

# Second Hand Tobacco Smoke among Primary School Children in Alexandria

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## Abstract:

**Importance:** SHS causing damage to individual health. Children are the most vulnerable group exposed to SHS. **Objective:** The study aimed to estimate the prevalence of second hand tobacco smoke among governmental primary school children aged 10-12 years in Alexandria.

**Design:** Using a cross sectional study. A predesigned structured interviewing questionnaire was used to collect data from the children to calculate the prevalence of SHS.

**Setting:** Governmental primary school children in Alexandria, Egypt.

**Participant:** Children of grade six student in the governmental primary school children were included in the study.

**Results:** The prevalence of SHS among primary school children was 62.3%. The proportion of smoking did not differ significantly among participants with different degrees of parents' education and occupation. Although the odds of smoking increased with decreased level of parents' education and occupation.

**Conclusion and Relevance:** It was found that the majority of the children were exposed to SHS.

**Key words:** Second hand tobacco smoke, children, prevalence

## Introduction:

Second hand tobacco smoke (SHS) causes more than 1.2 million premature deaths yearly. SHS has more negative damaging effects on children because they have smaller bronchial trees and less developed immune systems (American Academy of Pediatrics, 2017). Almost half of children usually breath air polluted by tobacco smoke, and around 65 000 children die each year from illnesses attributable to SHS (World Health Organization [WHO], 2019). Second hand tobacco smoke is a combination of exhaled main stream and side stream smoke released from a cigarette or any other smoking device (cigar, pipe, bidi, etc.) and diluted with the surrounding air. SHS is also referred to as environmental tobacco smoke or involuntary smoking. It involves inhaling carcinogens and other toxic components. SHS is considered a serious public health hazard because tobacco contains about 7 000 chemicals. Many of these chemicals are dangerous; and more than 60 of them are known to be the main cause of cancer (World Health Organization [WHO], 2019). Second hand tobacco smoke is associated with upper and lower respiratory tract infection of children. The years of life lost due to disability or early death in children due to their exposure to SHS in 2016 were 6.4 million lost years for lower respiratory infections, 2.5 million for chronic obstructive pulmonary disease, and about 200 000 for middle ear infection which is considered a common complication of upper respiratory tract infection (Drope, & Schluger, 2018). Second hand tobacco smoke damage the protective effect of human saliva by decreasing the salivary flow rate, lowering the salivary pH and buffering capacity, decreasing the level of salivary immunoglobulins, and increase the proliferation of bacteria, which results in subsequently an increased risk of oral diseases (Rezaei & Sariri, 2011). Despite the global efforts for tobacco control, almost one billion people worldwide are smokers and are exposing non-smokers, especially children, to SHS with its harmful effects on their oral health (Azadbakht et al., 2016). Good planning and adequate resources are essential for successful implementation and enforcement of smoke free legislation, because all people need to be protected from SHS exposure, so all indoor places should be smoke free (World Health Organization [WHO], 2019). The aim of this study was to study second hand tobacco smoke among governmental primary school children in Alexandria.

## Subjects and Methods:

Approval of the Ethics Committee of the High Institute of Public Health for conducting the research was taken. The study was conducted in chosen governmental primary schools in Alexandria in October 2019, using a cross sectional study. The target population was primary school children aged 10-12 years. The sample size was calculated using Epi Info 7 software. Based on a prevalence of second hand tobacco smoke among primary school children of 40 % (Precioso et al., 2019) and confidence limit of 5%, the minimum required sample size at 95% confidence level was calculated to be 369 and was rounded to 400. The actual sample included in the study amounted for 435.

A multistage stratified random sampling technique was used:

- In the first stage, three administrations were randomly selected from the eight educational administrations of Alexandria. They were Middle, Gomrok, and Ajamy directorates.
- The second stage included random selection of one school from the list of schools for each of the 3 selected administrations. They were Al Sory, Abi Eldardaa, and Al Bitash schools for both girls and boys.
- The third stage included selection of all grade 6 students in the selected schools.
- The fourth stage included the selection of all children exposed to SHS.

