

Supplementary Materials: Assessing Chemical Intolerance in Parents Predicts the Risk of Autism and ADHD in Their Children

Raymond F. Palmer, David Kattari, Rodolfo Rincon and Claudia S. Miller

7 Steps to Creating a Clean Air Oasis



We spend 90% of our day indoors where the air often is more polluted than the air outside.

Research suggests that a “clean room” may help people who suffer from breathing difficulties, allergies, headaches, brain fog/confusion, fatigue, and other health problems.

You can create a clean air oasis in your home, or in one room, where the air is as free as possible of chemicals, smoke, fragrances, and allergy triggers.

1. Pick a room

Choose the room where you spend most of your time, usually your bedroom. Bring in clean outside air whenever possible, but avoid opening windows when pollen or pollution levels are high.

2. Eliminate indoor air pollutants: Remove all products that have strong odors including cleaning and laundry products, pesticides, perfume/cologne, scented lotions, deodorants, cosmetics, candles, air fresheners (including plug-ins and diffusers). Avoid any aerosol sprays (such as hair spray) because their tiny droplets are easily inhaled.

3. Ask your primary care doctor about allergy testing: Dander (dead skin cells) from pets, dust mites, mold, and seasonal pollens can trigger asthma, allergies, and other problems.

4. Clean safely : Use only fragrance-free products for cleaning and doing laundry. Cleaning and vacuuming are best done when sensitive individuals are not in the immediate area. Ventilate during and after cleaning. See list of cleaning supplies and instructions on the back of this page.

5. Avoid burning anything indoors: Smoke and combustion gases irritate the lungs. Do not permit smoking, vaping, or the burning of candles or incense. Do not use fireplaces, open-flame gas heaters, or unvented water heaters. Prevent carbon monoxide poisoning—never heat your home using a gas stove, gas oven, or Hibachi. If you move or purchase new appliances, electric stoves and other electric appliances are the better health option.

6. Go the extra mile: An air purifier with HEPA and charcoal filters can remove some pollutants. Keep the purifier running while the room is occupied, including overnight. Bring in clean outside air whenever possible.

7. Learn more: Many of our choices affect the quality of air we breathe. Learn how to remove fragrances from fabrics, stop pests without using pesticides, control humidity and mold, and find safer products for home repair/remodeling. Visit [TILTResearch.org](https://www.tiltresearch.org) for more information.



UT Health
San Antonio
Family & Community
Medicine

Figure S1. 7 Steps to Creating a Clean Air Oasis at Home.

Table S1: Peer-reviewed Journal Articles Using the QEESI by Country

COUNTRY	AUTHOR & DATE	N	COUNTRY	AUTHOR & DATE	N
Austria	Weiss, 2017	72	Japan	Hojo, 2009	412
Colombia	Storino, 2021	1	Japan	Ishibashi, 2007	214
Denmark	Dantoft, 2014	298	Japan	Lu, 2020	667
Denmark	Hauge, 2015	69	Japan	Manabe, 2008	368
Denmark	Skovbjerg, 2012	1493	Japan	Mizuki, 2004	32
Denmark	Tran, 2014	3	Japan	Mizuki, 2015	40
Denmark	Tran, 2017	39	Japan	Mizukoshi, 2015	8
Finland	Heinonen-Guzejev, 2012	327	Japan	Nakaoka, 2018	43
Finland	Selinheimo, 2019	52	Japan	Ohsawa, 2020	2
Finland	Vuokko, 2019	12	Japan	Suzuki, 2020	141
Finland	Suojalehto, 2021	88	Japan	Watai, 2018	528
Finland	Nynäs, 2021	667	Japan	Yoshino, 2004	69
Finland	Karvala, 2018	4971	Saudi Arabia	Khalil, 2020	134
Finland	Suojalehto, 2021	88	South Korea	Heo, 2017	1030
France	Kamoun, 2011	20	South Korea	Jeon, 2012	300
Germany	Bauer, 2007	202	South Korea	Jeong, 2014	379
Germany	Schnakenberg, 2007	521	South Korea	Yun, 2013	1
Indonesia	Hildebrandt, 2019	471	South Korea	Woo Kwon, 2019	261
Indonesia	Kubota, 2020	707	Spain	Aguilar-Aguilar, 2018	52
Indonesia	Sani, 2023	896	Spain	Alobid, 2014	118
Italy	Caccamo, 2013	443	Spain	Fernandez-Solà, 2005	75
Italy	De Luca, 2010	444	Spain	García-Sierra, 2014	125
Italy	De Luca, 2014	300	Spain	Lago Blanco, 2016	73
Italy	De Luca, 2015	563	Spain	Mena, 2013	231
Italy	Gugliandolo, 2016	34	Spain	Nogué, 2007	52
Italy	Micarelli, 2016a	38	Spain	Paredes-Rizo, 2018	1
Italy	Micarelli, 2016b	38	Spain	Pérez-Crespo, 2018	514
Italy	Viziano, 2017	38	Spain	Loria KohenV, 2017	52
Italy	Cannata, 2021	38	Spain	Fares-Medina 2022	210
Japan	Azuma, 2021	4683	Sweden	Andersson, 2009	207
Japan	Azuma, 2013	122	Sweden	Nordin, 2010	283
Japan	Azuma, 2015a	7245	Taiwan	Huang, 2011a	658

