

Louisiana Morbidity Report



Office of Public Health - Environmental Epidemiology & Toxicology Section
P.O. Box 4489, Baton Rouge, LA 70821-4489 Phone: (225) 342-7136
www.ldh.louisiana.gov/LMR



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REBEKAH E. GEE MD MPH
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Childhood Asthma: East Baton Rouge Parish Louisiana, 2010-2015

Section of Environmental Epidemiology and Toxicology (SEET)

Report Summary

Asthma is a lung disorder associated with the narrowing of the airways, leading to breathing difficulties, coughing, wheezing, and chest tightness. Starting most often in childhood, asthma can result in the increased absence of children from the classroom as well as the playground.

In July 2018, a Baton Rouge physician contacted Louisiana Department of Health (LDH), Office of Public Health's (OPH) Section of Environmental Epidemiology and Toxicology (SEET) with concerns regarding childhood asthma in an industrialized area of East Baton Rouge (EBR) Parish. In response, SEET conducted a preliminary sub-parish (sub-county) analysis of the Emergency Department (ED) visits and hospitalizations for asthma among children residing there. The results were then assessed within the framework of the statewide childhood asthma burden as well as the socioeconomic and environmental factors within EBR Parish.

At the parish-level, EBR ranked tenth in the state in terms of ED visits and 19th in terms of the hospitalization rate for childhood asthma. Both rates for EBR Parish

were statistically significantly higher than the state rates. Sub-county analyses of EBR Parish revealed three ZIP Code Tabulation Areas (ZCTAs) of special concern: 70802, 70805 and 70812.

While no direct causal associations could be drawn from this report, the data suggest a complex intermingling of several factors at these locations. These include poverty, race and potential environmental exposures, though many other factors that could not be examined here likely also play a role. Contributions from indoor environmental quality, such as in the home or in schools where children spend much of their time, are touched upon briefly in this issue, using available SEET data from the Indoor Environmental Quality Education Service (IEQES). Overall, the results highlight the demographic inequities in health outcomes in EBR Parish and the resulting burden of asthma from a healthcare as well as cost perspective. SEET has subsequently sparked outreach efforts in the areas of concern with the aim to promote better management of childhood asthma and thereby advance the cause of health equity in Louisiana.

Sub-county Analysis of Pediatric Asthma Identifies Areas that May Benefit from Comprehensive Interventions: East Baton Rouge Parish

Arundhati Bakshi, PhD; Anna Reilly, PhD MPH; Kate Friedman, MNS

Asthma is a chronic lung disorder characterized by the constriction of airways, resulting in wheezing, breathlessness, coughing and chest tightness. People of all ages can have asthma, but it most often starts in childhood^[1]. The Centers for Disease Control and Prevention's (CDC) 2015 Behavioral Risk Factor Surveillance System (BRFSS) estimates that about 14% of children in Louisiana have been diagnosed with asthma, with about 8.8% currently

suffering from the symptoms of the condition^[2]. A major component of asthma management involves identifying personal asthma triggers and avoiding exposure to them. Common asthma triggers include outdoor air pollutants (such as ozone and fine particulate matter) as well as indoor air pollutants (tobacco smoke, dust mites, animal dander, mold, etc.)^[3].

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In July 2018, a pediatrician practicing in Baton Rouge, Louisiana contacted SEET with concerns regarding high rates of asthma-related ED visits among children from an industrialized area in western EBR Parish. In response, the Environmental Public Health Tracking (“Tracking”) and Occupational Health programs collaborated to provide a preliminary sub-county analysis of asthma in EBR Parish.

Methods

Childhood asthma ED visits and hospitalization events (for population younger than 18 years of age), where asthma was a primary diagnosis, were extracted by ZIP code for 2010 to 2015. Asthma cases from 2010 to 2015, quarters one to three (Q1-Q3) were identified using the International Classification of Diseases, ninth edition (ICD-9) code 493.XX. In the fourth quarter of 2015, the U.S. switched to the ICD-10 system. Thus, nearly all cases from 2015 Q4 were identified using ICD-10 codes for asthma, J45.XX and J46.XX. Due to the small population size at the ZIP code-level, crude rates (as opposed to age-adjusted rates) were calculated using the estimated population of the corresponding ZCTA for that time period.* ZCTAs are generalized representations of the U.S. Postal Service ZIP code service areas and are the best available population estimate for a ZIP code.** Rates derived from fewer than 20 cases are considered unstable and should be interpreted with caution. The calculated rates, along with socioeconomic factors known to affect asthma prevalence (race/ethnicity, poverty and health insurance coverage) [4] and Medicaid usage, were mapped by ZCTA. Crude rate ratios and 95% confidence intervals (C.I.) were calculated to estimate whether the rate of ED/hospital visits for asthma was higher in a particular ZCTA than for the parish overall. The percentage by which the ZCTA rate was higher than the parish rate was calculated by subtracting one (1) from the rate ratio (x 100).***

Results and Discussion

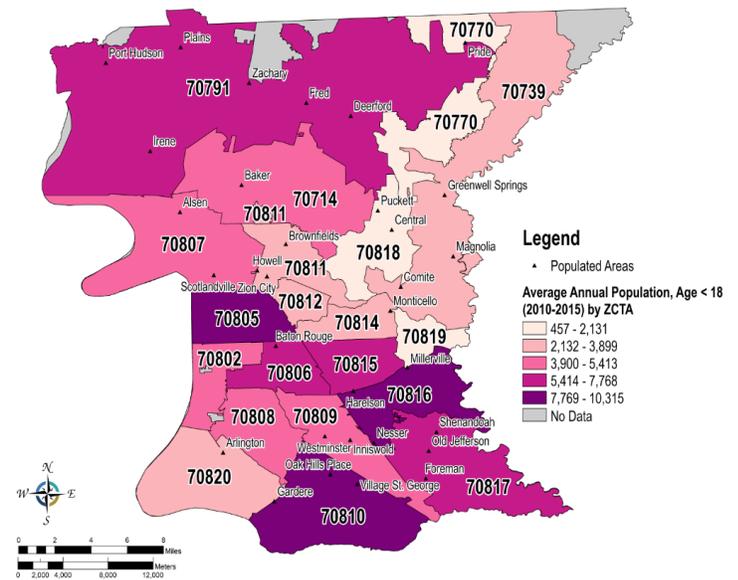
A demographic profile of residents younger than 18 years of age in EBR Parish is presented in Figure 1. In terms of the general population, from 2010 to 2015, the highest number of children resided in ZCTAs 70805, 70810 and 70816.

* Data and procedural limitations are noted in the ‘Data Limitations’ section.

** For discussion on ZCTA vs. ZIP code see (i) in the ‘Further Reading’ section.

*** Details on the methodology are in the complete report by LDH Tracking - see (i) in the ‘Further Reading’ section.

Figure 1: Average Population Younger than 18 Years of Age by ZCTA - EBR Parish, 2010-2015. Data Source: U.S. Census Bureau.