Data was gathered through a predesigned interviewing questionnaire that was carefully developed and structured by the researcher. It was used to collect data from children about the following:

- Sociodemographic data such as age, gender, parents' level of education, occupation, address, and telephone number.
- Parents' smoking history.

The collected data were revised, coded and analyzed using SPSS version 20 software for tabulation and analysis (Kirkpatrick & Feeney, 2013). Significance of the obtained results was judged at 5% level. The given graphs were constructed using Microsoft Excel software. Categorical variables were summarized by frequency and percent. Chi-square test was used to study significant association between two categorical variables. Monte-Carlo significance were adopted if more than 20% of total expected cell counts <5 at .05 level of significance.

### Results:

The total number of children included in the study was 435 children. Table (1) shows the distribution of children by their sociodemographic characteristics. It appears from the table that the age of the children ranged between 10 and 12 years with a mean of  $11.8 \pm 0.036$  years. More than half of the children (60%) were aged 10 to less than 11 years, children aged 11-12 constituted 40% of the sample. Regarding gender, males constituted more than half (54.9%) of the sample. Concerning fathers' education, it appears from the same table that 30.4% of fathers were illiterate or just read and write. Fathers with primary school education constituted 11.3%. Those with preparatory school education were 21.1%, and those with secondary school education were 27.1%. Fathers who received university education constituted 10.1%. As regards mothers' education, 32.9% of the mothers were illiterate or just read and write. Those with primary school education were 11%. Mothers having preparatory and secondary school education constituted 20.7% and 29.6% respectively. Those who received university education constituted 5.7%. Regarding fathers' occupation, more than two thirds of fathers (67.4%) were skilled workers, 20.7% were unskilled workers, 8% were professionals, and only 3.9% were technical workers. Concerning mothers' occupation, the majority of the mothers (89.7%) were housewives, 9.2% were unskilled workers, and only 1.1% were professionals.

**Table (1): Sociodemographic characteristics of the selected governmental primary school children, Alexandria, 2019**

Sociodemographic characteristics	No. (n= 435)	%
<b>Age (years)</b>		
10-	261	60.0
11-12	174	40.0
Mean $\pm$ SD: $11.8 \pm 0.036$		
<b>Gender</b>		
Male	239	54.9
Female	196	45.1
<b>Fathers' education</b>		
Illiterate/Read and write	132	30.4
Primary	49	11.3
Preparatory	92	21.1
Secondary	118	27.1
University	44	10.1
<b>Mothers' education</b>		
Illiterate/Read and write	143	32.9
Primary	48	11.0
Preparatory	90	20.7
Secondary	129	29.7
University	25	5.7
<b>Fathers' occupation</b>		
Skilled worker	293	67.4
Unskilled worker	90	20.7
Professional	35	8.0
Technical worker	17	3.9
<b>Mothers' occupation</b>		
Housewife	390	89.7
Unskilled worker	40	9.2
Professional	5	1.1

The prevalence of exposure to SHS was 62.3% in the total sample (figure 1).

