1. BACKGROUND

CIRCUMSTANCES

On Wednesday May 13, 2009 at 13:30 the Bureau of Epidemiology (BOE) in the Houston Department of Health and Human Services (HDHHS) received a report from the Houston Independent School District (HISD) Medical Administration that Travis Elementary School was experiencing an outbreak of unknown illness, primarily among 3rd grade students. The school nurse initially reported that 41 third grade students (41/117 = 35%) were absent (21 students) or sent home (20 students). Symptoms reported were primarily fever, headache, lethargy, and stomach ache. Some had cough while several students were nauseous, one vomited and one had diarrhea. Absentee numbers in other grade levels ranged from two to five students per grade level. Grade levels range from pre-K to 5th grade.

Travis Elementary School is a magnet school for gifted and talented students and is located in the Heights neighborhood in Houston. About 35% of the student population lives in the school zone but some live in several different areas of Houston.

FOLLOW-UP

Phone Interviews on 5/13/2009 - The BOE received contact information from the school on 73 students who were absent or sent home on 5/13. Of those, the parents of 20 students were contacted in the evening of 5/13 and 18 students reported symptoms of fever = 100.4°F (18), headache (12), cough (9), sore throat (9), nausea (8), muscle aches (7), vomiting (6), difficulty breathing (4), and runny nose (3). The onset dates of illness were 5/12/2009 (4) and 5/13/2009 (14).

Key Informant Interviews on 5/13/2009 - Key informant interviews with three third grade teachers and a teaching assistant identified some of the school activities. A detailed description of these activities is located in the Appendix under Table A: Type of School Activities and Grade-Level Participation at Travis Elementary School, Houston, Texas 2009. It was also reported that the school's air conditioning system was not functioning properly and there were rolling blackouts a week prior to the outbreak.

School Absenteeism on 5/14/2009 - A total of 216 students (30%) were absent and more than one-third were 3rd grade students (38%). Twenty six students were also sent home. Three staff felt ill but no staff were absent. Fourteen students were seen by physicians, of those 7 had ILI (Influenza-like Illness) symptoms and their specimens were submitted to HDHHS lab for testing.

Visit to the School on 5/14/2009 - An Environmental Health Specialist, an Epidemiologist and Sanitarians visited the school. No violation was noted in food preparation areas. Testing and environmental assessment at the school appeared normal.

Based on the findings thus far, the acute nature of the incident, and the rapid increase in school absenteeism, BOE suggested that a probable flu outbreak was most likely spreading in the school.

School Closure **-** On May 15, 2009, Travis Elementary School was closed with plans to re-open on May 26, 2009.

On 5/15 at 8:00 the first 2 confirmed H1N1 cases from Travis Elementary School were reported. By 5/15 at 15:20 there were 12 confirmed H1N1 cases (10 from 3rd grade; 1 from 4th grade; and 1 from 2nd grade).

May 26th Travis Scheduled Reopening:
Based on complaints from parents and school staff, water testing was performed by an HISD contract laboratory during the week of the school's closure.Elevated levels of unspecified bacteria were detected in two of three water sources tested.Data from the on-line survey needed to help rule out sources of infection other than novel H1N1 was not available prior to the scheduled reopening date of 5/26/09.Because an additional infection source could not be completely ruled out, the decision was made to extend the closure through the final three days of the school year .

2. EPI AID TEAM FROM CDC/DSHS

The HDHHS requested CDC assistance with the investigation of this outbreak On Monday 5/18 a nine member Epi Aid Team (two CDC staff, 1 staff from Texas DSHS, 1 staff from PHR 6/5S, and 5 Epi Staff from Angel Staffing Agency) was deployed to assist HDHHS BOE with Travis Elementary School outbreak investigations and any associated epidemiological activities. The following activities were conducted.

INVESTIGATIONS OF CONFIRMED CASES

Forty confirmed H1N1 cases from Travis Elementary School were investigated, and one case was lost to follow-up. Seventy-nine percent of confirmed cases had ILI, with 59% having an illness onset date of 5/13. Cough and fever were the most commonly reported symptoms (90% and 95% respectively). A summary table of demographic characteristics and symptom distribution of confirmed cases from Travis Elementary School is located in the Appendix Table B: Demographic Characteristics and Symptom Distribution of Confirmed H1N1 Cases-Travis Elementary School, Houston, Texas June 2009 (N=40*).