Sub-county analysis of childhood asthma meanwhile revealed a pattern of high ED visits and hospitalization events for pediatric asthma in ZCTAs 70802, 70805 and 70812 between 2010 and 2015. It is notable these three ZIP codes were also of special concern to the doctor who initially approached SEET. The ED visit rates for asthma in these ZCTAs were statistically significantly higher than the parish rate (by 69% to 86%); hospitalization rates for childhood asthma were also significantly higher, ranging from 1.59-times to twice the parish rate (Figure 2, Figure 3 and Table 1).

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Assistant Secretary OPH	Alexander Billieux, MD, DPhil
State Epidemiologist	Raoult Ratard, MD, MPH
Editors	Shannon Soileau, MS Rosalind Green, ScD Rosemarie Robertson, BS, MT(C), CNMT

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Figure 2: Average Annual Crude Rate of Childhood Asthma ED Visits per 1,000 Residents Younger than 18 Years of Age by ZCTA - EBR Parish, 2010-2015. ED Visits Data Source: LDH.

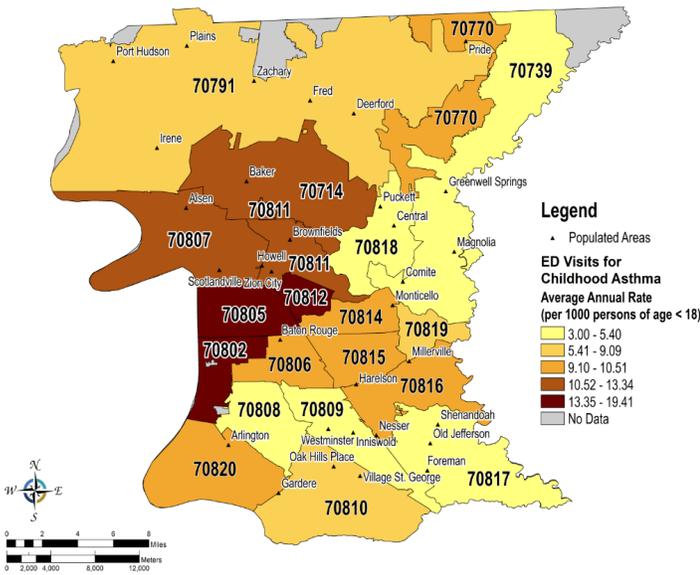


Figure 3: Average Annual Crude Rate of Childhood Asthma Hospitalizations per 1,000 Residents Younger than 18 Years of Age by ZCTA - EBR Parish, 2010-2015. Rates Based on Fewer than 20 Cases Are Marked "Unstable." Hospitalization Data Source: LDH.

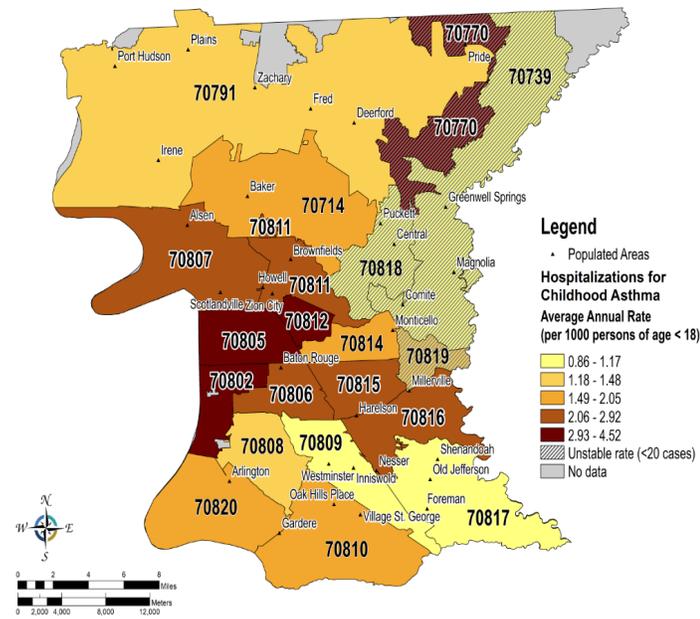
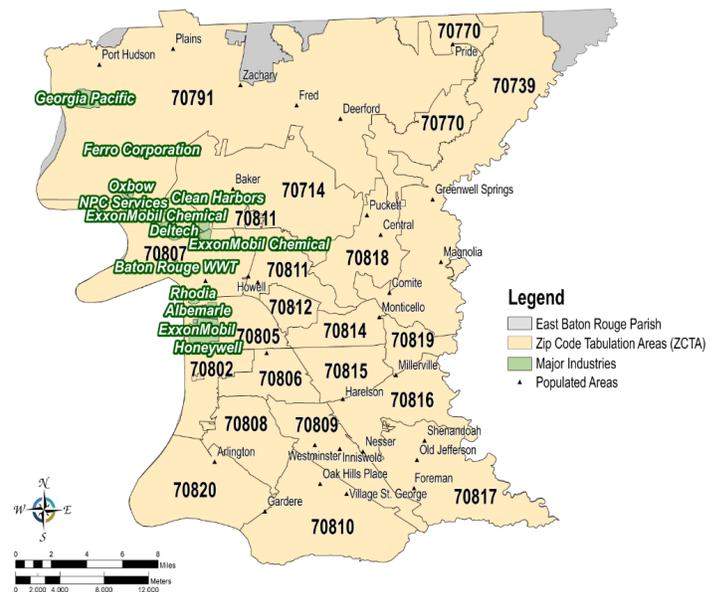


Table 1: Top Three ZCTAs with the Highest Crude Rates for Childhood Asthma ED Visit and Hospitalization - EBR Parish, 2010-2015. A Rate Ratio of Greater than 1.0, Where the 95% C.I. Does Not Include the Value of 1.0, Indicates that the ZCTA Rate is Statistically Significantly Higher than the EBR Parish Rate.

Location	ED Visits		Hospitalizations	
	Rate (per 1,000 children, age < 18)	Rate Ratio compared to EBR (95% C.I.)	Rate (per 1,000 children, age < 18)	Rate Ratio compared to EBR (95% C.I.)
EBR	10.45	Reference	2.26	Reference
70802	19.18	1.83 (1.69, 1.99)	3.60	1.59 (1.32, 1.93)
70805	19.41	1.86 (1.74, 1.98)	4.52	2.00 (1.75, 2.30)
70812	17.71	1.69 (1.52, 1.89)	4.21	1.86 (1.49, 2.34)

SEET found that ZCTA 70805, which had the highest asthma-related ED visit rate, also had the highest concentration of industrial facilities in the parish (Figure 4). However, this observation alone should not be used to make any assumptions regarding causal associations (see Data Limitations).