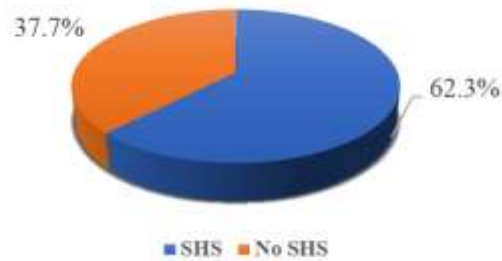


Figure (1):Prevalence of school children,

SHS among the selected governmental primary Alexandria, 2019

Table (3) shows that the proportion of smoking didn't differ significantly among participants with different levels of father's education ( $p = 0.25$ ). Although the odds of smoking increased by 80% among participants with illiterate or read and write fathers compared to those with university education (OR 1.8, 95% CI: 0.52-2.07), by 30% among those had fathers with primary school education (OR 1.30, 95% CI: 0.80-4.49), 50% among children who had fathers with preparatory school education (OR 1.50, 95% CI: 0.91-4.08) and 60% among children had fathers graduated from secondary school (OR 1.60, 95% CI: 0.63-2.58). However, this difference is not statistically significant. Also, the risk of exposure to SHS smoking increased by 60% among children who had illiterate or read and write mothers compared to mothers graduated from university (OR 1.60, 95% CI: 0.04-5.77), 50% among children who had mothers graduated from primary, preparatory, secondary schools (OR 1.50, 95% CI: 0.08-10.80, OR 1.50, 95% CI: 0.13-16.82 and OR 1.50, 95% CI 0.08-9.88 respectively). This difference is not statistically significant ( $p = 0.21$ ). The proportion of children exposed to SHS is not significantly different among different categories of fathers' occupation whether professional, technical, skilled, or unskilled worker ( $p = 0.61$ ). Although smoking risk increased by 50% among skilled and unskilled workers compared to professional, (OR 1.50, 95% CI: 0.61-2.56 and OR 1.50, 95% CI: 0.47-2.33 respectively). Mother's occupation is not a determinant factor for exposure to SHS, and insignificant association existed between different categories of mother's occupation and smoking risk ( $p = 0.17$ ).

Table (2):Relation between parents' education and occupation and exposure of the selected governmental primary school children to SHS, Alexandria, 2019.

Parents education and occupation	SHS				□ □	P value	OR (95% CI)
	Yes (n=271)		No (n=164)				
	No.	%	No.	%			
<b>Fathers' education</b>							
Illiterate/ Read and write (n=132)	87	32.1	45	27.4	5.315	0.25	1.80(0.50-1.90)
Primary (n= 49)	29	10.7	20	12.3			1.30(0.80-4.49)
Preparatory (n= 92)	57	21.0	35	21.3			1.50(0.61-2.08)
Secondary(n=118)	75	27.7	43	26.2			1.60(0.63-2.58)
University(n=44)	23	8.5	21	12.8			Ref
<b>Mothers' education</b>							
Illiterate/Read and write(n=143)	91	33.6	52	31.7	5.756	0.21	1.60(0.5-2.72)
Primary(n=48)	30	11.1	18	10.9			1.50(0.6-4.80)
Preparatory(n=90)	56	20.7	34	20.7			1.50(0.75-4.50)
Secondary(n=129)	81	29.9	48	29.4			1.50(0.7-4.38)
University(n=25)	13	4.7	12	7.3			Ref
<b>Fathers' occupation</b>							
Professional(n=35)	19	7.0	16	9.8	1.806	0.61	Ref
Technical worker(n=17)	9	3.3	8	4.9			0.9(0.29-3.10)
Skilled worker(n=293)	186	68.6	107	65.2			1.50(0.61-2.56)
Unskilled worker(n=90)	57	21.1	33	20.1			1.50(0.65-2.33)
<b>Mothers' occupation</b>							
Professional(n=5)	3	1.1	2	1.2	3.585	0.17	Ref
Unskilled worker(n=40)	26	9.6	14	8.5			1.20(0.61-5.71)
Housewife(n=390)	242	89.3	148	90.3			1.10(0.81-6.00)