Although Influenza most commonly spreads from person-to-person, the possibility of common-source exposure was also investigated. All of the 39 confirmed cases reported their onset dates from May 12th-19th. The highest number of cases were reported on May 13th and six with onset dates of May 12th. An index case has not been identified.

Interviews with the parents of confirmed cases identified three possible epidemiologically-linked events; a baseball league event on 5/09; two opera performance and presentation activities at the

school on 5/11. The events and ensuing investigations are described in detail in Appendix Table C: Epidemiologically Linked Events and Resulting Investigations.

DEVELOPMENT AND IMPLEMENTATION OF ON-LINE SURVEY

An on-line questionnaire was developed and implemented using the CDC's on-line interview tool, MR-Interview:

- to help determine the possible extent of the outbreak of acute respiratory illness at Travis Elementary School and
- to assess and determine possible modes of transmission of novel influenza A (H1N1) virus among students at Travis Elementary School and possibly among household members of students.

* ***There are 40 confirmed cases but this curve was based on onset dates from 39 cases due to lost to follow up on 1 case.***

Development of On-Line Survey

- HDHHS along with the Epi Aid Team visited the school on 5/19 and on 5/21. Interviews were conducted with school maintenance staff, teachers, and the school principal in order to gain a better understanding of the student environment and to solicit further information regarding key activities and events.
- The questionnaire was developed based on those used in New York City and San Antonio.
- The on-line survey asked questions about dates and symptoms of illness in students and staff of Travis Elementary School as well as their household contacts, attendance at school events the week before the outbreak, activities performed outside of school (such as sport leagues or scouts), and adherence to social distancing recommendations.
- The questionnaire was available on the internet from the morning of Thursday, 5/28 through Monday 6/08.

Implementation of On-Line Survey

A communication strategy was developed to reach as many parents or guardians of Travis students and staff as possible.

- 5/26-5/27 Assigned user IDs and passwords to students from the HISD directory (712); additional students from school directory and teacher e-mail lists (43); faculty and staff (103).
- 5/27 Phone blast by school principal
- 5/27 Mass mailing of 712 letters informing parents or guardians about the survey and asking for their participation.
- 5/28-5/29 (4-8pm) To overcome the lack of Internet access, computer stations with HDHHS staff support were available at a church near Travis Elementary School
- 5/27-5/29 Made three phone calls to each student household (150 questionnaires were completed over the phone)
- 5/28 Sent e-mails informing parents/guardians about the survey and asked for their participation

- 5/29 Sent e-mails informing teachers/staff about the survey and asked for their participation
- 6/1-6/2 Sent a letter home with all students attending graduation ceremonies
- 6/3 Reminder 2nd phone blast by school principal
- 6/4 Reminder e-mails to non-completers
- 6/4-6/8 Phone calls to confirmed cases who have not completed the survey
- 6/4-6/8 Phone calls to those individuals who have only partially completed the survey

Response of On-Line Survey

A total of 332 households (38.6% response rate) completed the survey; 50% of our completed questionnaires were completed over the phone and 23 confirmed H1N1 cases completed the survey.

HDHHS received and analyzed the final SAS dataset from CDC. A total 330 households (representing 1,234 individuals) are included for the analysis. Individuals were divided into four groups: Travis students; Travis staff; Non-Travis School-aged Children (< 19 yrs old); Non-Travis Adults (19+ yrs old). Gender distribution was almost identical when comparing Travis students to Non-Travis children completing the survey. Of survey respondents 54% of Non-Travis children were Hispanic compared to 43% of Travis students. Forty-three percent of Travis students and 52% of Travis staff reported travel history outside of Houston compared to 30% of Non-Travis children and 45% of Non-Travis adults. Of survey respondents 32% of Travis students reported ILI, almost three times the percentage of Non-Travis children. Characteristics of the survey respondents are described in Table D: Characteristics of survey respondents by relationship to Travis Elementary and age group, located in the Appendix.

Environmental Assessment

Initial water testing in the school detected elevated levels of unspecified bacteria from two of three water sources tested.The City of Houston conducted additional water testing which also detected the presence of unspecified bacteria. tests were negative for total coliform and *E. coli* bacteria.Preventive maintenance was performed on the water lines including back flow prevention and flushing of the lines.All water samples collected after the preventive maintenance were negative for bacterial contamination.