Figure 4: Major Industrial Sites - EBR Parish, 2018. Data Source: Internal LDH. Polygons (Green) Were Compiled from Various Sources for General Reference Only and Are Not Intended to be an Exhaustive List. Ongoing Changes to Plant Ownership, Status and Extent Often Occur, and Sites may be Incorrect or Missing from this List. This Map Alone Should Not Be Used to Make Any Causal Assumptions (see Data Limitations)

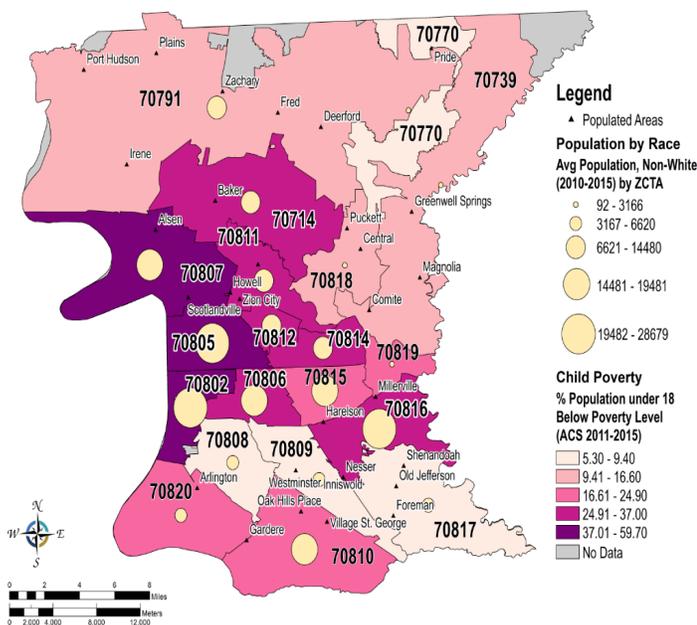


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Statistics for several socioeconomic factors were also notable for ZCTAs 70802, 70805 and 70812, where the childhood asthma ED visit/hospitalization rates were the highest. In terms of demographics, non-white populations comprised much of these three ZCTAs during 2010 to 2015. As a fraction of their total population, ZCTAs 70805 and 70812 were comprised of ~ 95% to 97% non-white residents. In terms of total number, ZCTA 70802 and 70805 were among the top three ZCTAs with the largest average population of non-white residents. Poverty among children in ZCTAs 70802 and 70805 was among the highest in the parish (~ 52% to 60% of residents younger than 18 years of age), (Figure 5). Medicaid was listed as a payer for nearly 90% of the ED visits and over 40% of the hospitalization events for asthma among children in these three ZCTAs.* Of note, payer information was available for only about half of the hospitalization cases; therefore, the percentage of hospitalization cases paid for by Medicaid may be greater than the current estimate. Overall, these data serve to highlight the demographic inequities in health outcomes in EBR Parish, and the resulting burden of asthma from both a healthcare as well as a cost perspective.

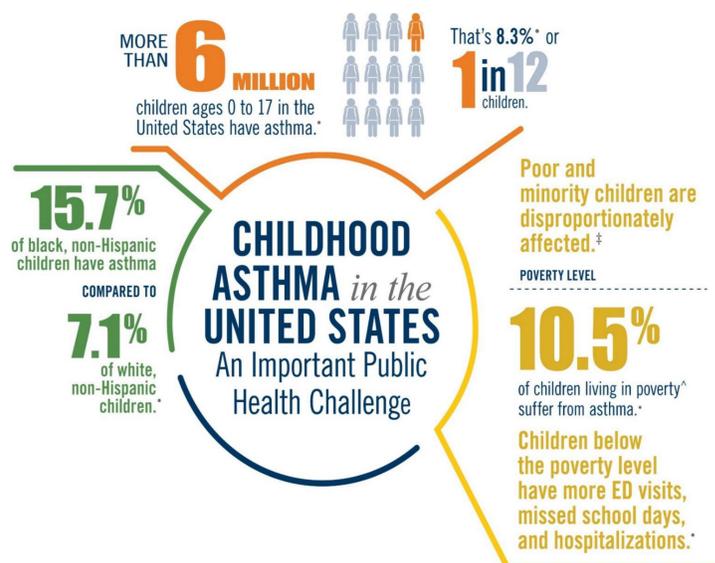
Figure 5: Demographic Profile by Race and Poverty by ZCTA - EBR Parish. Shading on the Map Shows Percent Population Younger than 18 Years of Age with a Past 12-Month Income Below the Poverty Level (Data Source: U.S. Census Bureau American Community Survey, 2011-2015). Size of the Circles Indicate the Average Number of Residents Who Did Not Identify Their Race as "White" During the Years 2010 to 2015 (Data Source: U.S. Census Bureau).



* For Medicaid usage and health insurance coverage maps, see (i) in the 'Further Reading' section.

Racial minorities and individuals of lower socioeconomic status are disproportionately affected by health disparities, which are often further compounded by inherently unequal environmental burdens [5-6]. This is particularly notable in the case of respiratory diseases such as asthma, which can be aggravated by environmental triggers in both indoor and outdoor air. Indeed, demographic inequities in childhood asthma is recognized by the Environmental Protection Agency (EPA) and CDC as a national issue (Figure 6), which will likely require a concerted effort at the local level to overcome.

Figure 6: Childhood Asthma - United States, 2016 [Image Source: EPA; Data Source: 2016 National Health Interview Survey Data (CDC)]



† Coordinated Federal Action Plan to Reduce Racial and Ethnic Asthma Disparities. https://www.epa.gov/sites/production/files/2014-08/documents/federal_asthma_disparities_action_plan.pdf

^ Defined as Living At or Below 100% of the Federal Poverty Level

* CDC Vital Signs Asthma in the U.S. 2018. <https://www.cdc.gov/vital-signs/childhood-asthma/>

Spurred by the preliminary associations described here, SEET is now developing outreach strategies to increase awareness of environmental asthma triggers and to minimize exposure at area homes and schools. Possible health interventions include collating and promoting asthma management resources available to Medicaid recipients through Managed Care Organizations. Guided by this sub-county analysis, SEET's goal is to promote better asthma management among children, and thereby advance the cause of health equity in Louisiana.

Data Limitations

These data and maps are provided to assist in answering questions related to the environment and possible impacts on human health. Direct connections are difficult to support with

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(Sub-county Analysis ... continued from page 4)

preliminary analyses and include only a small fraction of the available data needed to conduct a thorough investigation or study. In this specific example, factors such as asthma management, smoking and second-hand smoke exposure, other environmental asthma triggers and access to health care are just a few examples of additional considerations that could not be addressed here. These data are intended to spur research and should be used only as a starting point to understanding how the environment and other contributing factors may be connected to disease.