Japan	Azuma, 2015b	12		Taiwan	Huang, 2011b	tbd
Japan	Azuma, 2016	16		Taiwan	Huang, 2014	658
Japan	Azuma, 2019	909		Taiwan	Huang, 2015a	30
Japan	Cui, 2013	324		Taiwan	Huang, 2015b	30
Japan	Cui, 2014	2464		United States	Gould Peek, 2015	563
Japan	Cui, 2015	565		United States	Heilbrun, 2015	694
Japan	Fujimori, 2012	1,084		United States	Katerndahl, 2012	400
Japan	Hasegawa, 2009	51		United States	Miller, 1999a	421
Japan	Hojo, 2002	1260		United States	Miller, 1999b	421
Japan	Hojo, 2003	760		United States	Palmer, 2020	10,000
Japan	Hojo, 2005	440		United States	Masri, 2021	N/A
Japan	Hojo, 2008	106		United States	Palmer, 2020	293
Japan	Hojo, 2019	555		United States	Miller, 2021	147
Japan	Hojo, 2009	412		Uruguay	De Ben, 2014	2
Japan	Hojo, 2018	214				
Japan	Hojo, 2018	214				
Japan	Hojo, 2019	555				
Japan	Tsumura, 2023	149			96 Publications	
Japan	Nakaono, 2022	1		16 Countries Total N > 56,043 subjects		

*Quick Environmental Exposure and Sensitivity Inventory (QEESI)

Publications by Country

Austria

Weiss, E. M., Singewald, E., Baldus, C., Hofer, E., Marksteiner, J., Nasrouei, S., . . . Holzer, P. (2017). [Differences in psychological and somatic symptom cluster score profiles between subjects with Idiopathic environmental intolerance, major depression and schizophrenia](#). *Psychiatry Research*, 249, 187-194.
doi:10.1016/j.psychres.2016.12.057

China

Huang, L.-L., Ikeda, K., Chiang, C.-M., Kagi, N., Hojo, S., & Yanagi, u. (2011). [Field Survey on the Relation between IAQ and Occupants' Health in 40 Houses in Southern Taiwan](#). *Journal of Asian Architecture and Building Engineering*, 10. doi:10.3130/jaabe.10.249

Huang, L.-l., Ikeda, K., Hojo, S., Kagi, N., & Juan, H.-C. (2014). [Study of the different Cutoff Point of the QEESI](#)

[Questionnaire as a Screening Tool for Sick Building Syndrome Diagnosis in Taiwan](#). *Journal of Asian Architecture and Building Engineering*, 13(2), 507-513. doi:10.3130/jaabe.13.507

Colombia

Storino, V., Muñoz-Ortiz, J., Villabona-Martinez, V., Villamizar-Sanjuán, J. D., Rojas-Carabali, W., & dela-Torre, A. (2021). [An Unusual Case of Multiple Food Allergies Comorbid with Multiple Chemical Sensitivity: A Case Report](#). *Journal of asthma and allergy*, 14, 317–323.

<https://doi.org/10.2147/JAA.S293248>

Denmark

Dantoft, T. M., Elberling, J., Brix, S., Szecsi, P. B., Vesterhauge, S., & Skovbjerg, S. (2014). [An elevated proinflammatory cytokine profile in multiple chemical sensitivity](https://pubmed.ncbi.nlm.nih.gov/24485486/inflammatory_cytokine_profile_in_multiple_chemical_sensitivity). *Psychoneuroendocrinology*, 40, 140-150.

doi:10.1016/j.psyneuen.2013.11.012

Hauge, C. R., Rasmussen, A., Piet, J., Bonde, J. P., Jensen, C., Sumbundu, A., & Skovbjerg, S. (2015). [Mindfulness-based cognitive therapy \(MBCT\) for multiple chemical sensitivity \(MCS\): Results from a randomized controlled trial with 1 year follow-up](#). *Journal of Psychosomatic Research*, 79(6), 628-634.