It was reported that the air conditioning system was sporadically non-functional a week prior to the outbreak at Travis. In addition the windows in most of the classrooms could not be opened. Therefore, fresh air circulation in the classrooms when the air-conditioning was down might have been compromised.

3. RESULTS

ABSENTEE RATE

The absentee rates for all grades are accounted and charted (Figure 1). After examination of the two weeks prior to Travis Elementary closure (5/4 – 5/14), the data indicates a relatively stable trend through time. Beginning May 13th, a spike forms in the third grade rate while the other grades remain consistent with the previous trend. On May 14th the third grade rate increases exponentially to 70.9% absent. The same day shows an increased rate in all grades, but not nearly as substantial as the third grade.

Figure 1: Percent of Students Absent at Travis Elementary School from May 4, 2009 to May 14, 2009.

OVERALL PREVALENCE OF ILLNESS

There are 40 confirmed H1N1 cases at Travis Elementary School. Students with confirmed cases of H1N1 account for 13.4% of the third grade and 8.8% of the fourth grade. Similarly, most instances of ILI and ARI were among third grade students compared to all other grades.

Attack rates for confirmed H1N1cases, and ILI with ARI by grade can be found in the Appendix as Figures A and B respectively.

The prevalence of ARI, ILI, ILI with gastro-intestinal symptoms, and fever was also examined among Travis Elementary students, staff, and their household contacts. The following graph of symptom prevalence shows that ARI, ILI, ILI with GI, and fever are all present in higher numbers in children than adults (Figure 2). Furthermore, it is clear that the prevalence of all symptoms is significantly higher in the Travis-associated groups than in non-associated groups. This suggests that there was something unique about the Travis environment that increased transmission within the school.

Figure 2: The Prevalence of ARI, ILI, ILI with GI, and Fever in the Travis Outbreak.

*ARI– Acute Respiratory Illness with measured fever =100.4°F
± ILI– Influenza-like illness with measured fever =100.4°F
#ILI with GI- Influenza-like illness with measured fever=100.4°F and gastrointestinal symptoms
+Fever- measured fever =100.4°F

EPIDEMIC CURVES

Confirmed Cases and Influenza-Like Illness

The majority of students became ill on Wednesday, May 13. Among the Travis students, the disease trend for the ILI is similar to the trend for the confirmed H1N1 cases which suggests that those with ILI may have tested positive for H1N1 (Figure 3).

Figure 3: Epidemic Curve of Confirmed H1N1 Cases and Line Graph of ILI Among Travis Elementary Students by Onset Dates

The earliest onset of confirmed H1N1 was on May 12th among five third graders and one first grader. Although the first graders showed the earliest ILI symptoms at Travis Elementary, the third graders had the highest number of students with ILI, peaking on May 13th. The second and fourth graders peaked shortly after the third grade on May 16th and May 14th, respectively. All other grades seem to have had similar trends in the disease spread, suggestive of the fact that other factors may have interacted to cause the striking spike of cases among third graders. (An epidemic curve and line graph of confirmed H1N1 and ILI in Travis Elementary by grade and onset dates can be found in the Appendix Figures C and D.)

Household Contacts of Cases

The following epidemic curve shows that while most Travis students and staff with ILI had an illness peak on May 13th, their household contacts showed an illness peak on May 18th and 19th (Figure 4). This suggests there may be a five to six day incubation period for this illness. This curve also suggests that the Travis students and staff were the primary cases and the exposure most likely occurred in the school.

Figure 4: Epidemic curve of Travis Students and Staff with ILI (N=131) and a Line Graph of Travis Contacts with ILI (N=50) by Onset Dates.

* Travis Contacts include non-Travis school-ages children =18 years old and Travis adults >18 years old.

The timeline of ILI onset was examined by observing each household that contains multiple residents with ILI symptoms. A baseline individual was determined by the first Travis Elementary student to exhibit symptoms within the domicile. Each individual residing in the same household, and displayed symptoms, was cataloged by symptom onset date and temporally charted against the baseline (Figure 5). Within 37 family units, only 6 contain members who present symptoms preceding the baseline. The average time lapse between baseline and secondary ILI is 3.4 days.

Figure 5. Days Between Travis ILI Onset and Household Member ILI Onset

DURATION OF ILLNESS

Many of the confirmed cases participating in the survey were given Tamiflu to treat their illness. There is an observed, but not statistically significant, shorter duration of illness for those cases given Tamiflu compared to those cases who received another medication or none at all (Table 1).