Data limitations should be noted if conducting exploratory ecological studies with these data. Limitations may include data gaps, reporting errors and discrepancies (for example, a disruption of reporting or instrument recording following hurricanes), and insufficient data on all potentially confounding factors. There are numerous additional factors which may contribute to disease onset. These include genetics, access to health care, existing health conditions, medicines, other chemical substances we come into contact with or ingest, nutrition, route and duration of exposure, level of activity, level of stress, and many others.

Crude rates were compared in this sub-county analysis

because the small number of cases at the ZIP code level did not allow for reliable stratification by age necessary for age-adjustment. One major limitation of this analysis, therefore, is that it cannot take into account whether any observed differences may be due to differences in the underlying structure of the population younger than 18 years of age in these geographies.

Responsible use of this data, therefore, requires exercising caution when drawing conclusions based solely on views of the limited available data. Any perceived relationship, trend, or pattern apparent in the data should not be interpreted to imply causation; it may, in fact, be unrelated and should be regarded as preliminary and potentially erroneous until more in-depth study and, if applicable, statistical evaluation can be applied. The LDH Bureau of Health Informatics, Environmental Public Health Tracking Program and the LDH Office of Public Health cannot guarantee the completeness of the information contained in these datasets.

Note that this is a preliminary review of data and maps, and this work can be added to or refined in future reports. Cite all sources when sharing or referencing these data and maps.

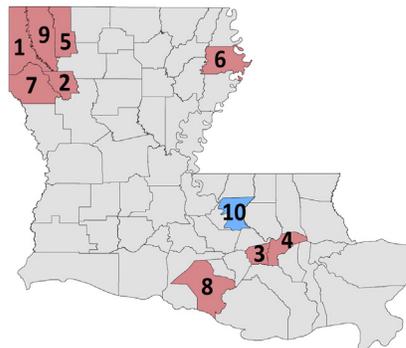
Data in Context: Tracking EBR Parish Asthma Relative to the Statewide Childhood Asthma Burden

The Environmental Public Health Tracking program tracks ED visit and hospitalization events for asthma and other health outcomes across the State of Louisiana. These data, along with the corresponding metadata, are updated biannually and made publicly available via the LDH Health Data Portal (<https://healthdata.ldh.la.gov/>). Tracking data from this query system were analyzed to provide context to the sub-county analysis by presenting the EBR Parish asthma data within the wider landscape of the statewide childhood asthma burden.

Based on 2010 to 2015 ED data, EBR Parish had the tenth highest age-adjusted rate of ED visits for childhood asthma of the 64 parishes in the state (Table 2).

Table 2: Top Ten Parishes with the Highest Age-Adjusted Rate of ED Visits for Childhood Asthma in Louisiana. The Age-Adjusted Rate for Louisiana Is Also Shown for Reference. The Map on the Right Shows the Location of the Parishes Listed in the Table; Parish Numbers on the Map Correspond to the Rank in the Table.

Rank	Parish	Age-adjusted Rate, per 1,000 Children (ED Visits; 2010-2015)
1	Caddo	24.67
2	Red River	20.35
3	St. James	19.63
4	St. John the Baptist	17.77
5	Webster	16.12
6	Madison	15.71
7	De Soto	13.50
8	St. Mary	13.34
9	Bossier	12.77
10	East Baton Rouge	12.42
-	Louisiana	9.89



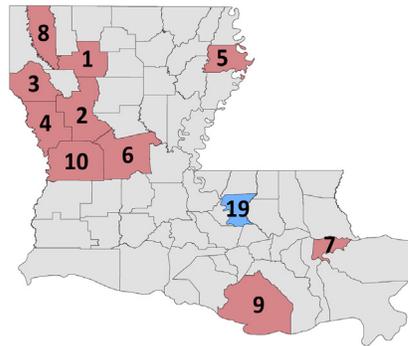
During the same time, EBR Parish ranked 19th in the state in terms of the age-adjusted rate of hospitalization events for childhood asthma (Table 3).

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Table 3: Top Ten Parishes with the Highest Age-Adjusted Rate of Hospitalization Events for Childhood Asthma in Louisiana. The Age-Adjusted Rates for Louisiana and EBR Parish Are Also Shown for Reference. The Map on the Right Shows the Location of the Parishes Listed in the Table; Parish Numbers on the Map Correspond to the Rank in the Table.

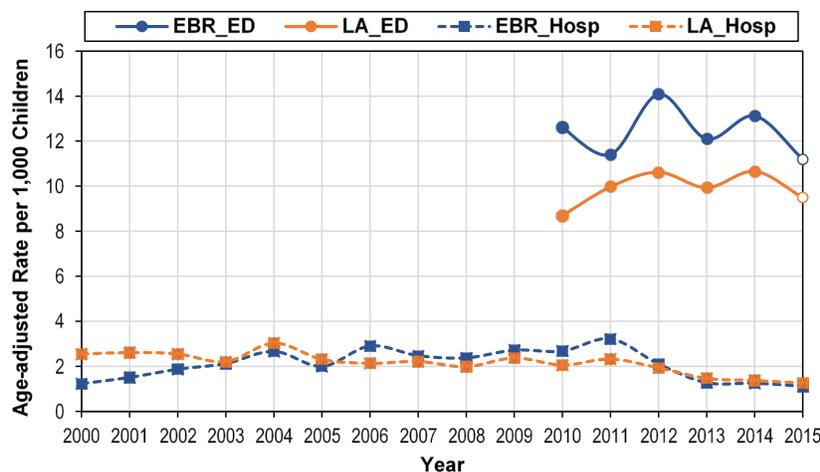
Rank	Parish	Age-adjusted Rate, per 1,000 Children (Hospitalizations; 2010-2015)
1	Bienville	3.72
2	Natchitoches	3.24
3	De Soto	3.08
4	Sabine	2.99
5	Madison	2.89
6	Rapides	2.84
7	Orleans	2.82
8	Bossier	2.75
9	Terrebonne	2.56
10	Vernon	2.46
...		
19	East Baton Rouge	1.95
-	Louisiana	1.72



Note that age-adjusted rates could be calculated at the parish and state levels due to sufficiently large counts; smaller counts at the sub-county level rendered this process unfeasible. Age-adjustment is a statistical process by which rates are calculated for geographies, assuming they have the same age distribution as that of the 2000 U.S. population (in this case, only the population under 18 years of age was considered). Thus, any potential difference that would be observed due to a difference in the population age structure of the compared geographies is eliminated.

Childhood asthma ED visit and hospitalization rates were higher for EBR Parish compared to the state as a whole during 2010 to 2015. The age-adjusted childhood asthma ED visit rate for EBR Parish was ~25% higher than the state rate (rate ratio = 1.25; 95% CI = 1.23-1.29). This is the most clearly observable feature in Figure 7 where all data points for ED visit rates for EBR Parish are higher than those for Louisiana. For 2010 to 2015, the age-adjusted hospitalization rate for childhood asthma in EBR Parish was ~13% higher than the state rate (rate ratio = 1.13; 95% CI = 1.07-1.20).

