

Summary of Michigan Cotinine Study Results*

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The purpose of the study was to determine differences in exposure to secondhand smoke and reported respiratory and general health among bar employees in the state of Michigan before and after Michigan’s smoke-free air law went into effect on May 1, 2010.

Forty bar employees from the following Michigan counties participated in the study: Benzie-Leelanau, Berrien, Delta-Menominee, Genesee, Ingham, Marquette, Muskegon, Emmet, Ottawa, St. Clair, and Wayne. Each participant completed the pre- and post-law urine specimen collection for cotinine (nicotine metabolite), creatinine, and 4-(Methylnitrosamino)-1-(3-pyridyl)-1-butanol (NNAL) analysis. Each of these chemical compounds are biomarkers for measuring level of exposure to secondhand smoke. Each participant also completed a respiratory and general health questionnaire. The same participants completed a urine collection and the questionnaire approximately four to six weeks before and approximately six to ten weeks after the smoke-free law went into effect.

The results demonstrated a significant decrease in mean cotinine levels among participants working in the same bars before ($M = 35.92$) and after ($M = 0$) the smoke-free law went into effect ($t = 13.043$, $df = 39$, $p < .001$). There was not a significant difference in mean creatinine levels among participants before and after the law went into effect. However, assessment of creatinine levels alone is not as reliable nor as direct a measure of secondhand smoke exposure as cotinine levels, and many other extraneous biological and lifestyle factors can impact creatinine levels, for instance, kidney functioning, and frequency and level of physical activity, especially weight training, or if an individual consumes creatinine supplements. There was also a significant decrease in mean NNAL levels among participants working the same bar before ($M = .086$) and after ($M = .034$) the smoke-free law went into effect ($t = 4.477$, $df = 35$, $p < .001$).

The results also demonstrated a significant improvement in reported general health status on a scale from 1 = “Worst” to 10 = “Best”, before ($M = 7.20$) and after the law went into effect ($M = 8.23$), ($t = -5.272$, $df = 39$, $p < .001$). There was also a significant decrease in six reported respiratory symptoms before and after the smoke-free law went into effect. See table below for mean differences and for significance test results for differences in the means for each reported respiratory symptom before and after the smoke-free went into effect. Each symptom was rated on a scale of 1 (Not Present) to 5 (Severe).

Respiratory Symptom	Pre-law Mean (Not Present = 1, Severe = 5)	Post-law Mean (Not Present = 1, Severe = 5)	Paired-samples t-test results
Allergic symptoms	2.50	1.55	$t = 5.538$, $df = 39$, $p < .001$
Wheezing	1.33	1.15	$t = 2.014$, $df = 39$, $p = .051$
Shortness of breath	1.69	1.38	$t = 2.226$, $df = 38$, $p = .032$
Phlegm production	1.79	1.44	$t = 2.483$, $df = 38$, $p = .018$
Day time cough	1.48	1.18	$t = 2.504$, $df = 39$, $p = .017$
Morning cough	1.55	1.13	$t = 3.185$, $df = 39$, $p = .003$

*Also referred to as the “Michigan Secondhand Smoke Exposure Study”