$\chi^2$ : Chi square test

OR: Odds ratio

CI: Confidence interval

Ref: Reference category

### Discussion:

In Egypt, the prevalence of smoking among adults is 30 %. About 0.6% of females and 38.1 % of males are smokers About 96% of men and 0.8% of women who smoke, do this daily (Fouda et al., 2018). SHS is a major concern affecting community health especially children who have no control over their indoor environment (Booalayan et al., 2020). In the current study, nearly two thirds of the primary school children were exposed to SHS at their homes (62.3%). This result is approximately consistent with the result concluded by a study done in 2016, which revealed that 64.1% of all Egyptian children younger than 15 years were exposed to SHS (Mbulo et al., 2016). The prevalence of SHS in the present study is more than that of other studies done in Iran, Turkey and Kuwait. Where the prevalence of SHS at home among students aged 6 - 18 years, living in 30 provinces in Iran (2016) was 47.5% (Kelishadi et al., 2016). In Turkey (2020), a meta-analysis was performed about the in-house SHS prevalence. The meta analysis showed that the SHS exposure for children younger than 15 was 55.9% (Kılınc et al., 2020). In a cross-sectional study done in Kuwait (2020), the prevalence of SHS exposure among children at their homes was 54% (Booalayan et al., 2020). A study conducted (2019) among Australian households that had children aged  $\leq 14$  years, reported that daily exposure to second hand smoke in their home was only 2.4%. The prevalence in Australia was very low in comparison to the current result. However, living in a smoke free household is still not universal in Australia. Parental smoking, low socioeconomic status and lower level of education attained by parents are consistently identified to be associated with children's SHS exposure in their homes (Greenhalgh et al., 2021). The high prevalence of SHS among the study sample is that all children included in the current study were from governmental school in Alexandria, so they almost belong to the same socioeconomic class. It was found that smoking is highly concentrated in the social networks of lower education (Hitchman et al., 2014). Another cause of the high prevalence of SHS among primary school children be attributed to the fact that Egypt is one of developing countries which exhibits an increase in smoking among its population in all socioeconomic levels (Fouda et al., 2018), as well as the lack of public health interventions and the inadequate efforts to control tobacco smoking. Also, the absence of implementation of smoke-free policies may explain this high prevalence of SHS (Fouda et al., 2018). In the current study, exposure to SHS was more likely to be associated with fathers and mothers' education and as well as fathers' occupation, even there was no significant relationship. Children exposed to SHS were more likely to have illiterate or read and write parents or parents graduated from primary, preparatory or secondary schools. Children exposed to SHS were more likely to have skilled or unskilled worker fathers. A study conducted in China, 2018, found that individuals with higher education were less likely to smoke especially at their homes which is in agreement with the current study results. In contrast, it was found that professionals were more likely to smoke, although there was no significant relation. The association between lower educational level and higher degree of smoking may be due to lower level of health awareness. This finding could be explained by the fact that professionals are more likely to smoke than unemployed persons, because in china cigarettes are considered as a gift to build relationships and facilitate business (Wang et al., 2018). The opposite occurs in Egypt, as cigarettes are considered as a gift between workers. Results of a survey carried out in Japan, 2019, agreed with results of the present study. It was found that higher prevalence smoking in those who graduated from junior or high school compared to university graduates. Also, it was found that there was a higher prevalence of smoking in manual workers compared with professionals. The explanation of this variation is that people with lower level of education or occupation may suffer from more stress in their life, and this stress is relieved with smoking nicotine (Tomioka et al., 2020).

### Conclusions:

The majority of governmental primary school children in Alexandria are exposed to SHS and there is a negative association to some extent between SHS and parents' education and occupation.

### Recommendations:

- Raising awareness of public regarding SHS and its hazardous effects especially among children through mass media and all health facilities.
- Smoking and SHS hazards should be included in the students' curricula to raise the students' awareness through all education levels.
- Further studies are needed to Estimate the prevalence of SHS in Egypt among all age groups.