Figure 7: Trends in Childhood Asthma-Related ED Visit (2010-2015) and Hospitalization (2000-2015) Rates: EBR Parish and Louisiana. Based on Current Data Availability, the ED Visit Rate for 2015 (White Circles) Could Only Be Based on Preliminary Counts; the Actual Rate Is Likely to Be Higher.



Additional hospitalization data available to Tracking (2000 to 2015), and all available years of ED data (2010 to 2015) were further analyzed to discern any potential trends over time in childhood asthma ED visit/hospitalization rates using the Mann-Kendall trend test (Figure 7). Based on this non-parametric statistical test, which is not dependent on specific

parameters or frequency distributions, a trend is considered strong if the absolute value of Kendall's tau (τ) is close to 1.0. A negative value of tau means a negative (decreasing) trend, and vice versa. A statistically significant trend has a P-value of < 0.05, indicating a less than 5% probability that the trend was obtained by chance. According to the results, there may

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(Data in Context ... continued from page 6)

be a slight but significant decreasing trend in the hospitalization rate for childhood asthma in Louisiana during the 16-year period from 2000 to 2015 ($\tau = -0.65$; $P = 0.0005$). No other significant trends were noted in the childhood asthma ED visit or hospitalization rates for EBR Parish or Louisiana. Note that this analysis is not designed to discern any factors that may be accountable for any potential trends.

A Few Important Considerations

Note that the parish and state level rates shown here are not directly comparable to the sub-county rates for childhood asthma-related ED visits and hospitalizations presented in the first part of this article. Again, crude rates were calculated at the ZCTA level since the number of cases was too few to calculate stable age-adjusted rates. At the parish level, however, the higher number of cases allowed for reliable age-adjustment, which takes into account any gross underlying differences in the structure of the population younger than 18 years of age in the compared geographies. Furthermore, several methodological differences exist between how the National Environmental Public Health Tracking program at the CDC have determined to process the data ('Tracking data') and how the sub-county data were processed by SEET for this report. The most notable differences include the following:

- ED data processed by Tracking accounts for patients who were treated and released through the ED as well as patients who were admitted to the hospital through the ED. Sub-county

ED data only took into account patients who were billed through the ED.

- While sub-county data are based on discharge dates, Tracking data are based on admission dates. For this reason, Tracking requires the discharge data for the first quarter (Jan-Mar) of the subsequent year to get complete case counts for admissions in a particular year. At the time the Tracking data were processed, 2016 ED data were not available. Thus, the 2015 ED visit rate at the parish and state levels only include preliminary case counts. The actual 2015 ED visit rate is likely to be higher than the estimate provided here.

- The ICD-10 code for asthma used by Tracking is J45.XX, whereas the ICD-10 codes for asthma used for the sub-county data analysis were J45.XX and J46.XX. This factor, however, is expected to only make a minor difference as the ICD-10 system was only introduced in the 2015 Q4. Using the preceding ICD-9 system, the 493.XX code for asthma was consistently applied in both analyses to extract data from 2000 to 2015 Q1 to Q3 (Jan-Sept).

Further information regarding the data processing steps used by Tracking is included in the metadata, available from <https://healthdata.ldh.la.gov/>*

** For the complete EBR Parish sub-county report prepared by LDH Tracking, which includes all maps and methodological notes, see (i) in the 'Further Reading' section.*

SEET's Indoor Environmental Quality Education Service (IEQES) Promotes Healthy Indoor Environments for Asthma Management

Melanie Ramson, MSPH; Arundhati Bakshi, PhD; Collette Stewart-Briley, MSPH; Kate Friedman, MNS

Indoor Environments and Childhood Asthma

According to the EPA, children spend the majority of their day indoors. Children have smaller organ systems than adults and their systems are more vulnerable to indoor pollutants. A child's heart rate and respiration are also faster than an adult's, which adds to their natural vulnerability to inhaled pollutants [7-8].

Asthma is a disease that affects a child's ability to adequately breathe due to inflammation and mucus production deep within the lung tissue. Asthmatic children may have immune systems that are much more sensitive to air quality and environmental fluctuations. Subtle changes in the indoor environment (temperature and relative humidity) can exacerbate their asthma symptoms [9].

Pollutants in the indoor air may also trigger asthma exacerbations, particularly in young children. Asthma triggers include dust, insect droppings and body parts, chemicals, cleaning products, painting products, fragrances, animal

dander, environmental tobacco smoke, and repair/remediation trash/debris [10].

Perhaps unexpected, outdoor air intrusion should also be noted when considering sources of indoor environmental contaminants. These types of contaminants can enter the indoor environment in one or a combination of ways: the fresh-air intake of the heating, ventilation, and air-conditioning mechanical system; improperly sealed windows and doors; opening and/or leaving windows and doors open. Thus, what occurs outdoors can quickly become part of the indoor environment [10].

Children can be exposed to many of these pollutants in homes as well as schools [7]. Keeping living spaces and classrooms clean and free of these triggers can go a long way to reducing the number and severity of asthma attacks.

Indoor Environmental Quality Education Service (IEQES)

LDH/OPH/SEET developed IEQES in 2000 in response to

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(SEET's Indoor Environmental ... continued from page 7)

calls and concerns from the public regarding indoor environmental issues. Additional services provided by IEQES include conducting walkthroughs of public facilities, as deemed necessary, in cooperation with officials in the OPH-Region of concern and Sanitarian Services. During these visits, The EPA's Indoor Air Quality Tools for Schools Walkthrough Checklist ^[1] is used to assess the extent of the indoor environmental concern and to recommend mitigation strategies.

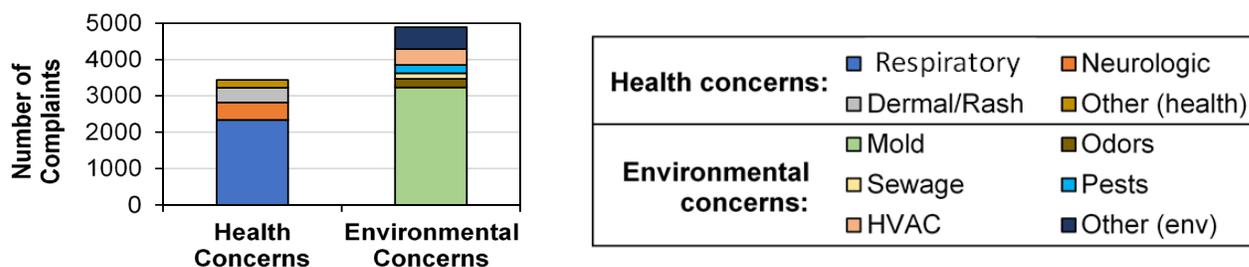
As part of the onsite educational activities, LDH developed the *Indoor Environmental Quality Top Ten**, which summarizes and provides at-a-glance environmental quality directives that inspire improvement of indoor spaces. These tools are provided to onsite staff and administration as a means of maintaining corrective actions, educating on the topic of indoor environmental quality, and communicating ongoing or in-progress remediation/repair activities.