doi:10.1016/j.jpsychores.2015.06.010

Skovbjerg, S., Berg, N. D., Elberling, J., & Christensen, K. B. (2012). [Evaluation of the Quick Environmental](#)

[Exposure and Sensitivity Inventory in a Danish Population](#). *Journal of Environmental and Public Health*, 2012, 304314. doi:10.1155/2012/304314

Tran, M. T. D., Skovbjerg, S., Arendt-Nielsen, L., Bech, P., Lunde, M., & Elberling, J. (2014). [Two of three patients with multiple chemical sensitivity had less symptoms and secondary hyperalgesia after transcranially applied pulsed electromagnetic fields](#). *Scand J Pain*, 5(2), 104-109.

doi:10.1016/j.sjpain.2013.11.008

Tran, M. T. D., Skovbjerg, S., Arendt-Nielsen, L., Christensen, K. B., & Elberling, J. (2017). [A randomised,](#)

[placebo-controlled trial of transcranial pulsed electromagnetic fields in patients with multiple chemical sensitivity](#). *Acta Neuropsychiatrica. Officieel Wetenschappelijk Orgaan van Het IGBP (Interdisciplinair Genootschap voor Biologische Psychiatrie)*, 29(5), 267-277. doi:10.1017/neu.2016.51

Finland

Heinonen-Guzejev, M., Koskenvuo, M., Mussalo-Rauhamaa, H., Vuorinen, H., Heikkilä, K., & Kaprio, J. (2012).

[Noise sensitivity and multiple chemical sensitivity scales: Properties in a population based epidemiological study](#). *Noise and Health*, 14(60), 215-223. doi:10.4103/1463-1741.102956

Selinheimo, S., Vuokko, A., Hublin, C., Järnefelt, H., Karvala, K., Sainio, M., . . . Paunio, T. (2019). [Health-related quality among life of employees with persistent nonspecific indoor-air-associated health complaints](#).

Journal of Psychosomatic Research, 122, 112-120. doi:10.1016/j.jpsychores.2019.03.181

Vuokko, A., Karvala, K., Suojalehto, H., Lindholm, H., Selinheimo, S., Heinonen-Guzejev, M., . . . Sainio, M.

(2019). [Clinical Characteristics of Disability in Patients with Indoor Air-Related Environmental Intolerance](#).

Safety and health at work, 10(3), 362-369. doi:10.1016/j.shaw.2019.06.003

Suojalehto, H.; Ndika, J.; Lindström, I.; Airaksinen, L.; Karvala, K.; Kauppi, P.; Lauerma, A.; Toppila-Salmi, S.; Karisola, P.; Alenius, H. [Transcriptomic Profiling of Adult-Onset Asthma Related to Damp and Moldy Buildings and Idiopathic Environmental Intolerance](#). *Int. J. Mol. Sci.* 2021, 22, 10679. <https://doi.org/10.3390/ijms221910679>

Nynäs, P.; Vilpas, S.; Kankare, E.; Karjalainen, J.; Lehtimäki, L.; Numminen, J.; Tikkakoski, A.; Kleemola, L.; Huhtala, H.; Uitti, J. [Multiple Chemical Sensitivity in Patients Exposed to Moisture Damage at Work and in General Working-Age Population—The SAMDAW Study](#). *Int. J. Environ. Res. Public Health* 2021, 18, 12296. <https://doi.org/10.3390/ijerph182312296>

France

Kamoun, H., Romdhane, N. A., Rekik, W., Laadheri, N., Youssef, I., Ben Salah, F., & Gharbi, R. (2011). [Multiple chemical sensitivity syndrome. Observation of a cohort of 20 workers](#). *Archives des Maladies Professionnelles et de l'Environnement*, 72(1), 73-79. <https://doi.org/10.1016/j.admp.2010.08.006>

Germany

Bauer, A., Schwarz, E., Martens, U. (2007). [Patients with multiple chemical sensitivities: A case for environmental or psychosomatic medicine?](#) *Zeitschrift für Allgemeinmedizin*, 83(11):442-446.

