

## Brief article

## Portuguese children's exposure to second-hand tobacco smoke in the family car

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## ABSTRACT

**Objectives:** To assess the prevalence of children's exposure to second-hand smoke in the family car; to compare exposure among children with smoking and non-smoking parents.**Methods:** In 2011, a self-administered questionnaire was applied to a 4th grade Portuguese children national sample (N = 3187, mean age 9.5 ± 0.7, 51.1% boys). Prevalence rates and chi-square tests were computed.**Results:** Of the participants, 52.0% reported having, at least, one smoking parent. Overall exposure in the car was 28.9% (95% CI 27.3–30.5). Children's exposure among those reporting smoking parents was 46.9% (95% CI 44.4–49.4); and 8.6% (95% CI 7.1–10.1) among those reporting non-smoking parents (p < .001). Therefore, children with smoking parents were 5.44 times more likely to be exposed.**Conclusions:** Children's exposure to second-hand smoke in the family car is frequent, especially if one or both parents smoke. This highlights the need for effective tobacco control measures to prevent this severe health hazard.

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## Exposición de los niños y niñas portugueses al humo ambiental de tabaco en el coche familiar

## RESUMEN

**Objetivos:** Describir la prevalencia de la exposición de niños y niñas al humo ambiental del tabaco en el coche familiar; comparar la exposición de niños y niñas con padres fumadores y no fumadores.**Métodos:** En 2011, se aplicó un cuestionario auto-administrado a una muestra de niños y niñas portugueses de 4º curso (N = 3187, edad promedio 9,5 ± 0,7, 51,1% varones). Se calcularon ratios de prevalencia y pruebas de chi-cuadrado.**Resultados:** El 52,0% informaron tener al menos un padre/madre fumador. En la muestra total, la exposición fue del 28,9% (CI95%: 27,3–30,5). Esta exposición fue del 46,9% (CI95%:44,4–49,4) entre los niños y niñas con padres fumadores y del 8,6% (CI95%:7,1–10,1) entre los con padres no fumadores (p < 0,001), por lo tanto, fue más de cinco veces mayor entre los niños y niñas con padres fumadores.**Conclusiones:** La exposición es alta, especialmente si uno o ambos padres fuman. Esto indica la necesidad de medidas de control efectivo del consumo de tabaco para prevenir este severo riesgo para la salud.

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## Palabras clave:

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## Introduction

Worldwide, more than 600 000 deaths per year are attributable to second-hand smoke (SHS) exposure. Of these, 28% occur among children.<sup>1</sup> The World Health Organization estimates that about half of the children world population is exposed to SHS.<sup>1,2</sup>

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**Table 1**  
Prevalence of children's exposure to second-hand tobacco smoke in the family car by parental smoking and region (Portugal, 2011).

Region and Portugal	Parental smoking	SHS in the family car							p	Exposure prevalence ratio <sup>a</sup> (95% CI)
		Yes (regular/occasional)				No				
		N	n	%	95% CI	n	%	95% CI		
Alentejo	Non-smoking parents	63	5	7.9	1.2-14.6	58	92.1	85.4-98.8	<.001	5.73 (2.39-13.75)
	One/both smoking parents	77	35	45.5	34.4-56.6	42	54.5	43.4-65.6		
Algarve	Non-smoking parents	94	7	7.4	2.1-12.7	87	92.6	87.3-97.9	<.001	6.28 (2.98-13.23)
	One/both smoking parents	92	43	46.7	36.5-56.9	49	53.3	43.1-63.5		
Azores	Non-smoking parents	59	15	25.4	14.3-36.5	44	74.6	63.5-85.7	<.001	2.32 (1.44-3.73)
	One/both smoking parents	78	46	59.0	48.1-69.9	32	41.0	30.1-51.9		
Centre	Non-smoking parents	69	5	7.2	1.1-13.3	64	92.8	86.7-98.9	<.001	5.26 (2.14-12.94)
	One/both smoking parents	63	24	38.1	26.1-50.1	39	61.9	49.9-73.9		
Lisbon	Non-smoking parents	337	32	9.5	6.4-12.6	305	90.5	87.4-93.6	<.001	5.39 (3.83-7.57)
	One/both smoking parents	518	265	51.2	46.9-55.5	253	48.8	44.5-53.1		
Madeira	Non-smoking parents	100	5	5.0	0.7-9.3	95	95.0	90.7-99.3	<.001	7.12 (2.93-17.30)
	One/both smoking parents	118	42	35.6	27.0-44.2	76	64.4	55.8-73.0		
North	Non-smoking parents	670	51	7.6	5.6-9.6	619	92.4	90.4-94.4	<.001	5.93 (4.49-7.82)
	One/both smoking parents	623	281	45.1	41.2-49.0	342	54.9	51.0-58.8		
Portugal <sup>b</sup>	Non-smoking parents	1392	120	8.6	7.1-10.1	1272	91.4	89.9-92.9	<.001	5.44 (4.55-6.51)
	One/both smoking parents	1569	736	46.9	44.4-49.4	833	53.1	50.6-55.6		
Total		2961	856	28.9	27.3-30.5	2105	71.1	69.5-72.7	-	-