Indoor Environmental Quality in EBR Parish and Louisiana

SEET/IEQES receives complaints and informational requests for guidance through emails, phone calls, website inquiries, federal/state/local agencies, non-profit organizations, and other LDH programmatic referrals. An assessment of the data collected from these calls for the 2010 to 2015 timeframe offered the following major insights into indoor environmental quality (IEQ) issues in EBR Parish and Louisiana**.

1. The most frequently reported IEQ concern was mold (Figure 8). Approximately 85% of the calls from both Louisiana and EBR Parish were concerning mold.
2. Approximately 60% of the calls from Louisiana as well as EBR Parish reported respiratory complaints associated with the IEQ concern. Over two-thirds of the calls from Louisiana reported one or more health concerns, the most frequent among them being respiratory issues (Figure 8).

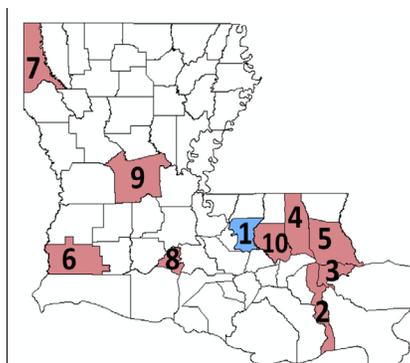
Figure 8: Most Frequent Health and Environmental Concerns Reported by Inquirers to SEET/IEQES - Louisiana, 2010-2015. Note that One Call May Register More than One Complaint.



3. Based on callers' self-reported location of issue, calls regarding EBR Parish accounted for ~21% of total calls (794/3787) - the highest in the state, even though only 9% of the state population lives in EBR Parish (Table 4).

Table 4: Top Ten Parishes from Which the Greatest Number of Calls Were Received Regarding Indoor Environmental Quality (IEQ) Issues by SEET/IEQES, 2010-2015. The Map on the Right Shows the Location of the Parishes Listed in the Table; Parish Numbers on the Map Correspond to the Rank in the Table.

Rank	Parish	Average Annual Number of IEQ Calls (Percent Mold-Related Calls)
1	East Baton Rouge	132.33 (85.39%)
2	Jefferson	60.50 (81.82%)
3	Orleans	53.83 (73.68%)
4	Tangipahoa	30.50 (93.44%)
5	St. Tammany	29.17 (82.29%)
6	Calcasieu	27.83 (92.22%)
7	Caddo	26.50 (90.57%)
8	Lafayette	22.17 (91.73%)
9	Rapides	20.50 (91.06%)
10	Livingston	19.83 (90.75%)



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* See (ii) in the 'Further Reading' section.

**A complete report summarizing IEQES complaint calls from 2008-2017 is available; see (iii) in the 'Further Reading' section.

(SEET's Indoor Environmental ... continued from page 8)

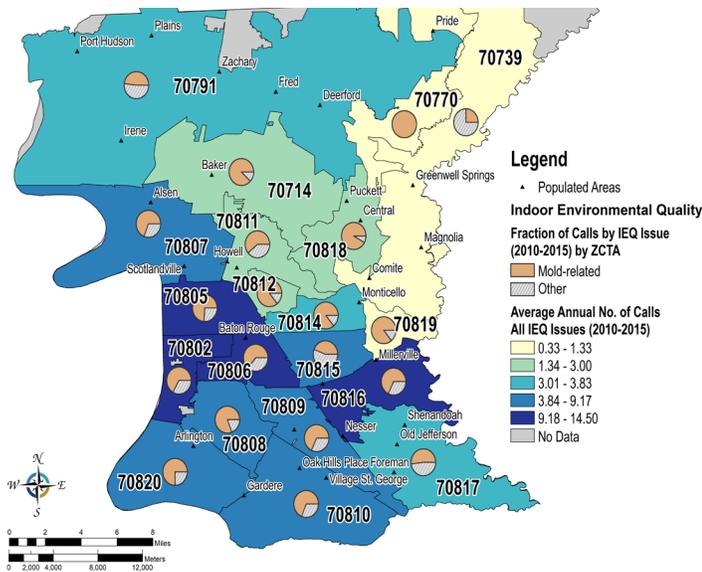
The greatest number of mold-related calls also reported these issues in EBR Parish (678/3232; ~21%). These observations may, at least in part, reflect the public's awareness about the IEQES program.

4. Within EBR Parish, the greatest number of IEQ-related calls originated from ZIP codes 70802, 70805, 70806 and 70816. More than half of the calls in these areas were related to mold. About 70% of the callers from ZIP code 70805 and 56% to 59% of the callers from 70806 and 70816 reported respiratory concerns. Note that the total calls by ZIP code may be slightly higher than represented due to ~8% of callers not providing ZIP code information (Figure 9).

Table 5: Total Number and Percentage of Calls from Schools and Residences (Owned and Leased/Rented) Reporting Respiratory Complaints and Mold Concerns to IEQES, 2010-2015.

Location of Concern	No. of Calls with Respiratory Complaints (%)	No. of Calls with Mold Complaints (%)
Louisiana (3787 Total Calls)		
Residence (All)	2087 (55.11%)	2755 (72.75%)
Residence (Rented/Leased Only)	1567 (41.38%)	1981 (52.31%)
Schools	70 (1.85%)	84 (2.22%)
EBR Parish (794 Total Calls)		
Residence (all)	450 (56.68%)	584 (73.55%)
Residence (Rented/Leased Only)	374 (47.10%)	479 (60.33%)
Schools	5 (0.63%)	10 (1.26%)

Figure 9: Indoor Environmental Quality Issues in EBR Parish by ZCTA, 2010-2015. Brown on the Pie Charts Show the Fraction of Calls that Were Related to Mold. Data Source: SEET/IEQES.



5. Among the EBR callers concerned about an indoor environmental issue in a residence, ~74% reported mold concerns, and ~57% reported respiratory issues. Approximately 83% of the calls regarding residential spaces were made by a tenant. While a majority of callers were concerned with mold in their homes during 2010 to 2015, 84 callers statewide, including ten from EBR Parish, reported mold in a school building (Table 5). Depending on the extent of the mold issue, each of these reports could represent the potential for impacts to the indoor environmental quality of dozens or even hundreds of children*.

Indoor Environments and Asthma in EBR Parish

Some of the areas reporting the highest number of IEQ concerns to IEQES likewise ranked among the top five ZCTAs with the largest non-white population (70802, 70805 and 70816) and the highest rates of child poverty (70802, 70805, 70806 and 70816) between 2010 and 2015 (Figures 5 and 9). Most of the residential mold complaints concerned leased/rented spaces, indicating that at least some of the tenants calling may not have the financial means for homeownership (Table 5). These data are consistent with various existing publications highlighting the disproportionate share of environmental burdens that can affect racial minorities and people of lower socioeconomic status, which can, in turn, contribute to the health disparities observed in these communities [5-6, 12].