SYMPTOM PROFILE

When comparing the prevalence of symptoms between Travis students with ILI and the prevalence of symptoms among the confirmed H1N1 cases from Travis Elementary, in both cases the top symptoms are fever, cough and fatigue. A slight difference between the groups was observed in GI symptoms. Confirmed cases had close to 8% less diarrhea and close to 6% more nausea and vomiting than the Travis students with ILI. Table E: Prevalence of Symptoms Among ILI Travis Outbreak Population Groups, located in the appendix describes these symptoms in greater detail.

VISITS TO PROVIDERS

Symptoms involving fever resulted in an increased incidence of health care provider visits. The high incidence of provider visits among Travis staff is to be expected due to the publicity of ILI symptoms at the start of the outbreak. Non-Travis associated students also had a higher incidence of provider visits, which also is to be expected as this population was made up of secondary contacts of Travis patients and parents may have been more cognizant of symptoms due to the publicity of the outbreak. A graph of provider visit incidence by symptom category is located in the Appendix, Figure E.

ACTIVITY ANALYSIS

This portion of the analysis looks at events that are significantly associated with influenza-like illness for Travis Elementary Students. The analysis used a list of events from a two week period preceding the outbreak (non-significant events not displayed). There were no significant associations between events and disease among any other groups including Travis staff, non-Travis children, and non-Travis adults. For Travis Elementary Students, the Musiqa Workshop in the library on May 5th , the "Hot Town, Cool City" presentation in the library on May 8th and the "History of the Heights" were the events that had the highest unadjusted odds ratios associated with illness from the days preceding the outbreak. These events were selected based on the date they took place which corresponds to an incubation period of one to seven days, and made them more biologically plausible for transmission of the disease. The first date of onset was 5/12/09. Odds ratios that are significant for events which occur on the 12th and 13th do not fall into the suspected incubation window and therefore may not play a role in transmission as this event is occurring parallel to the peak of the outbreak. For more detail refer to Table F: Event Specific Odds Ratios for Travis Students, located in the Appendix.

Limitations:
All of the events had a high proportion of third grade participants. The third grade had a higher frequency of illness than any other grade ($p = .0008$). This trend follows in most of the events. In addition, many of the events, with the exceptions of the Travis Centennial Celebration and the Music and Fine Arts Showcase, had a very small number of participants which is reflected in the confidence intervals for those estimates (Table F).

CLASSROOM SPECIFIC ANALYSIS

Classroom Specific Attack Rates for Confirmed Cases, ILI and ARI

When the attack rates are superimposed on the layout of the school, and compared to the classroom movement in the weeks prior to the outbreak, an interesting pattern arises. The Third Grade wing (rooms D201-D205 from figure F) shows the highest combined total attack rate (13.56%), as well as the highest individual classroom rate of 26.09%. This wing had inoperative air conditioning from May 5th through the 7th. The third grade homerooms subsequently transferred location to the fourth grade wing (rooms E201-E205 from figure F) on May 7th. The fourth grade wing possesses the second highest combined attack rate as well as the second highest individual classroom rate (22.73%). All other wings had cases, but did not contain rates as high as those seen in the third and fourth grade regions. When looking at the classroom specific attack rate for ILI and ARI the patterns are similar to those of the confirmed cases. The highest rates in the school were observed in rooms located on the second floor. Refer to the Appendix Figure F for the class room specific attack rates.

HOUSEHOLD LEVEL ANALYSIS

Regarding the individuals' level of concern about catching H1N1, most (45%) of the household respondents reported being "not at all worried" and 38% reported being "a little worried" about H1N1. Analysis of voluntary social distancing measures among those households with a confirmed case, households with ILI, and households with neither ILI or a confirmed case revealed no significant differences between the activities performed by household members.

Many of the household respondents reported receiving information about how to keep from catching or spreading H1N1. Eighty percent received information from school officials. Other common sources of information were television (64%) and the internet (57%). According to the respondents, the content of this material included information about H1N1 (84%) and encouraging sick people to stay home (81%).

4. INTERPRETATION

This report describes an outbreak of novel influenza A (H1N1) associated with an elementary school in Houston. Forty laboratory confirmed H1N1 cases, mostly in the third grade (13/40=33%) have been reported. Their onset dates range from May 12th to May 19th with the majority of cases reported on May 13th. Six cases (five 3rd grade students and one 1st grade student) had onset dates on May 12th. No Index case was identified.