Schnakenberg, E., Fabig, K. R., Stanulla, M., Strobl, N., Lustig, M., Fabig, N., & Schloot, W. (2007). [A cross-sectional study of self-reported chemical-related sensitivity is associated](#)

[with gene variants of drug-metabolizing enzymes](#). *Environmental health : a global access science source*, 6,
6. <https://doi.org/10.1186/1476-069X-6-6>

Indonesia

- Hildebrandt, S., Kubota, T., Sani, H. A., & Surahman, U. (2019). [Indoor Air Quality and Health in Newly Constructed Apartments in Developing Countries: A Case Study of Surabaya, Indonesia](#). *Atmosphere*, 10(4):182
- Kubota, T., Sani, H. A., Hildebrandt, S., & Surahman, U. (2020). [Indoor air quality and self-reported multiple chemical sensitivity in newly constructed apartments in Indonesia](#). *Architectural Science Review*.
<https://doi.org/10.1080/00038628.2020.1779647>

Italy

- Caccamo, D., Cesareo, E., Mariani, S., Raskovic, D., Ientile, R., Currò, M., . . . De Luca, C. (2013). [Xenobiotic sensor- and metabolism-related gene variants in environmental sensitivity-related illnesses: a survey on the Italian population](#). *Oxidative Medicine and Cellular Longevity*, 2013, 831969.
doi:10.1155/2013/831969
- De Luca, C., Scordo, M. G., Cesareo, E., Pastore, S., Mariani, S., Maiani, G., . . . Korkina, L. G. (2010). [Biological definition of multiple chemical sensitivity from redox state and cytokine profiling and not from polymorphisms of xenobiotic-metabolizing enzymes](#). *Toxicology and Applied Pharmacology*, 248(3), 285-292. doi:10.1016/j.taap.2010.04.017
- De Luca, C., Thai, J. C., Raskovic, D., Cesareo, E., Caccamo, D., Trukhanov, A., & Korkina, L. (2014). [Metabolic and genetic screening of electromagnetic hypersensitive subjects as a feasible tool for diagnostics and intervention](#). *Mediators of Inflammation*, 2014, 924184.
doi:10.1155/2014/924184
- De Luca, C., Gugliandolo, A., Calabrò, C., Currò, M., Ientile, R., Raskovic, D., . . . Caccamo, D. (2015). [Role of Polymorphisms of Inducible Nitric Oxide Synthase and Endothelial Nitric Oxide Synthase in Idiopathic Environmental Intolerances](#). *Mediators of Inflammation*, 2015, 245308. doi:10.1155/2015/245308
- Gugliandolo, A., Gangemi, C., Calabrò, C., Vecchio, M., Di Mauro, D., Renis, M., . . . Caccamo, D. (2016). [Assessment of glutathione peroxidase-1 polymorphisms, oxidative stress and DNA damage in sensitivity-related illnesses](#). *Life Sciences*, 145, 27-33. doi:10.1016/j.lfs.2015.12.028
- Micarelli, A., Vizio, A., Bruno, E., Micarelli, E., & Alessandrini, M. (2016a). [Vestibular impairment in Multiple Chemical Sensitivity: Component analysis findings](#). *Journal of Vestibular Research*, 26(5-6), 459-468. doi:10.3233/ves-160594

- Micarelli, A., Viziano, A., Genovesi, G., Bruno, E., Ottaviani, F., & Alessandrini, M. (2016b). [Lack of contralateral suppression in transient-evoked otoacoustic emissions in multiple chemical sensitivity: a clinical correlation study](#). *Noise Health*, 18(82), 143-149. doi:10.4103/1463-1741.181997
- Viziano, A., Micarelli, A., & Alessandrini, M. (2017). [Noise sensitivity and hyperacusis in patients affected by multiple chemical sensitivity](#). *International Archives of Occupational and Environmental Health*, 90(2), 189-196. doi:10.1007/s00420-016-1185-8
- Cannata A., De Luca, C., Andolina, G., Caccamo, D., Curro, M., Ferlazzo, N., Ientile, R., Alibrandi, A., and Korkina, L (2021) [Influence of the SOD2 A16V gene polymorphism on alterations of redox markers and erythrocyte membrane fatty acid profiles in patients with multiple chemical sensitivity](#). *Biomedical Reports* 15: 101, 2021 DOI: 10.3892/br.2021.1477

