

Case Definition

Health Effects Related to Unconventional Natural Gas Development (UNGD) Environmental Exposures

A case definition is a set of uniform criteria used to define a disease for public health surveillance or epidemiological research. A case definition usually includes both an objective or laboratory criterion and clinical signs or symptoms which must be present to qualify as a case. Cases are classified as “suspected”, “probable”, or “confirmed” based on increasingly stringent criteria for being designated as a case. Case definitions are useful for estimating the magnitude of the health impacts of an exposure on a population. When in a clinical setting, due to the inherent sensitivity and specificity limitations (false negatives and false positives), a case definition should not be used as the only criterion when determining whether an individual is experiencing health effects related to an exposure.

Rationale

Case definitions for environmental exposures typically require an indicator for the environmental exposure in addition to clinical signs and symptoms compatible with the exposure. In the current case definition, an actual measured exposure to a contaminant provides the most stringent exposure indicator, and is required to meet the criteria for a confirmed case. As in other studies, in the absence of a measured exposure, proximity to one or more exposure sources is used as a surrogate. Presence within 1 kilometer of facilities extracting, transporting, processing or storing UNGD gas or waste, is required for a probable case, and within 1-2 kms for a suspected case. Examples of “a presence” include residing, working, or attending school. The case definition is not intended to address the occupational exposures of individuals working within the shale gas industry.

The Southwest Pennsylvania Environmental Health Project (EHP)

case definition for health effects related to environmental exposures from UNGD activities is primarily derived from the knowledge gained from EHP’s health assessments of over 80 individuals in southwest Pennsylvania with potential exposure to UNGD related air and water contaminants. The observations of several physicians outside of EHP with experience evaluating residents with UNGD related exposures were

also incorporated into the case definition. The case definition takes into account the recognized short term health effects of both the ubiquitous air emissions (volatile organic compounds, formaldehyde, and particulate matter), as well as the more sporadically occurring water contamination. The case definition also recognizes that based on both source characteristics and weather variables, exposures, and therefore symptoms, may be episodic, persistent, or transient.

The case definition includes only the acute health effects experienced by residents exposed to UNGD contaminants. Exposure to many of the contaminants responsible for the short term symptoms also increase the risk for serious long term adverse health consequences, such as chronic respiratory disease, chronic neurologic dysfunction, and cancer.

Residents living in proximity to shale gas activities frequently report the new onset of psychological symptoms that interfere with normal functioning including anxiety, depression, fatigue, behavior changes, difficulty focusing, and feeling a loss of control. Although it is important to recognize and to address these disabling symptoms they were not included in the case definition, as they may often be attributable to other circumstances associated with shale drilling, rather than the environmental chemical exposures.

Criteria for a **Confirmed** Case of Health Effects Related to Shale Development Environmental Exposures

Environmental Exposure A documented* air and/or water exposure to an emission or contaminant originating from a shale gas site. *Instrument or laboratory measured air contaminant. Laboratory confirmed water contaminant.

AND Clinical Signs or Symptoms The development of signs or symptoms or worsening of pre-existing signs or symptoms from two or more of the following systems:

1. Respiratory (cough, shortness of breath, throat soreness or irritation, sinus problems, or nosebleeds)
2. Dermal (rash, pruritus, or irritation)
3. Neurological (headache or dizziness)
4. Gastrointestinal (nausea or abdominal pain)

Relevant signs or symptoms must occur after the onset of potential shale gas exposures and must be without a more plausible explanation (such as an unrelated exposure, pre-existing medical condition (unless exacerbated), or intercurrent illness). New or worsening symptoms may be episodic, persistent or transient.

Criteria for a **Probable** Case of Health Effects Related to Shale Development Environmental Exposures

Environmental Exposure A presence for a period of at least 20 hours/week during a minimum of at least one month within one kilometer of one or more facilities extracting, transporting, processing or storing shale gas or waste.

AND Clinical Signs or Symptoms The development of signs or symptoms or worsening of pre-existing signs or symptoms from two or more of the following systems:

1. Respiratory (cough, shortness of breath, throat soreness or irritation, sinus problems, or nosebleeds)
2. Dermal (rash, pruritus, or irritation)
3. Neurological (headache or dizziness)
4. Gastrointestinal (nausea or abdominal pain)

Relevant signs or symptoms must occur after the onset of potential shale gas exposures and must be without a more plausible explanation (such as an unrelated exposure, pre-existing medical condition (unless exacerbated), or intercurrent illness). New or worsening symptoms may be episodic, persistent or transient.

Criteria for a **Suspected** Case of Health Effects Related to Shale Development Environmental Exposures

Environmental Exposure A presence for a period of at least 20 hours/week during a minimum of at least one month within one to two kilometers of one or more facilities extracting, transporting, processing or storing shale gas or waste.

AND Clinical Signs or Symptoms The development of signs or symptoms or worsening of pre-existing signs or symptoms from two or more of the following systems:

1. Respiratory (cough, shortness of breath, throat soreness or irritation, sinus problems, or nosebleeds)
2. Dermal (rash, pruritus, or irritation)
3. Neurological (headache or dizziness)
4. Gastrointestinal (nausea or abdominal pain)

Relevant signs or symptoms must occur after the onset of potential shale gas exposures and must be without a more plausible explanation (such as an unrelated exposure, pre-existing medical condition, (unless exacerbated), or intercurrent illness). New or worsening symptoms may be episodic, persistent or transient.

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