As previously noted, the rates of childhood asthma ED visit and hospitalizations were among the highest in ZCTAs 70802 and 70805 (Figures 2 and 3 and Table 1). These areas simultaneously ranked among the top five in EBR Parish for the highest number of IEQ-related reports while also sharing the socioeconomic factors (discussed previously) associated with high asthma rates (Figures 5 and 9).

Moreover, the highest number of respiratory complaints associated with IEQ issues in EBR Parish were registered from ZIP code 70805, where the majority of the callers' concerns were related to mold (Figure 9). The CDC lists mold as a common asthma trigger found in indoor environments [3]; however, no direct causal assumptions may be made without more specific information (e.g. the spaces occupied by asthmatics, their individual triggers, the type and stage of any mold growth, etc.). At the same time, environmental burdens such as these, which may be related to location, age and/or maintenance status of housing and schools (among other factors), may provide some additional, partial insight into the root causes of the asthma-related health disparities observed in these areas.

* For strategies on creating asthma-friendly school environments, see (iv) in the 'Further Reading' section.

(continued on page 10)

(SEET's Indoor Environmental ... continued from page 9)

A Few Important Considerations:

- An inquiry is listed by the location of concern.
- A single call may contain several health symptoms and environmental issue category types.
- The data collected is subjective; it represents details as reported by the caller.
- No causal relationship is established between the respiratory health symptoms reported and mold exposure.
- The number of IEQ calls by EBR Parish ZIP code may represent an underestimation of the actual number of reported issues due to ~8% of callers not providing ZIP code information. Additionally, ZIP code information was unavailable for ~21% of mold-related calls due to discrepancies in data entry. Regardless of the ZIP code, if the address matched EBR Parish, then the calls have been included in the parish-level counts.

7. Reference Guide for Indoor Air Quality in Schools https://www.epa.gov/iaq-schools/reference-guide-indoor-air-quality-schools#IAORG_Section1 accessed February 18, 2019
8. Children and Air Pollution <https://www.lung.org/our-initiatives/healthy-air/outdoor/air-pollution/children-and-air-pollution.html> accessed February 18, 2019
9. Why Indoor Air Quality is Important to Schools <https://www.epa.gov/iaq-schools/why-indoor-air-quality-important-schools> accessed February 18, 2019
10. Reference Guide for Indoor Air Quality in Schools: Understanding IAQ Problems https://www.epa.gov/iaq-schools/reference-guide-indoor-air-quality-schools#IAORG_Section2 accessed February 18, 2019
11. Creating Healthy Indoor Air Quality in Schools <https://www.epa.gov/iaq-schools> accessed January 29, 2019
12. The indoor environment and inner-city childhood asthma; Kanchongkittiphon, W. et al. (2014); *Asian Pac J Allergy Immunol.* 32:103-110.

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References

1. Asthma; <https://www.nhlbi.nih.gov/health-topics/asthma> accessed December 12, 2018
2. 2015 Child Asthma Data: BRFSS Prevalence Tables; <https://www.cdc.gov/asthma/brfss/2015/child/brfsschilddata.htm> accessed February 13, 2019
3. Common Asthma Triggers; <https://www.cdc.gov/asthma/triggers.html> accessed December 12, 2018
4. Asthma and Ethnic Minorities: Socioeconomic Status and Beyond; Forno E. and Celedon J.C. (2011); *Curr Opin Allergy Clin Immunol.* 9: 154-160.
5. Socioeconomic Status and Health: The Potential Role of Environmental Risk Exposure; Evans G.W. and Kantrowitz E. (2002); *Annu Rev Public Health* 23: 303-331.
6. Environmental Justice: Income, Race and Health; Massey R. (2004); *Global Development and Environment Institute, Tufts University (Medford, MA).*

Further Reading

- i. Complete sub-county report on asthma in EBR Parish: http://www.ldh.la.gov/assets/oph/Center-EH/envepi/Reports/EBR_Asthma_EXTENDED.pdf
- ii. Louisiana's Top Ten No- or Low-Cost Tools for Schools: Indoor Air Quality Interventions: http://www.ldh.la.gov/assets/oph/Center-EH/envepi/Indoor_Air/Documents/LA_Top_10_Indoor_Air_Quality_for_Schools.pdf
- iii. Complete report summarizing IEQES complaint calls from 2008-2017: http://ldh.la.gov/assets/oph/Center-EH/envepi/Indoor_Air/Documents/A_Descriptive_Summary_of_Indoor_Environmental_Education_Service_Complaint_Cases_2008_to_2017.pdf
- iv. Applying the Social Ecological Model to Creating Asthma-Friendly Schools in Louisiana (Nuss et al., 2010, J. Sch Health): <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4754781/>.

For more information, please contact Dr. Bakshi (arundhati.bakshi@la.gov) at 225-342-3279. IEQ-related questions can be directed to Ms. Ramson (melanie.ramson@la.gov) at 225-342-8303, the toll-free hotline 1-888-293-7020 or through the online Environmental Epidemiology Complaint/Inquiry Form: <http://new.dhh.louisiana.gov/index.cfm/form/61>.

**Sanitary Code - State of Louisiana
Part II - The Control of Disease**

LAC 51:II.105: The following diseases/conditions are hereby declared reportable with reporting requirements by Class:

Class A Diseases/Conditions - Reporting Required Within 24 Hours

Diseases of major public health concern because of the severity of disease and potential for epidemic spread-report by telephone immediately upon recognition that a case, a suspected case, or a positive laboratory result is known; [in addition, all cases of rare or exotic communicable diseases, unexplained death, unusual cluster of disease and all outbreaks shall be reported.

Acute Flaccid Paralysis	Fish/Shellfish Poisoning (domoic acid, neurotoxic shellfish poisoning, ciguatera, paralytic shellfish poisoning, scombroid)	Plague (<i>Yersinia pestis</i>)	Smallpox
Anthrax	Foodborne Infection	Poliomyelitis (paralytic & non-paralytic)	<i>Staphylococcus aureus</i> , Vancomycin Intermediate or Resistant (VISA/VRSA)
Avian or Novel Strain Influenza A (initial detection)	<i>Haemophilus influenzae</i> (invasive infection)	Q Fever (<i>Coxiella burnetii</i>)	Staphylococcal Enterotoxin B (SEB) Pulmonary Poisoning
Botulism	Influenza-associated Mortality	Rabies (animal and human)	Tularemia (<i>Francisella tularensis</i>)
Brucellosis	Measles (Rubeola imported or indigenous)	Ricin Poisoning	Viral Hemorrhagic Fever (Ebola, Lassa, Marburg, Crimean Congo, etc.)
Cholera	<i>Neisseria meningitidis</i> (invasive infection)	Rubella (congenital syndrome)	Yellow Fever
<i>Clostridium perfringens</i> (foodborne infection)	Outbreaks of Any Infectious Disease	Rubella (German Measles)	
Diphtheria	Pertussis	Severe Acute Respiratory Syndrome-associated Coronavirus (SARS-CoV)	

Class B Diseases/Conditions - Reporting Required Within 1 Business Day

Diseases of public health concern needing timely response because of potential of epidemic spread-report by the end of the next business day after the existence of a case, a suspected case, or a positive laboratory result is known.