The absentee rates over a two week period (May 4th – May 14th) prior to Travis Elementary School closure on May 15th showed a sharp increase in the 3rd grade relative to other grades. In addition, attack rates of H1N1 confirmed cases, ILI and ARI were also highest among 3rd grade students.

Analysis of activities at Travis revealed that the Musiqa Workshop in the library on May 5th, the "Hot Town, Cool City" presentation in the library on May 8th, and "History of the Heights" presentation by Mrs. B in the library on 5/11 had the highest unadjusted odds ratios associated with ILI for Travis students. All of theses associated events had a high proportion of 3rd grade participants. These events were selected based on the date they took place which corresponds to an incubation period of one to seven days, and made them more biologically plausible for transmission. Initially, Mrs. B was suspected as an index case but she reported that she had worked with the 3rd grade students on a history project on 5/06 and 5/07, the week before the outbreak. It appears that she may have been exposed in the same setting as the 3rd grade students. All other findings suggest there was something unique about the Travis school environment that increased transmission of the illness within the school, particularly in 3rd grade students.

The epidemic curve shows that while most Travis students with ILI symptoms had an illness peak on May 13th, their household contacts showed an illness peak on May 18th or 19th. Examination of the Travis students with household contacts suggested that the Travis students and staff were the primary cases and the exposure most likely occurred in the school.

Teachers and staff at Travis elementary school repeatedly reported A/C malfunction and sporadic power surges prior to the week of the outbreak. Environmental assessments have been conducted by the Houston Independent School District (HISD) (1). Drinking water and indoor air quality were reported to be within normal range. It was also reported that the windows could not be opened in most of the classrooms. Therefore, fresh air introduction into the classrooms when the air-conditioning was down may have been compromised. On May 7th many students from the 3rd grade classrooms (four of the five classes) were moved into 4th grade classroom.

Although influenza most commonly spreads from person-to-person, the epidemic curve suggests point-source transmission. However, person-to-person contact most likely played a role in this outbreak. The increased risk for person-to-person transmission of novel influenza A (H1N1) in a school environment is most likely due to a combination of population susceptibility; close proximity of students with in the classroom and the hygiene practices of young children. In combination with these factors the ventilation in the 3rd grade classrooms may have played a role in the high attack rates and reported ILI. A similar circumstantial outbreak of influenza aboard a commercial airliner has been reported (2). Inoperative airline ventilation system during the flight delay was described as a possible explanation for the high attack rate among unrelated passengers placed in an enclosed, poorly ventilated space who were exposed on the airplane but who came from areas of no known influenza activity.

Data from this outbreak suggest that the novel influenza A (H1N1) virus has the potential for rapid spread among young school-aged children. It has been reported that the symptoms of novel influenza A (H1N1) virus in people are similar to the symptoms of seasonal flu and include fever, cough, sore throat, runny or stuffy nose, body aches, headache, chills and fatigue (3). A significant number of people who have been infected with the H1N1 virus also have reported diarrhea and vomiting. Similar symptoms were observed among Travis students. The illness associated with infection is generally uncomplicated as most of the infected children/staff recovered quickly.

Respiratory hygiene and hand washing should be promoted in schools, and parents need to be reminded to keep their children home if they have symptoms of ILI. As with Seasonal Flu students, teachers and staff should follow sanitary measures to reduce the spread of novel influenza A (H1N1) virus. These measures include covering the nose and mouth with a tissue when coughing or sneezing; frequent hand washing with soap and water; using hand sanitizer when soap and water are not available.

References:

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3. CDC. *Novel H1N1 Flu in Humans*. Retrieved June, 2009, from http://www.cdc.gov/h1n1flu/qa.htm

A Report of Novel Influenza A (H1N1) Outbreak in Travis Elementary School Houston, TX June 2009

Prepared by: Bureau of Epidemiology, OSPHP/HDHHS

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Table A. Type of School Activities and Grade-Level Participation at Travis Elementary School, Houston, Texas 2009

