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Region 2: NJ | NY | PR | USVI

8 de octubre de 2024

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Comentarios Plan Prioritario para la Estabilización de la Red Eléctrica Caso Núm.: NEPR-MI-2024-0005

As pediatricians and scientists at the Pediatric Environmental Health Specialty Unit (PEHSU) at the Icahn School of Medicine at Mount Sinai, we are grateful for the opportunity to comment on proposed Liquefied Natural Gas (LNG) infrastructure and new methane (natural gas) fired power generation in Puerto Rico. The mission of the Mount Sinai PESHU is to provide clinical consultation and education to families, healthcare professionals, public health officials, policy-makers and community organizations with concerns regarding children's environmental health throughout Federal Region II, which includes New York, New Jersey, Puerto Rico and the US Virgin Islands.

Children are particularly vulnerable to outdoor air pollutants, as the lungs continue to develop until adolescence. Environmental pollutants serve as irritants that can disrupt lung development, with exposure to these chemicals associated with inflammatory changes in airways and decreased lung function.[1] Children are at risk for greater and more prolonged exposure to environmental pollutants, compared to adults. Children tend to spend more time outdoors and have a higher resting respiratory rate compared to adults. As a result, children inhale more pollutants and expose a larger surface area of the lung to these chemicals, relative to their size. Furthermore, children have narrower and less rigid airways, and lack fully-developed and functional protective body systems capable of filtering pollutants and processing chemicals. Children are therefore more susceptible to airway irritation, inflammation, and obstruction, compared to adults.[2] Exposure to these pollutants can also impact a child's prenatal development, as maternal exposure to particulate matter, ozone, and nitrogen oxides is associated with preterm birth, low birth weight, and increased risk of neonatal respiratory distress. These exposures can impact lung development and function in the neonate and are

[1] NIEHS. 2024. Children's Environmental Health. https://www.niehs.nih.gov/health/topics/population/children/index.cfm
[2] Mandeep S. Jassal, Pediatric asthma and ambient pollutant levels in industrializing nations, International Health, Volume 7, Issue 1, January 2015, Pages 7–15, https://doi.org/10.1093/inthealth/ihu081

associated with impaired lung function in childhood and increased risk of childhood respiratory illness including asthma.[3] Asthma is reported to impact 36.5% of Puerto Ricans, and 20% of the young population.[4] A concurrent respiratory illness such as asthma poses an additional risk, increasing the vulnerability of affected children to the impacts of environmental respiratory irritants. With approximately 3% of the population under 5 years old and 15.6% under 18 years old, Puerto Rico, carries a large at-risk population particularly susceptible to the health impacts of environmental pollutants. [5]

Pollutants emitted into the environment from the combustion of natural gas include nitrogen oxides, sulfur dioxide, particulate matter, greenhouse gases, and ozone, which can be formed from volatile organic compounds (VOCs).[6],[7] Each of these pollutants is associated with short and long-term health effects, posing significant health risks for exposed children. Nitrogen oxides, particulate matter, sulfur dioxide, and many VOCs can cause inflammation in the eyes, nose, throat, and skin; this irritation of the airways can lead to shortness of breath, decreased lung function, and exacerbations of respiratory illnesses including asthma. In addition to respiratory impacts, VOCs and CO have neurological, and cardiovascular effects including headache, dizziness, fatigue, and nausea. Long-standing exposure to these pollutants increases the risk of developing chronic illnesses including COPD, kidney failure, and certain cancers.[8] Additionally, greenhouse gases contribute to increases in temperature and decreases in air quality that can exacerbate health effects in children, elderly, and those with chronic illness (NIEHS).[9] These long and short-term health consequences can vary based on the specific pollutants and duration of exposure. In addition to pollutants associated with the burning of natural gas, sulfur dioxide, nitrogen oxide, volatile organic compounds, particulate matter and greenhouse gases are known to be released into the air by LNG infrastructure.[10]

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[3] Seeni I, Ha S, Nobles C, Liu D, Sherman S, Mendola P. Air pollution exposure during pregnancy: maternal asthma and neonatal respiratory outcomes. Ann Epidemiol. 2018;28(9):612-618.e4. doi:10.1016/j.annepidem.2018.06.003

[4] Wohlford EM, Borrell LN, Elhawary JR, Plotkin B, Oh SS, Nuckton TJ, et al. (2020) Differential asthma odds following respiratory infection in children from three minority populations. PLoS ONE 15(5): e0231782. https://doi.org/10.1371/journal.pone.0231782

[5] *QuickFacts Puerto Rico*. (2020-2023). census.gov: US Census Bureau Retrieved from https://www.census.gov/quickfacts/fact/table/PR/AGE135223#AGE135223

[6] Agency, U. S. E. P. (1998). Natural Gas Combustion. In *AP-42, Compilation of Air Pollutant Emissions Factors from Stationary Sources* (5 ed., Vol. 1). https://www.epa.gov/sites/default/files/2020-09/documents/1.4_natural_gas_combustion.pdf

[7] Agency, U. S. E. P. (2024). Greenhouse Gas Standards and Guidelines for Fossil Fuel-Fired Power Plants. https://www.epa.gov/stationary-sources-air-pollution/greenhouse-gas-standards-and-guidelines-fossil-fuel-fired-power

[8] Brumberg HL, Karr CJ; COUNCIL ON ENVIRONMENTAL HEALTH. Ambient Air Pollution: Health Hazards to Children. Pediatrics. 2021 Jun;147(6):e2021051484. doi: 10.1542/peds.2021-051484. Epub 2021 May 17. PMID: 34001642.

[9] Perera F, Nadeau K. Climate Change, Fossil-Fuel Pollution, and Children's Health. N Engl J Med. 2022 Jun 16;386(24):2303-2314. doi: 10.1056/NEJMra2117706. PMID: 35704482.

[10] Shaykevich, A., Otto, C.; Troubled Waters for LNG: The COVID-19 recession and overproduction derail dramatic expansion of liquified natural gas terminals, Environmental Integrity Project, October 5, 2020

Thus from both LNG infrastructure and methane-fired power plants, communities and residents in the neighborhoods -particularly those that are downwind from any emissions - are at risk for toxic exposures. These residents at greater risk include a particularly prevalent subgroup of children who live in these neighborhoods as 45% of the Puerto Rico population consists of low-income working families with children.[11] Simple adherence to National Ambient Air Quality Standards is likely not sufficient to protect the health of these vulnerable subgroups. Furthermore, exposure polluting emissions will likely be chronic given the expected useful life of new LNG infrastructure.

[11] Puerto Rico Statistics on children, youth and families in Puerto Rico from the Annie E. Casey Foundation and the Youth Development Institute. https://datacenter.aecf.org/data/tables/10381-low-income-working-families-with-children?loc=53&loct=4#detailed/4/any/false/1095,2048,1729,37,871,870,573,869,36,868/any/20052,20053