Amoeba (free living infection: <i>Acanthamoeba</i> , <i>Naegleria</i> , <i>Balamuthia</i> , others)	Chagas Disease	Hepatitis B (perinatal infection)	Mumps
Anaplasmosis	Chancroid	Hepatitis E	Salmonellosis
Arthropod-Borne Viral Infections (West Nile, Dengue, St. Louis, California, Eastern Equine, Western Equine, Chikungunya, Usutu, and others)	<i>Escherichia coli</i> , Shiga-toxin producing (STEC), including <i>E. coli</i> O157:H7	Herpes (neonatal)	Shigellosis
Aseptic Meningitis	Granuloma Inguinale	Human Immunodeficiency Virus ² [(HIV), infection in pregnancy]	Syphilis ¹
Babesiosis	Hantavirus (infection or Pulmonary Syndrome)	Human Immunodeficiency Virus ² [(HIV), perinatal exposure]	Tetanus
	Hemolytic-Uremic Syndrome	Legionellosis	Tuberculosis ³ (due to <i>M. tuberculosis</i> , <i>M. bovis</i> , or <i>M. africanum</i>)
	Hepatitis A (acute illness)	Malaria	Typhoid Fever
	Hepatitis B (acute illness and carriage in pregnancy)		

Class C Diseases/Conditions - Reporting Required Within 5 Business Days

Diseases of significant public health concern-report by the end of the workweek after the existence of a case, suspected case, or a positive laboratory result is known.

Acquired Immune Deficiency Syndrome ³ (AIDS)	Giardiasis	Listeriosis	Staphylococcal Toxic Shock Syndrome
<i>Anaplasma Phagocytophilum</i>	Glanders (<i>Burkholderia mallei</i>)	Lyme Disease	Streptococcal Disease, Group A (invasive disease)
Blastomycosis	Gonorrhea ¹ (genital, oral, ophthalmic, pelvic inflammatory disease, rectal)	Lymphogranuloma Venereum ¹	Streptococcal Disease, Group B (invasive disease)
Campylobacteriosis	Hansen's Disease (leprosy)	Melioidosis (<i>Burkholderia pseudomallei</i>)	Streptococcal Toxic Shock Syndrome
Chlamydial infection ¹	Hepatitis C (acute illness)	Meningitis, Eosinophilic (including those due to <i>Angiostrongylus</i> infection)	<i>Streptococcus pneumoniae</i> , invasive disease
Coccidioidomycosis	Histoplasmosis	Nipah Virus Infection	Transmissible Spongiform Encephalopathies (Creutzfeldt-Jacob Disease & variants)
Cryptococcosis (<i>C. neoformans</i> and <i>C. gattii</i>)	Human Immunodeficiency Virus ² (HIV) (infection other than as in Class B)	Non-gonococcal Urethritis	Trichinosis
Cryptosporidiosis	Human T Lymphocyte Virus (HTLV I and II infection)	Ophthalmia neonatorum	Varicella (chickenpox)
Cyclosporiasis	Leptospirosis	Psittacosis	Vibrio Infections (other than cholera)
Ehrlichiosis (human granulocytic, human monocytic, <i>E. chaffeensis</i> and <i>E. ewingii</i>)		Spotted Fevers [<i>Rickettsia</i> species including Rocky Mountain Spotted Fever (RMSF)]	Yersiniosis
<i>Enterococcus</i> , Vancomycin Resistant [(VRE), invasive disease]		<i>Staphylococcus aureus</i> (MRSA), invasive infection	

Class D Diseases/Conditions - Reporting Required Within 5 Business Days

Cancer	Heavy Metal (arsenic, cadmium, mercury) Exposure and/or Poisoning (all ages) ²	Phenylketonuria ⁴	Severe Traumatic Head Injury
Carbon Monoxide Exposure and/or Poisoning ⁵	Hemophilia ⁴	Pneumoconiosis (asbestosis, berylliosis, silicosis, byssinosis, etc.)	Severe Undernutrition (severe anemia, failure to thrive)
Complications of Abortion	Lead Exposure and/or Poisoning (all ages) ^{4,5}	Radiation Exposure, Over Normal Limits	Sickle Cell Disease ⁶ (newborns)
Congenital Hypothyroidism ⁴	Pesticide-Related Illness or Injury (all ages) ²	Reye's Syndrome	Spinal Cord Injury
Galactosemia ⁴			Sudden Infant Death Syndrome (SIDS)

Case reports not requiring special reporting instructions (see below) can be reported by mail or facsimile on Confidential Disease Report forms (2430), facsimile (504) 568-8290, telephone (504) 568-8313, or (800) 256-2748 for forms and instructions.

¹Report on STD-43 form. Report cases of syphilis with active lesions by telephone, within one business day, to (504) 568-8374.

²Report to the Louisiana HIV/AIDS Program: Visit www.hiv.dhh.louisiana.gov or call 504-568-7474 for regional contact information.

³Report on form TB 2431 (8/94). Mail form to TB Control Program, DHH-OPH, P.O. Box 60630, New Orleans, LA. 70160-0630 or fax both sides of the form to (504) 568-5016

⁴Report to the Louisiana Genetic Diseases Program and Louisiana Childhood Lead Poisoning Prevention Programs: www.genetics.dhh.louisiana.gov or facsimile (504) 568-8253, telephone (504) 568-8254, or (800) 242-3112

⁵Report to the Section of Environmental Epidemiology and Toxicology: www.seet.dhh.louisiana.gov or call (225) 342-7136 or (888) 293-7020

All **laboratory facilities** shall, in addition to reporting tests indicative of conditions found in §105, report positive or suggestive results for additional conditions of public health interest. The following findings shall be reported as detected by laboratory facilities: 1. adenoviruses; 2. coronaviruses; 3. enteroviruses; 4. hepatitis B (carriage other than in pregnancy); 5. hepatitis C (past or present infection); 6. human metapneumovirus; 7. parainfluenza viruses; 8. respiratory syncytial virus; and 9. rhinoviruses.

LOUISIANA DEPARTMENT OF HEALTH
OFFICE OF PUBLIC HEALTH
P.O. BOX 60630 NEW ORLEANS LA 70160

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