Exposure to environmental tobacco smoke (ETS), also referred to as secondhand smoke or passive smoking, increases the risk of lung cancer. In adults, exposure to ETS increases the risk of ischemic heart disease, asthma, and reduced lung function. In children and fetuses, it is causally associated with negative respiratory and developmental effects including low birth weight, Sudden Infant Death Syndrome (SIDS), lower respiratory tract infections, middle ear infections, upper airway sensitization, asthma, and lifelong cardiovascular effects. Childhood exposure to ETS is also associated with Type 2 diabetes and obesity.

There is evidence that exposure to ETS increases the risk of breast cancer, nasal sinus cavity cancer, and nasopharyngeal cancer in adults, and of leukemia, lymphoma, and brain tumors in children.

In Israel, smoking is banned in most closed public places including hospitals, schools and areas adjacent to them, trains and buses, restaurants, pubs, places of worship, and government buildings, as well as in some open public spaces such as playgrounds, zoos, swimming pools, railway station platforms, sports stadiums, and 75% of outdoor areas in pubs, restaurants, and wedding halls. Smoking is still permitted in designated areas in pubs, restaurants, and wedding halls, and there are special smoking rooms in the Knesset. The prohibitions on smoking in public places also apply to new tobacco products, such as electronic cigarettes and heat-not-burn tobacco products.

Despite extensive legislation to prevent exposure of the non-smoking population to ETS, surveys and studies show that over 50% of the Israeli population (including non-smokers and children) is exposed to ETS.
**Progress since 2017**

The *Environmental Health in Israel 2017* report defined challenges related to Environmental Tobacco Smoke. Progress in meeting them during the past three years is outlined below.

### The challenge: Validate analytical techniques to measure cotinine levels in blood, urine and saliva samples

**In short:** The Ministry of Health's public health laboratory has validated and implemented a method for measuring cotinine levels in urine.

**Challenge for the coming years:** Continue to use the method.

In 2018–2019, staff at the Ministry of Health’s public health laboratory implemented an analytical method for measuring urinary cotinine levels. The method was validated in an international quality assessment program and is being used in biomonitoring studies in Israel.

### The challenge: Measure urinary cotinine levels in children

**In short:** Significant progress was achieved in measuring urinary cotinine levels in children.

**Challenge for the coming years:** Continue biomonitoring cotinine as part of the National Biomonitoring Program.

In the National Health and Nutrition Survey (Rav-MABAT) in 2015–2016, urine samples were collected from 103 Jewish and Arab children aged 6–11, and urinary cotinine levels were measured to detect ETS exposure in the twenty-four hours prior to the sampling.\(^4\) Cotinine was detected in 59% of the children's urine samples, indicating exposure to ETS. This contrasts with parents' self-report, according to which fewer than 40% of the children were exposed to ETS. Among the children sampled, cotinine levels among those exposed to ETS at home exceeded cotinine levels of the others. Cotinine levels were higher in children of low socioeconomic status in both the Jewish and Arab populations.

In an international comparison of average cotinine levels, the findings among Israeli children exceeded those among children in Canada, Germany, England and Cyprus (Figure 1).\(^5\)

Recently published data from the Rav-MABAT survey (2015–2016) among over 1,500 children indicated that, according to parental reporting, 8.2% of children aged 2–11 were exposed to secondhand smoke to a large or very large extent (Jews: 3.9%, Arabs: 22.1%), while 22.3% were exposed to secondhand smoke to a small extent (Jews: 20.2%, Arabs: 29.4%) and 69.4% were not exposed at all (Jews: 76.0%, Arabs: 48.5%).\(^6\) It is possible the urinary measures of cotinine did not reflect differences in ETS exposure between Jewish and Arab children due to the small sample size of the study.