Japan

- Azuma, K., Uchiyama, I., Takano, H., Tanigawa, M., Azuma, M., Bamba, I., & Yoshikawa, T. (2013). [Changes in cerebral blood flow during olfactory stimulation in patients with multiple chemical sensitivity: a multihttps://pubmed.ncbi.nlm.nih.gov/24278291/channel near-infrared spectroscopic study](#). *PloS One*, 8(11), e80567. doi:10.1371/journal.pone.0080567
- Azuma, K., Uchiyama, I., Katoh, T., Ogata, H., Arashidani, K., & Kunugita, N. (2015a). [Prevalence and Characteristics of Chemical Intolerance: A Japanese Population-Based Study](#). *Archives of Environmental & Occupational Health*, 70(6), 341-353. doi:10.1080/19338244.2014.926855
- Azuma, K., Uchiyama, I., Tanigawa, M., Bamba, I., Azuma, M., Takano, H., . . . Sakabe, K. (2015b). [Assessment of cerebral blood flow in patients with multiple chemical sensitivity using near-infrared spectroscopy-recovery after olfactory stimulation: a case-control study](#). *Environmental Health and Preventive Medicine*, 20(3), 185-194. doi:10.1007/s12199-015-0448-4
- Azuma, K., Uchiyama, I., Tanigawa, M., Bamba, I., Azuma, M., Takano, H., . . . Sakabe, K. (2016). [Association of Odor Thresholds and Responses in Cerebral Blood Flow of the Prefrontal Area during Olfactory Stimulation in Patients with Multiple Chemical Sensitivity](#). *PloS One*, 11(12), e0168006. doi:10.1371/journal.pone.0168006
- Azuma, K., Uchiyama, I., & Kunugita, N. (2019). [Factors affecting self-reported chemical intolerance: A fivehttps://pubmed.ncbi.nlm.nih.gov/30782347/year follow-up study in Japan](#). *Journal of Psychosomatic Research*, 118, 1-8. doi:10.1016/j.jpsychores.2019.01.001

- Cui, X., Lu, X., Hiura, M., Oda, M., Miyazaki, W., & Katoh, T. (2013). [Evaluation of genetic polymorphisms in patients with multiple chemical sensitivity](#). *PloS One*, 8(8), e73708-e73708. doi:10.1371/journal.pone.0073708
- Cui, X., Lu, X., Hiura, M., Oda, M., Hisada, A., Miyazaki, W., . . . Katoh, T. (2014). [Prevalence and interannual changes in multiple chemical sensitivity in Japanese workers](#). *Environmental Health and Preventive Medicine*, 19(3), 215-219. doi:10.1007/s12199-014-0378-6
- Cui, X., Lu, X., Hisada, A., Fujiwara, Y., & Katoh, T. (2015). [The correlation between mental health and multiple chemical sensitivity: a survey study in Japanese workers](#). *Environmental Health and Preventive Medicine*, 20(2), 123-129. doi:10.1007/s12199-014-0434-2
- Fujimori, S., Hiura, M., Yi, C. X., Xi, L., & Katoh, T. (2012). [Factors in genetic susceptibility in a chemical sensitive population using QEESI](#). *Environmental Health and Preventive Medicine*, 17(5), 357-363. doi:10.1007/s12199-011-0260-8
- Hasegawa, M., Ohtomo, M., Mizuki, M., & Akiyama, K. (2009). [\[Diagnosis of multiple chemical sensitivity by chemical compounds exposure tests\]](#). *Arerugi*, 58(2), 112-118.
- Hojo, S. (2002). [A questionnaire survey of multiple chemical sensitivity in Japan by using QEESI](#). *NeuroOphthalmology Japan*, 19(2), 169-175.
- Hojo, S., Kumano, H., Yoshino, H., Kakuta, K., & Ishikawa, S. (2003). [Application of Quick Environment Exposure Sensitivity Inventory \(QEESI©\) for Japanese population: study of reliability and validity of the questionnaire](#). *Toxicology and Industrial Health*, 19(2-6), 41-49. doi:10.1191/0748233703th180oa
- Hojo, S., Yoshino, H., Kumano, H., Kakuta, K., Miyata, M., Sakabe, K., . . . Ishikawa, S. (2005). [Use of QEESI© questionnaire for a screening study in Japan](#). *Toxicology and Industrial Health*, 21(3-4), 113-124. doi:10.1191/0748233705th219oa
- Hojo, S., Ishikawa, S., Kumano, H., Miyata, M., & Sakabe, K. (2008). [Clinical characteristics of physicianhttps://pubmed.ncbi.nlm.nih.gov/18155642/diagnosed patients with multiple chemical sensitivity in Japan](#). *International Journal of Hygiene and Environmental Health*, 211(5-6), 682-689. doi:10.1016/j.ijheh.2007.09.007
- Hojo, S., Sakabe, K., Ishikawa, S., Miyata, M., & Kumano, H. (2009). [Evaluation of subjective symptoms of Japanese patients with multiple chemical sensitivity using QEESI©](#). *Environmental Health and Preventive Medicine*, 14, 267-275.
- Hojo, S., Mizukoshi, A., Azuma, K., Okumura, J., Ishikawa, S., Miyata, M., . . . Sakabe, K. (2018). [Survey on changes in subjective symptoms, onset/trigger factors, allergic diseases, and chemical exposures in the past decade of Japanese patients with multiple chemical sensitivity](#). *International Journal of Hygiene and Environmental Health*, 221(8), 1085-1096. doi:10.1016/j.ijheh.2018.08.001
- Hojo, S., Mizukoshi, A., Azuma, K., Okumura, J., Mizuki, M., & Miyata, M. (2019). [New criteria for multiple chemical sensitivity based on the Quick Environmental Exposure and Sensitivity](#)