<sup>a</sup> Exposure prevalence ratio calculated for each region and for Portugal by taking the result of participants with non smoking parents as reference.

<sup>b</sup> Portugal corresponds to the total sample, including the 7 main Portuguese Regions: Alentejo, Algarve, Azores, Centre, Lisbon, Madeira and North.

n: number of exposed or non-exposed; N: sample; SHS: second-hand smoke.

SHS is a complex mixture of gases and micro-particles containing nicotine and many other toxic and irritants and several carcinogens.<sup>3-5</sup> SHS is considered the most preventable indoors pollutant. No level of SHS exposure can be considered safe.<sup>2,4,5</sup>

When compared with adults, children have a higher breathing frequency, their liver metabolism and other clearing mechanisms are not yet fully developed, and inhale more air per body weight, resulting in higher exposures. This explains why children are more vulnerable to SHS exposure.<sup>6</sup>

Children's exposure to SHS is associated with poor lung function and several other respiratory health hazards such as asthma, bronchitis and pneumonia, coughing, wheezing and dyspnoea. SHS is also associated with a greater risk for sudden infant death syndrome, middle ear infections and meningitis.<sup>4-6</sup> Children belonging to families with lower socio-economic status are among those most exposed to SHS. In addition, at least one study has reported an association between SHS exposure and smoking uptake.<sup>7,8</sup>

SHS exposure in the car is particularly dangerous due to higher pollutants' concentration in this confined space.<sup>9</sup> Moreover, car interiors are made with materials that retain tobacco smoke pollutants which are dangerous for human health and remain in vehicles' surfaces long time after people finish smoking.<sup>10,11</sup>

Children's exposure to SHS is mainly caused by parental smoking, or by other household smoking. Smoking parents are more permissive to indoors smoking.<sup>12</sup> The current study aimed to determine the prevalence of children's exposure to SHS in the family car and to compare exposure among children with smoking and non-smoking parents

## Methods

This was a questionnaire-based cross-sectional study. In February-May 2011, 3187 questionnaires were administrated in

the classroom to 4<sup>th</sup> grade Portuguese children (mean age 9.5± 0.7 years, 51.1% boys).

The sampling strategy combined convenience and random methods.<sup>13</sup> Nine municipalities (Angra do Heroísmo, Braga, Covilhã, Évora, Faro, Funchal, Lisboa, Porto, Viana do Castelo) representing the seven main regions of Portugal (Alentejo, Algarve, Azores, Centre, Lisbon, Madeira and North) were convenience samples. Considering the amount of 4<sup>th</sup> grade students from these municipalities as the total population, and estimating that each class has 20 students, a proportional number of classes per municipality was randomly chosen to participate in the study. Response rate was 77.5%; range: 69.2% (Funchal) to 91.9% (Angra do Heroísmo).

The questionnaire was based on survey tools used in previous studies.<sup>13,14</sup> Core questions assessed: 1) parental/other relative smoking [Does your father/mother/brother(s)/other(s) family member(s) smoke? Answer: no, sometimes, yes]; 2- children's SHS exposure in the family car [Does your father/mother/brother(s)/other(s) smoke in the family car? Answer: always, sometimes and never]. The questionnaire was piloted among a small group of 4<sup>th</sup> grade children and reviewed according to their feedback.

The survey was approved by the Portuguese Ministry of Education. Schools' principals received guidelines regarding parents'/carers' informed consent and the questionnaire application. Trained teachers and research fellows administrated the questionnaires in the classroom following a standardized procedure.

Prevalence rates were computed and chi-square tests were performed using the statistical software *IBM SPSS Statistics* version 22.

## Results

Of the participants, 52.0% reported at least one smoking parent. Overall exposure in the car was 28.9%. Children's exposure was 46.9% among those reporting smoking parents and 8.6% among

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