### References

1. Booalayan, H., Abdualrasool, M., Al-Shanfari, S., Boujarwa, A., Al-Mukaimi, A., Alkandery, O., & Akhtar, S. (2020). Exposure to environmental tobacco smoke and prevalence of asthma among adolescents in a middle eastern country. *BMC Public Health*, 20(1), 1210-1210. <https://doi.org/10.1186/s12889-020-09245-9>.
2. Drope, J., & Schluger, N. W. (Eds.) (2018). *The tobacco atlas* (6th edition). The American Cancer Society.
3. Fouda, S., Kelany, M., Moustafa, N., Abushouk, A. I., Hassane, A., Sleem, A., Mokhtar, O., Negida, A., & Bassiony, M. (2018). Tobacco smoking in Egypt: a scoping literature review of its epidemiology and control measures. *Eastern Mediterranean Health Journal = La Revue de Sante de la Mediterranee Orientale = Al-Majallah Al-Sihhiyah Li-Sharq al-Mutawassit*, 24(2), 198-215.
4. Greenhalgh, E., Campbell, M., Ford, C., & Winstanley, M. (2021). Prevalence of exposure to secondhand smoke in the home. In E. Greenhalgh, M. Scollo & M. Winstanley (Eds.), *Tobacco in Australia: Facts and issues* (p.p. Chapter 15). Cancer Council Victoria.

5. Hitchman, S. C., Fong, G. T., Zanna, M. P., Thrasher, J. F., Chung-Hall, J., & Siahpush, M. (2014). Socioeconomic status and smokers' number of smoking friends: findings from the International Tobacco Control (ITC) Four Country Survey. *Drug and Alcohol Dependence*, *143*, 158-166. <https://doi.org/10.1016/j.drugalcdep.2014.07.019>.
6. Kelishadi, R., Shahsanai, A., Qorbani, M., Ardalan, G., Poursafa, P., Heshmat, R., & Motlagh, M. E. (2016). Exposure to hookah and cigarette smoke in children and adolescents according to their socio-economic status: The CASPIAN-IV study. *Iranian Journal of Pediatrics*, *26*(4), e3036. <https://doi.org/10.5812/ijp.3036>.
7. Kılınç, A., Çam, C., Önsüz, M. F., & Metintaş, S. (2020). Prevalence of second-hand smoke exposure in houses in Turkey: A meta-analysis study. *European Journal of Public Health*, *30*(Supplement\_5). <https://doi.org/10.1093/eurpub/ckaa166.142>.
8. Rezaei, A., & Sariri, R. (2011). Periodontal status, salivary enzymes and flow rate in passive smokers. *Pharmacologyonline*, *3*, 462-476.
9. Mbulo, L., Palipudi, K. M., Andes, L., Morton, J., Bashir, R., Fouad, H., Ramanandraibe, N., Caixeta, R., Dias, R. C., Wijnhoven, T. M., Kashiwabara, M., Sinha, D. N., & Tursan d'Espaignet, E. (2016). Secondhand smoke exposure at home among one billion children in 21 countries: Findings from the Global Adult Tobacco Survey (GATS). *Tobacco Control*, *25*(e2), e95-e100. <https://doi.org/10.1136/tobaccocontrol-2015-052693>.
10. Precioso, J., Frias, S., Silva, C. N., Rocha, V., Cunha-Machado, J., Gonçalves, F., & Sousa, I. (2019). Prevalence of children exposed to secondhand smoke at home and in the car in Azores (Portugal). *Pulmonology*, *25*(5), 283-288. <https://doi.org/10.1016/j.pulmoe.2019.02.006>.
11. Tomioka, K., Kurumatani, N., & Saeki, K. (2020). The association between education and smoking prevalence, independent of occupation: A nationally representative survey in Japan. *Journal of Epidemiology*, *30*(3), 136-142. <https://doi.org/10.2188/jea.JE20180195>.
12. Wang, Q., Shen, J. J., Sotero, M., Li, C. A., & Hou, Z. (2018). Income, occupation and education: Are they related to smoking behaviors in China. *PloS One*, *13*(2), e0192571-e0192571. <https://doi.org/10.1371/journal.pone.0192571>.
13. World Health Organization [WHO]. (2019). *Tobacco free initiative: Second-hand smoke impacts health*. WHO. <http://www.emro.who.int/tfi/quit-now/secondhand-smoke-impacts-health.html>