- [Inventory developed in response to rapid changes in ongoing chemical exposures among Japanese](#). *PloS One*, 14(4), e0215144e0215144. doi:10.1371/journal.pone.0215144
- Ishibashi, M., Tonori, H., Miki, T., Miyajima, E., Kudo, Y., Tsunoda, M., Sakabe, K., & Aizawa, Y. (2007). [Classification of patients complaining of sick house syndrome and/or multiple chemical sensitivity](#). *Tohoku Journal of Experimental Medicine*, 211(3), 223-233. <https://doi.org/10.1620/tjem.211.223>
- Lu, X., Hisada, A., Anai, A., Nakashita, C., Masuda, S., Fujiwara, Y., . . . Katoh, T. (2020). [Study of the Correlation Between Multiple Chemical Sensitivity and Personality Using the Quick Environmental Exposure Sensitivity Inventory Questionnaire and the Temperament and Character Inventory](#). *Journal of Occupational and Environmental Medicine*, 62(7), e348-e354. doi:10.1097/jom.0000000000001899
- Manabe, R., Kunugita, N., Katoh, T., Kuroda, Y., Akiyama, Y., Yamano, Y., . . . Arashidani, K. (2008). [\[Questionnaire survey of workers in specific buildings regarding multiple chemical sensitivity\]](#). *Nihon Eiseigaku Zasshi. Japanese Journal of Hygiene*, 63(4), 717-723. doi:10.1265/jjh.63.717
- Mizuki, M. (2004) [Effect of environmental factors in patients with multiple chemical sensitivity](#). *IRYO-Japanese Journal of National Medical Services*, 58(7), 399-407.
- Mizuki, M. (2015) [Intractable factors in patients with chemical sensitivity](#). *IRYO-Japanese Journal of National Medical Services*, 69(3), 117-126.
- Mizukoshi, A., Kumagai, K., Yamamoto, N., Noguchi, M., Yoshiuchi, K., Kumano, H., . . . Yanagisawa, Y. (2015). [In-situ Real-Time Monitoring of Volatile Organic Compound Exposure and Heart Rate Variability for Patients with Multiple Chemical Sensitivity](#). *International Journal of Environmental Research and Public Health*, 12(10), 12446-12465. doi:10.3390/ijerph121012446
- Nakaoka, H., Suzuki, N., Nakayama, Y., Takaya, K., Todaka, E., and Mori, C. (2018). [A preliminary study to investigate the relationships between indoor environment and its effect on physical and mental health](#). *WIT Transactions on Ecology and the Environment*, 230, 567-576.
- Ohsawa, M., Takayama, S., Kikuchi, A., Arita, R., Saito, N., Hojo, S., . . . Yaegashi, N. (2020). [Two Cases of Multiple Chemical Sensitivity Successfully Treated With Kampo Medicine](#). *Alternative Therapies in Health and Medicine*.
- Suzuki, N., Nakaoka, H., Nakayama, Y., Tsumura, K., Takaguchi, K., Takaya, K., . . . Mori, C. (2020). [Association between sum of volatile organic compounds and occurrence of building-related symptoms in humans: A study in real full-scale laboratory houses](#). *Science of the Total Environment*, 750, 141635. doi:10.1016/j.scitotenv.2020.141635

- Watai, K., Fukutomi, Y., Hayashi, H., Kamide, Y., Sekiya, K., & Taniguchi, M. (2018). [Epidemiological association between multiple chemical sensitivity and birth by caesarean section: a nationwide case-control study](#). *Environmental Health*, 17(1), 89. doi:10.1186/s12940-018-0438-2
- Yoshino, H., Amano, K., Matsumoto, M., Netsu, K., Ikeda, K., Nozaki, A., . . . Ishikawa, S. (2004). [Long-Term Field Survey of Indoor Air Quality and Health Hazards in Sick House](#). *Journal of Asian Architecture and Building Engineering*, 3(2), 297-303. doi:10.3130/jaabe.3.297

Saudi Arabia

- Khalil, A. I., Almutairi, M. S., & Ahmed, M. E. (2020). [Assessing risk factors of Autism Spectrum Disorders \(ASD\) and Attention Deficit Hyperactivity Disorder \(ADHD\) among Saudi Mothers: A retrospective study](#) [Article]. *Clinical Schizophrenia and Related Psychoses*, 14(1), Article 092320.
https://doi.org/10.3371/CSRP.IASM.092320