Date	Activity/Event	Grades Participated
5/02 (1-4 pm)	Travis Centennial Celebration – OFF SITE community event	All grades
5/05	Musiqa workshop – School Library	3rd grade
5/05 (8-10 AM)	Field Day for pre-K to 2nd grade at the School Play Ground	Pre-K, K, 1st and 2nd grades. Select 5th grade students
5/06 (8:30-10:30 AM)	Field Day for 3rd – 5th grades at the School Play Ground	3rd, 4th and 5th grades
5/07	Kindergarten Outdoor Centers	K, select 3rd grade students
5/07	Field Trip to Mount Bonnell and the State Capital in Austin	4th grade
5/08	Hot Town Cool City Presentation at the School Library	3rd grade
5/8-5/10	Camping trip near Dinosaur Valley State Park and Glen Cross, north of Dallas, and McFalls Ranch	2nd grade (with siblings from other grades and parents)
5/11	History of the Heights Presentation at the School Library Mrs. B came and spoke about the history of the neighborhood.	3rd grade

5/11	Houston Opera: 1-hour program in the school cafeteria/multi-purpose room 1 PM performance: Pre-K, K, 1st and 2nd grades 2 PM performance: 3rd , 4th and 5th grades	All grades
5/12	Tournaments of Knowledge	Group of 8 4th grade students
5/13	Heritage Society Museum – cancelled by 11 AM due to student complaints of feeling ill. The complaints started prior to the serving of snacks, bottled water and pretzels.to and from the museum was provided by a private coach/ bus	3 of 5 3rd grade classes

Table B. Demographic Characteristics and Symptom Distribution of Confirmed H1N1 Cases – Travis Elementary School, Houston, Texas June 2009 (N=40*)

Demographic Characteristics			**Symptoms**		
	Number	**%**		**Number**	**%**
Grade:			**ILI Symptoms**		
K	1	3	ILI	31	79
1	5	13	Not ILI	8	21
2	4	10	**Illness Onset Date**:		
3	16	41	5/12/09 – Tuesday	6	15
4	8	21	5/13/09 - Wednesday	23	59
5	5	13	5/14/09 – Thursday	4	10
Gender:			5/15/09 – Friday	1	3
Female	18	46	5/17/09 – Sunday	1	3
Male	21	54	5/18/09 – Monday	3	8
Ethnicity:			5/19/09 – Tuesday	1	3
Hispanic	7	18	**Symptoms:**		
Non-Hispanic	25	64	Fever (=100.4°F)	37	95
Unknown	7	18	Cough	35	90
Race:			Diarrhea	3	8
Black	2	5	Headache	25	64
White	32	82	Muscle ache	24	62
Unknown	5	13	Nausea	16	41
Household Contacts:			Rash	2	5
2	0	0	Runny nose	17	44
3	5	13	Seizures	0	0
4	9	23	Sore Throat	27	69

5	13	33	Vomiting	9	23
6	1	3	Lethargy/malaise	13	33
7	3	8	**Travel History:**		
Unknown	8	21	Yes	13	33
Zip Code:			No	18	46
77006	2	5	Unknown	8	21
77007	5	13	**Destination:**		
77008	8	21	Outside of Houston	12	92
77009 (school)	14	36	Outside of Texas	0	0
77018	3	8	Outside of Country	1	8
77020	1	3			
77022	1	3			
77026	1	3			
77076	1	3			
77092	2	5			
77981	1	3			

Table C. Epidemiologically Linked Events and Resulting Investigations

Epi-Linked Events	Description of Investigations	Summary
Baseball League on May 9th	25 kids in the baseball league attend Travis Elementary School. Of these, 5 were confirmed H1N1 cases.were no other confirmed cases from Houston or any other jurisdictions.	It appears that NO transmission took place at the baseball league.
Interview with Mrs. B – Presentation at Travis Elementary School on 5/11	She subsequently fell ill on 5/12 with symptoms of low grade fever, headache, chills nausea and diarrhea. She did not see a physician. She did report having worked with the 3rd grade students on a history project Wednesday 5/06 and Thursday 5/07 the week before 5/13. Her husband attended the presentation with her and never became ill. Mrs. B did not recall eating or drinking anything at the school	Initially suspected Mrs. B as an index case but it appears that she is exposed to whatever 3rd graders were exposed to.

