who recalled seeing the warnings. The association between certain characteristics and whether participants thought about quitting smoking as a result of seeing the warnings were assessed through a series of unadjusted logistic regression models. Of those who indicated they thought about quitting, unadjusted logistic regression models were used to analyze what factors were associated with the extent of their thinking. In both instances, stepwise logistic regression was conducted to build multivariable models. Resulting odds ratios and confidence intervals were evaluated. Statistical analyses were performed using SAS Version 9.2.

This study was reviewed and approved by the *Comissão Nacional de Ética em Pesquisa* (0326.0.084.000/2008), *Comitê de Ética em Pesquisa* of the *Pontifícia Universidade Católica do Paraná* (3004/2008) and the University of Alabama at Birmingham Institutional Review Board for Human Use (X070813006/2007). All participants read and signed an informed consent form.

## RESULTS

Of the 2,153 women who completed the survey, 12.3% were currently daily cigarette smokers, constituting the analytic sample. Most participants were married (65.0%) with a mean age of 45.1 (SD = 12.9). A high percentage

**Table 1.** Baseline characteristics of female daily smokers. Paraná, Southern Brazil, 2010. (N = 265)

Variable	Value
Age (years): Mean (SD)	45.1 (12.9)
Town	
Cambé: % (n)	12.8 (34)
Cascavel: % (n)	10.9 (29)
Curitiba: % (n)	19.2 (51)
Irati: % (n)	19.2 (51)
Londrina: % (n)	12.8 (34)
Maringá: % (n)	10.6 (28)
Pato Branco: % (n)	14.3 (38)
Marital Status	
Single: % (n)	17.0 (45)
Married/Living Together: % (n)	65.3 (173)
Separated/Divorced/Widowed: % (n)	17.7 (47)
Education	
Elementary or below: % (n)	58.2 (153)
Some HS or HS graduate: % (n)	33.8 (89)
Some College or higher: % (n)	8.0 (21)
Occupation	
Professional/Technical: % (n)	9.2 (24)
Administrative: % (n)	4.2 (11)
Working Class: % (n)	40.0 (104)
Homemaker: % (n)	43.1 (112)
Retired or student: % (n)	3.5 (9)
Unemployed: % (n)	0 (0)
Monthly family income: Mean (SD)	1,719.7 (1,652.1)
Number of people living on monthly family income: Mean (SD)	3.4 (1.5)
Monthly income per person: Mean (SD)	632.8 (788.7)
Children	
Yes: % (n)	88.7 (235)
No: % (n)	11.3 (30)
Tried to Quit Smoking in the past 12 months	
Yes: % (n)	48.3 (128)
No: % (n)	51.7 (137)
Age of smoking initiation: Mean (SD)	17.0 (6.1)
Number of cigarettes smoked per day: Mean (SD)	10.5 (7.1)
How soon after waking before first smoke	
Within 5 minutes: % (n)	20.0 (53)
6 to 30 minutes: % (n)	40.0 (106)
31 to 60 minutes: % (n)	19.6 (52)
More than 60 minutes: % (n)	20.4 (54)

of the sample were homemakers (43.0%), had an elementary education or below (58.2%), a monthly family income of R\$ 1,719.70 on average, and the majority (88.7%) had children. Of the sample, 48.3% had tried to quit smoking in the past 12 months. Participants reported smoking 10.5 (SD = 7.1) cigarettes a day on average. The average age of smoking initiation was 17 years old (SD = 6.1), and 60.0% of women first smoke within 30 minutes of waking (Table 1).

Of our sample of women daily smokers, 91.7% recalled seeing a photo or warning about the dangers of smoking on cigarette packages in the last 30 days. Of this group, 61.7% said seeing those warnings made them think about quitting and among them, 68.7% said it made them think about quitting 'a lot'.

Women who had an elementary education or below and women with some high school education or a high school diploma were more likely to think about

quitting smoking after seeing the PHW than women with some college education or higher (OR = 4.85;  $p = 0.0028$  and OR = 2.91;  $p = 0.05$ , respectively). There was also a significant difference regarding the women who 'thought about quitting smoking' across towns (Table 2). The sample from the towns of Curitiba and Cambé were significantly more likely to think about quitting smoking (OR 2.53 and 3.51, respectively) in comparison to the town of Pato Branco. Women who had attempted to quit in the past 12 months were more likely to think about quitting than women who had not attempted to quit smoking (OR = 2.49;  $p = 0.001$ ). A previous attempt within the last 12 months was also associated with thinking a lot about quitting as a result of seeing the PHW (OR = 2.2;  $p = 0.03$ ). The only factor associated with either thinking about quitting and the extent of that thought is whether a woman had previously tried to quit within the last 12 months in both stepwise regression models (results not shown). The other towns did not present any statistically significant differences.