South Korea

- Heo, Y., Kim, S. H., Lee, S. K., & Kim, H. A. (2017). [Factors Contributing to the Self-Reported Prevalence of Multiple Chemical Sensitivity in Public Facility Workers and the General Population of Korea](#). *J uoeh*, 39(4), 249-258. doi:10.7888/juoeh.39.249
- Jeon, B. H. L., S.H.; Kim H.A. (2012). [A Validation of the Korean Version of QEESI\(c\) \(The Quick Environmental Exposure and Sensitivity Inventory\)](#). *Korean Journal of Occupational and Environmental Medicine*, 24(1), 96-114.
- Jeong, I., Kim, I., Park, H. J., Roh, J., Park, J. W., & Lee, J. H. (2014). [Allergic diseases and multiple chemical sensitivity in Korean adults](#). *Allergy, Asthma & Immunology Research*, 6(5), 409-414. doi:10.4168/aaair.2014.6.5.409
- Yun, M. J., Kang, D. M., Lee, K. H., Kim, Y. K., & Kim, J. E. (2013). [Multiple chemical sensitivity caused by exposure to ignition coal fumes: a case report](#). *Ann Occup Environ Med*, 25(1), 32. doi:10.1186/20524374-25-32
- Byung Woo Kwon, Woo Yong Bae, Nam Yoon Jung, Chang Bae Lee, Daeyeon Kim (2019). [Chemical Intolerance in Patients With Nasal Inflammatory Disorders](#). *Archives of Clinical and Biomedical Research* Vol. 3 No. 4 - August 2019. [ISSN 2572-5017] 257; Arch Clin Biomed Res 2019; 3 (4): 257-271

Spain

- Aguilar-Aguilar, E., Marcos-Pasero, H., de la Iglesia, R., Espinosa-Salinas, I., Ramírez de Molina, A., Reglero, G., & Loria-Kohen, V. (2018). [Characteristics and determinants of dietary intake and](#)

- [physical activity in a group of patients with multiple chemical sensitivity](#). *Endocrinol Diabetes Nutr*, 65(10), 564-570.
doi:10.1016/j.endinu.2018.07.009
- Alobid, I., Nogué, S., Izquierdo-Dominguez, A., Centellas, S., Bernal-Sprekelsen, M., & Mullol, J. (2014). [Multiple chemical sensitivity worsens quality of life and cognitive and sensorial features of sense of smell](#). *European Archives of Oto-Rhino-Laryngology*, 271(12), 3203-3208.
doi:10.1007/s00405-0143015-5
- Fernandez-Solà, J. (2005). [Chronic fatigue syndrome and fibromyalgia in patients affected with multiple chemical sensitivity](#). *Med Clin (Barc)*; 124: 451-453.
- García-Sierra, R., & Álvarez-Moleiro, M. (2014). [Evaluation of suffering in individuals with multiple chemical sensitivity](#). *Clínica y Salud*, 25(2), 95-103.
doi:https://doi.org/10.1016/j.clysa.2014.06.006
- Lago Blanco, E., Puiguriguer Ferrando, J., Rodríguez Enríquez, M., Agüero Gento, L., Salvà Coll, J., & Pizà Portell, M. R. (2016). [Multiple chemical sensitivity: Clinical evaluation of the severity and psychopathological profile](#). *Medicina Clínica*, 146(3), 108-111.
https://doi.org/10.1016/j.medcli.2015.09.016
- Mena, G., Sequera, V. G., Nogué-Xarau, S., Ríos, J., Bertran, M. J., & Trilla, A. (2013). [[Translation and crosshttps://pubmed.ncbi.nlm.nih.gov/23347502/cultural adaptation of the Quick Environmental Exposure and Sensitivity Inventory for use in the Spanish population](#)]. *Medicina Clínica*, 140(7), 302-304. doi:10.1016/j.medcli.2012.10.024
- Nogué, S., Fernández-Solà, J., Rovira, E., Montori, E., Fernández-Huerta, J. M., & Munné, P. (2007). [[Multiple chemical sensitivity: study of 52 cases](#)]. *Medicina Clínica*, 129(3), 96-98; quiz 99.
doi:10.1157/13107370
- Paredes Rizo, M. (2018). [Multiple Chemical Sensitivity: analysis of a case registered in a reference Hospital](#). *Medicine and Occupational Safety*, 64 (251), 217-240.
- Pérez-Crespo, J., Lobato-Cañón, R., & Solanes-Puchol, Á. (2018). [Multiple Chemical Sensitivity in Chemical Laboratory Workers](#). *Safety and health at work*, 9(4), 473-478.
doi:10.1016/j.shaw.2018.03.001
- Loria-KohenV, Marcos-PaseroH, de la IglesiaR, Aguilar-Aguilar E, Espinosa-Salinas I, Herranz J, et al. [Sensibilidad química múltiple: caracterización genotípica, estado nutricional y calidad de vida de 52 pacientes](#). *Med Clin (Barc)*. 2017;149:141-146.