Opera to Go on Monday 5/11/09 – 7 staff members from the Houston Opera performed at Travis Elementary School	Four have reported to HDHHS, and 3 were performers and the 4th was the pianist.Only one performer reports any illness (just a "head cold, etc" recently symptom onset date unknown). All other performers reported that they were healthy before the performance and healthy after.sang a 45 minute long performance on the stage in the gymnasium. There were three children that went up on stage per show (they had two performances that day, so six kids in total), but there was no physical contact. They are not sure what grade the children were in who marched on stage. There was no small group or one-on-one contact with the children.	So far NO one who attended the Opera to Go performance at Travis reported with ILI symptoms. **All evidence points back to Travis Elementary School as a common place of possible exposure**

Table E. Prevalence of Symptoms Among ILI Travis Outbreak Population Groups

	Travis Students with ILI		Confirmed Travis Students		Travis Staff with ILI		Non-Travis School-Aged with ILI		Non-Travis Adults with ILI	
Fever (= 100.4˚ F)	128	(100)	22	(91.7)	3	(100)	25	(100)	25	(100)
Cough	119	(93.0)	20	(83.3)	3	(100)	22	(88.0)	22	(88.0)
Sore Throat	75	(58.6)	12	(50.0)	1	(33.3)	13	(52.0)	20	(80.0)
Headache	91	(71.1)	19	(79.2)	2	(66.7)	10	(40.0)	11	(44.0)
Chills	56	(43.8)	8	(33.3)	2	(66.7)	7	(28.0)	15	(60.0)
Difficulty Breathing	13	(10.2)	2	(8.3)	0	(0)	3	(12.0)	4	(16.0)
Fatigue	87	(68.0)	18	(75.0)	3	(100)	15	(60.0)	18	(72.0)
Bodyache	66	(51.6)	16	(66.7)	2	(66.7)	9	(36.0)	18	(72.0)
Nausea/Vomiting	46	(35.9)	10	(41.7)	2	(66.7)	11	(44.0)	7	(28.0)
Diarrhea	26	(20.3)	3	(12.5)	1	(33.3)	8	(32.0)	9	(36.0)
Runny Nose	56	(43.8)	11	(45.8)	1	(33.3)	15	(60.0)	12	(48.0)
Other	12	(9.4)	4	(16.7)	0	(0)	3	(12.0)	1	(4.0)
	128		24		3		25		25	

Figure A: The Confirmed H1N1 Attack Rate by Grade at Travis Elementary School

Figure B: The Attack Rate of ILI and ARI by Grade at Travis Elementary School

*ILI– Influenza-like illness with measured fever =100.4°F; ±ARI – Acute Respiratory Illness with measured fever =100.4°F

Figure C: Epidemic Curve and Line Graph of Confirmed H1N1 Cases in Travis Elementary by Grade and Onset Dates

*There are 40 confirmed H1N1 cases but this curve was based on onset dates from 38 cases due to lost to follow up on one case and missing grade-level data on one case.

Figure D: Epidemic Curve and Line Graph of ILI Travis Students by Grade and Onset Dates

*ILI– Influenza-like illness with measured fever =100.4°F

Figure E: The Percent Incidence of Provider Visits With the Travis Outbreak by Symptom Category

*ARI– Acute Respiratory Illness with measured fever =100.4°F
[±]ILI– Influenza-like illness with measured fever =100.4°F
[#]ILI with GI— Influenza-like illness with measured fever=100.4°F and gastrointestinal symptoms
[+]Fever – measured fever =100.4°F

Table F. Prevalence of Symptoms Among ILI Travis Outbreak Population Groups

	ILI n (%) N=128	Non-ILI n (%) N=270	OR	CI
Travis Centennial Celebration on 5/2	70 (54.69)	116 (42.96)	1.6	(1.05, 2.45)
Musiqa Workshop in Library (3rd grade) on 5/5	25 (19.53)	23 (8.52)	2.61	(1.41, 4.80)

"Hot Town, Cool City" presentation in school library on 5/8	21 (16.41)	23 (8.52)	2.11	(1.12, 3.97)
"History of the Heights" presentation by Mrs. B in school library on 5/11	23 (17.97)	16 (5.93)	3.48	(1.77, 6.85)
Tournament of Knowledge on 5/12	9 (7.03)	6 (2.22)	3.33	(1.16, 9.56)
Music & Fine arts showcase in school cafeteria/multi-purpose room on 5/12	51 (39.84)	74 (27.41)	1.75	(1.13, 2.73)
Heritage Society Field trip on 5/13	23 (17.97)	12 (4.44)	4.71	(2.26, 9.81)