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**Legend:**
- Significant progress
- Some progress
- Little or no progress
In the same survey, cotinine levels were measured in urine samples of 200 adults. Focusing on a sub-population of 133 non-smokers, urinary cotinine was detected in about 60% of the samples, indicating exposure to ETS. Both the scope and the level of exposure to ETS in non-smokers were unchanged relative to the findings of a similar study in Israel in 2011. Average cotinine levels in non-smoking adults were higher among the Arab population than among the Jewish population. Furthermore, the percentage of non-smoking Arabs who reported being exposed to ETS at home was higher than the percentage of non-smoking Jews who reported such exposure.

**Geometric Mean of Urinary Cotinine Levels in Children in Israel and in Selected Countries**

![Graph showing geometric mean of urinary cotinine levels in children in Israel and selected countries](image)

*Concentrations below the detection threshold were found in over 40% of the children; therefore, a geometric mean was not calculated.*

**The challenge: Measure urinary cotinine levels in pregnant women**

**In short:** A study conducted at the Hadassah Medical Center measured cotinine levels in pregnant women and in newborns.

**Challenge for the coming years:** Continue biomonitoring cotinine levels in pregnant women and in newborns from different population groups in Israel.

In a study conducted at the Hebrew University-Hadassah Braun School of Public Health and Community Medicine in collaboration with Ministry of Health (MoH) researchers, cotinine levels were measured in urine samples collected from 265 pregnant non-smoking women and ninety-seven newborns. Cotinine was detected in the urine of about 40% of the women and 29% of the newborns. No association was found between the women’s cotinine levels and those of the newborns. (Notably, the urine samples were collected from the women during their pregnancy and from the newborns—soon after their birth.) Higher cotinine levels were found among women whose husbands smoked. The researchers found an inverse correlation between cotinine levels in newborns and their birth weight and head circumference. That is, newborns who had been exposed to ETS during their mother’s pregnancy were born with smaller head circumference and lower body weight than those of newborns not exposed to ETS.
A 2016 amendment to the Prevention of Smoking in Public Places and Exposure to Smoking Law completely banned smoking in schools, schoolyards, and anywhere within ten meters of a school entrance. In April 2018, the Director General of the Ministry of Education issued a circular regarding the implementation of the law and the enforcement policy concerning pupils and staff in the education system. The Ministry began to monitor enforcement in 360 elementary schools and anti-smoking curricular materials were updated and developed for different age groups—primary, junior-high, and senior-high.

An MoH study that examined asthma hospitalization rates in children (aged 0–14) between 1996–2015, analyzed by regions, found a significant downward trend in rates over the years. A joint study by MoH and Clalit Health Services is examining trends in asthma incidence and prevalence among children aged 2–18 between 1998–2015.

In 2018, new regulations expanded the ban on smoking in public places to open areas where over fifty people gather and to playgrounds, zoos, and parking garages. The injunction against smoking in public places was also extended to electronic cigarettes. Despite the expansion of anti-smoking regulations and various initiatives by local governments and the Israel Defense Forces (IDF), enforcement at the municipal level is insufficient and encounters a range of obstacles.

In 2018, municipal inspectors issued over 6,000 fines for violating the Prevention of Smoking in Public Places and Exposure to Smoking Law, mostly for smoking in restaurants and in hospitals (Figure 2). In many cities (Eilat, Haifa, Tur’an, Kefar Sava, Mevaseret Zion, Ma’ale Adumim, Nes Ziona, Acre, Afula, and Ramle), municipal inspectors were trained to enforce the law but few of those trained actually engage in enforcement.
As of 2019, seven municipalities (Herzliya, Kiryat Gat, Ashdod, Eilat, Ramle, Kefar Sava, and Ma’ale Adumim) joined the “Smoke-Free City” initiative, in which cities establish and enforce clear policies to ensure a smoke-free environment. Initiatives to bolster enforcement include Project Mahush (Promoting Innovation and Partnership), a collaborative effort involving municipal government, central government, and the public. The project aims to analyze patterns of ETS exposure, identify obstacles to enforcement and weaknesses in legislation, and jointly work to reduce ETS exposure.

In 2017, the IDF launched an intervention program aimed at reducing smoking and ETS exposure in the army. The program includes revisions of army policies and regulations, efforts to raise awareness of the harmful effects of smoking and to help soldiers quit smoking, and a gradual ban on selling smoking products on IDF bases. It was first applied on open bases and is gradually being expanded to other bases countrywide.