**Table 2.** Unadjusted measures for cigarette pack health warnings and subsequent behaviors. Paraná, Southern Brazil, 2010.

Variable	Thought about quitting after viewing photos and advertisements on cigarette packages			Viewing advertisements made me think a lot about quitting		
	OR	CI	p	OR	CI	p
Age	1.01	0.99;1.03	0.36	1.01	0.98;1.04	0.52
Marital Status						
Single	1.15	0.48;2.77	0.75	0.36	0.10;1.26	0.11
Married/Living together	1.21	0.60;2.43	0.6	0.62	0.21;1.81	0.38
Separated/Divorced/Widowed	1			1		
Education						
Elementary or below	<b>4.85</b>	<b>1.73;13.63</b>	<b>0.0028</b>	1.31	0.23;7.57	0.76
Some HS or HS graduate	<b>2.91</b>	<b>1.01;8.41</b>	<b>0.05</b>	0.88	0.15;5.33	0.89
Some College or higher	1			1		
Occupation						
Professional/Technical	0.83	0.15;4.54	0.83	1.25	0.07;22.88	0.88
Administrative	2.92	0.44;19.23	0.27	0.67	0.04;11.28	0.78
Working class	4.19	0.94;18.69	0.06	1.24	0.11;14.4	0.86
Homemaker	2.5	0.56;11.08	0.23	1.08	0.09;12.74	0.95
Retired or student	1			1		
Income per person	1	1.0;1.0	0.06	1	1.0;1.0	0.33
Have children						
Yes	2.07	0.91;4.71	0.08	0.43	0.09;2.04	0.29
No	1			1		
Attempted to quit in the past 12 months						
Yes	<b>2.49</b>	<b>1.45;4.27</b>	<b>0.001</b>	<b>2.2</b>	<b>1.08;4.48</b>	<b>0.03</b>
No	1			1		
Age of smoking initiation	1	0.96;1.04	0.97	1.07	0.99;1.15	0.1
Number of cigarettes per day	0.99	0.95;1.02	0.44	1.02	0.96;1.08	0.56

Bold values represent statistically significant differences

## DISCUSSION

This is the first study to examine the impact of PHW on the intention to quit smoking specifically among women, and in particular among women in a tobacco producing country such as Brazil. PHW play an important role in the intention to quit smoking among women, and its impact was higher among less educated women as well as women who had at least one quit attempt in the past 12 months. These findings are particularly relevant as the tobacco industry increases their efforts to promote cigarette smoking among women by "...using seductive but false images of vitality, slimness, modernity, emancipation, sophistication, and sexual allure."<sup>7</sup> In a review of tobacco industry documents targeting Latin America and the Caribbean, Bialous & Shatenstein<sup>1</sup> (2002) unveiled their specific tactics in targeting women, taking into account culture and gender issues. It is critical to develop and implement effective measures not only to counteract the tobacco industry strategies but also to be proactive in tobacco control efforts, particularly among women and vulnerable populations. The PHW are a promising tobacco control strategy. Studies have shown that they are effective in improving knowledge about the health related hazards associated with tobacco use and exposure as well as reducing tobacco use itself.<sup>13</sup>

About 90.0% of participants noticed the PHW, which is higher than the results of a study conducted in the four largest Brazilian cities in the same year in which the data for the present study was collected.<sup>13</sup> However, it is difficult to compare these results since over 50.0% of the sample were males and the question referred to frequency (often/very often vs. never/once in a while) of seeing these warnings rather than the impact of seeing the warnings and the effect it has on a woman's intention to quit smoking. Their findings show that 45.5% indicated seeing the PHW often/very often and there were no significant gender differences.<sup>13</sup>