Sweden

- Andersson, M. J., Andersson, L., Bende, M., Millqvist, E., & Nordin, S. (2009). [The idiopathic environmental intolerance symptom inventory: development, evaluation, and application](#). *Journal of Occupational and Environmental Medicine*, 51(7), 838-847.
doi:10.1097/JOM.0b013e3181a7f021

- Nordin, S., & Andersson, L. (2010). [Evaluation of a Swedish version of the Quick Environmental Exposure and Sensitivity Inventory](#). *International Archives of Occupational and Environmental Health*, 83(1), 95-104.
doi:10.1007/s00420-009-0427-4

United States

- Gould Peek, G., & Wallace Lyon, M. (2014). [Housing and Health Relationship: Multiple Chemical Sensitivity \(MCS\)](#). *Housing and Society*, 41(1), 31-52. doi:10.1080/08882746.2014.11430620
- Heilbrun, L. P., Palmer, R. F., Jaen, C. R., Svoboda, M. D., Perkins, J., & Miller, C. S. (2015). [Maternal Chemical and Drug Intolerances: Potential Risk Factors for Autism and Attention Deficit Hyperactivity Disorder \(ADHD\)](#). *Journal of the American Board of Family Medicine*, 28(4), 461-470.
doi:10.3122/jabfm.2015.04.140192
- Katerndahl, D. A., Bell, I. R., Palmer, R. F., & Miller, C. S. (2012). [Chemical intolerance in primary care settings: prevalence, comorbidity, and outcomes](#). *Annals of Family Medicine*, 10(4), 357-365.
doi:10.1370/afm.1346
- Miller, C. S., & Prihoda, T. J. (1999a). [The Environmental Exposure and Sensitivity Inventory \(EESI\): a standardized approach for measuring chemical intolerances for research and clinical applications](#). *Toxicology and Industrial Health*, 15(3-4), 370-385. doi:10.1177/074823379901500311
- Miller, C. S., & Prihoda, T. J. (1999b). [A controlled comparison of symptoms and chemical intolerances reported by Gulf War veterans, implant recipients and persons with multiple chemical sensitivity](#). *Toxicology and Industrial Health*, 15(3-4), 386-397. doi:10.1177/074823379901500312
- Palmer, R. F., Jaén, C. R., Perales, R. B., Rincon, R., Forster, J. N., & Miller, C. S. (2020). [Three questions for identifying chemically intolerant individuals in clinical and epidemiological populations: The Brief Environmental Exposure and Sensitivity Inventory \(BREESEI\)](#). *PloS One*, 15(9), e0238296.
doi:10.1371/journal.pone.0238296
- Palmer, R. F., Walker, T., Kattari, D., Rincon, R., Perales, R. B., Rincon, R., Jaen, C. R., Grimes, C., Sundbland, D. R., & Miller, C. S. (2020). [Validation of a Brief Screening Instrument for Chemical Intolerance in a Large U.S. National Sample](#). *Int. J. Environ. Res. Public Health* 2021, 18, 8714. <https://doi.org/10.3390/ijerph18168714>

- Miller, C.S., Palmer, R., Dempsey, T., Ashford, N. A., Afrin L.B. (2021) [Mast cell activation may explain many cases of chemical intolerance](https://doi.org/10.1186/s12302-021-00570-3) Environmental Sciences Europe (2021) 33:129 <https://doi.org/10.1186/s12302-021-00570-3>
- Masri, S., Miller, C.S., Palmer, R., Ashford, N. [Toxicant-Induced Loss of Tolerance for chemicals, foods, and drugs: assessing patterns of exposure behind a global phenomenon](https://doi.org/10.1186/s12302-021-00504-z). Environ Sci Eur (2021) 33:65 <https://doi.org/10.1186/s12302-021-00504-z>

Uruguay

- De Ben, S., Sponton, F. Chaves, E., Medina, F., Tomasina, F. (2014.) [Multiple chemical sensitivity: a challenge for occupational health](#). Rev Med Urug, 30: 123-127.