**Research on Exposure to Environmental Tobacco Smoke in Israel**

- Researchers from Tel Aviv University examined parents’ views regarding the exposure of their children to ETS. They found that the parents’ awareness of their children’s exposure to ETS was based on sensory perception in the context of the physical environment (whether smoke can be smelled or inhaled). The same group of researchers examined an intervention program aimed at reducing the exposure of children to ETS; the program includes measurement of nicotine in children’s hair.
• Tel Aviv University researchers asked what Israelis (smokers and non-smokers) know about cigarettes and found widespread ignorance of the harmful health effects of exposure to ETS. For example, 20% of the participants in the study did not know that ETS can cause lung cancer.\textsuperscript{14}

• Researchers from MoH and the Israel Center for Disease Control analyzed cotinine levels in urine samples collected from 103 children and 200 adults (unmatched) who participated in the Rav-MABAT survey in 2015–2016. Cotinine was found in the urine samples of 59% of the children and about 60% of the non-smoking adults.\textsuperscript{4, 7}

• In a joint study by researchers from the Hebrew University-Hadassah Braun School of Public Health and Community Medicine and MoH, cotinine levels were analyzed in urine samples of 265 pregnant non-smoking women and ninety-seven newborns. Cotinine was detected in the urine of about 40% of the women and 29% of the newborns.\textsuperscript{8}

• Researchers from the University of Haifa found a correlation between ETS exposure and an increased risk of breast cancer in Arab women.\textsuperscript{15}

• Researchers from the Weizmann Institute of Science, in collaboration with colleagues in the U.S. and Japan, studied cellular defense mechanisms in mice exposed to cigarette smoke. They showed that certain molecules enable cells that were exposed to cigarette smoke to avoid cell death by triggering autophagy (orderly degradation of non-vital cellular components).\textsuperscript{16}

• Researchers from Tel Aviv University and Mount Sinai Hospital in New York showed that ETS exposure affects atherosclerosis morbidity and is causally associated with coronary heart disease.\textsuperscript{17}

**Future Challenges**

Several countries have adopted new policies that further restrict smoking in order to reduce exposure of non-smokers to ETS:

• Smoking has been banned in cars when children are present (New Zealand in 2020, Puerto Rico and several U.S. states: Arkansas, Louisiana, California, Utah, Oregon, and Vermont).

• In the U.S., smoking was banned in multi-unit public housing in 2018 and, in various counties in California, in shared areas of multi-unit buildings (in 2006 and onwards).

• In Ireland, Scotland, England, and several states in the U.S. (New York, Michigan, and Minnesota), smoking was completely banned in restaurants and pubs (2004–2009).

Israel should consider adopting similar new restrictions and re-examining exceptions in existing restrictions on smoking in public places.
New MoH legislation from December 2018 limits the advertisement of tobacco products, requires uniform packs without advertisements, and expands the ban on smoking in public places. The legislation also subjects electronic cigarettes to all restrictions and requirements that apply to tobacco products and restricts nicotine content in electronic cigarette liquids. It is important to study the longitudinal impact of the new legislation on smoking, vaping, and ETS exposure among the non-smoking public. It is also important to update the 2011 National Tobacco Control Plan to include ETS from regular cigarettes, electronic cigarettes, and heat-not-burn tobacco products. As vaping becomes increasingly popular among youth in Israel (26% of whom smoked electronic cigarettes as of 2019), it is important to enforce the restriction on nicotine content in electronic cigarette liquids to prevent early nicotine addiction.

To strengthen enforcement of the smoking ban in public places, MoH should create a dedicated unit and develop innovative tools for reporting on smoking in public places. It is critically important to increase municipal involvement in controlling smoking in public places.

In addition to bolstering enforcement and raising the general population’s awareness of the hazards of smoking and ETS exposure, the focus should be on high-risk populations—including the Arab population, low socioeconomic status groups, pregnant women, and people with mental illness living in hostels in the community.

References