Among women smokers who noticed the PHW, 61.7% reported that seeing these messages made them think about quitting. These results are consistent with previous findings in Brazil and other countries.<sup>12</sup> Thrasher et al<sup>13</sup> (2010) compared the intention to quit among smokers exposed to health warning labels in cigarette smokers in Brazil, Uruguay, and Mexico. A larger percentage of Brazilians (72.6%) indicated that the health warnings made them think about quitting than Mexicans (57.7%), and Uruguayans. The authors speculated that these differences were due to depictions of human suffering and gruesome images used in the health warnings in Brazil as compared to the abstract images used in Uruguay and text-only messages used in Mexico. Thrasher et al<sup>12</sup> (2012) found that 23.0% indicated thinking about quitting as a result of exposure to these warnings in a follow-up study about the impact of the pictorial health warnings among smokers

in Mexico. The larger impact of PHW in Brazil may be multi-faceted as these warnings occurred in the context of the implementation of multiple tobacco control policies and strategies that have happened in Brazil for the past two decades, including strong implementation and enforcement of government regulations, and periodic replacement of the PHW to avoid habituation.

PHW had a significantly higher impact among less educated women and women who had attempted to quit smoking in the past 12 months. The only variable associated with "thinking a lot" about quitting was having at least one quit attempt in the past 12 months. Quitting smoking is a process that involves awareness of the problem, planning to change, action, and reinforcement of the obtained gain.<sup>4</sup> It is likely that the PHW serve as behavioral cues toward the behavior change of quitting. Longitudinal studies are needed to determine the role of PHW on quitting, relapse, and long-term abstinence.

Cigarette smoking is inversely associated with educational attainment.<sup>11</sup> Women with a college degree were less likely to be cigarette smokers than women with eight years of education or less.<sup>9</sup> Therefore, preventive and cessation efforts targeted at women with low educational attainment are needed. PHW have a higher impact among less educated women as compared to women with high educational attainment, suggesting that this may be an important tobacco control strategy. This finding confirms other studies showing that despite the knowledge that people with higher education may have about the hazards of smoking, the higher the education level, the lower the impact of PHW on the decision making process of quitting smoking.<sup>5,13</sup>

Although this study was conducted in one state of a large country, previous results show significant disparities in prevalence of cigarette smoking across towns and regions within the state.<sup>9</sup> The results of the present study also indicated differences in the impact of PHW across towns. PHW had a significantly higher impact on women smokers who lived in Curitiba (OR 2.53) and Cambé (OR 3.51) who were thinking about quitting as compared to women smokers living in Pato Branco. Curitiba is the state capital and the largest city in the state and Cambé is part of the metropolitan area of Londrina, the second largest city in the state, while Pato Branco is considered a medium-size town and it is located in a primarily agricultural area of the state. A large epidemiological study conducted in Brazil in 2008 indicated a higher prevalence of cigarette smoking among rural populations as compared to individuals living in urban areas.<sup>b</sup> These differences may be attributed to easier access to information and services and enforcement of policies in urban settings as compared to rural areas. Perhaps the impact of PHW occurred within a context of implementation and enforcement of other tobacco control policies as discussed above.

The results from this study have some limitations. The cross-sectional design does not allow the examination of causality. This is particularly relevant given the finding that previous attempts to quit were significantly associated with the intention to quit and its intensity after noticing the PHW. There is a need for longitudinal studies to assess the impact on PHW on intention to quit, cessation, and long-term abstinence taking into account the sociopolitical context where other variables may interact with such association (e.g., policies that restrict tobacco use). The obtained data was based on self-reporting, which may be subjected to bias.

Despite its limitations, the present study makes two important contributions to advancing tobacco control efforts among women. First, the findings confirm the results of previous studies on the positive impact

of PHW on the women's intention to quit smoking. However, previous studies have not focused on women, and our findings support that PHW may be an effective tobacco control among women smokers, a segment of the population that is being heavily targeted by the tobacco industry. Second, PHW seem to have a greater impact on less educated women as compared to women with higher educational attainment. Given the burden of tobacco disease as well as higher prevalence of cigarette smoking in less educated women, this represents a cost-effective strategy of using graphics and pictures rather than written messages to reach this underserved population. PHW as they are being implemented in Brazil (e.g., rotating pictures/graphics, gruesome images) may be a promising tobacco control strategy to counteract the tobacco industry's tactics targeting women in low- and middle-income countries.

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