

Background

Since 1996, the US Public Health Service Region VI Infertility Prevention Project (IPP) in Louisiana (LA) has been testing and treating men and women for chlamydia (CT) and gonorrhea (GC) at family planning (FP) and selected sexually transmitted disease (STD) clinics throughout LA. Beginning September 2005, implementation was challenged after Hurricane Katrina.

Hurricane Katrina was the costliest and one of the five deadliest storms in the history of the United States. Katrina formed in late August 2005 and after crossing Florida it strengthened in the Gulf of Mexico. It made landfall on August 29th in southeast Louisiana. The levee problems and flood protection failures during the hurricane resulted in significant loss of human life, massive population displacements, and destruction of property and public infrastructure. Among the infrastructure problems was the closure of many public health department STD and FP clinics in New Orleans and surrounding parishes. For those southeastern Louisiana clinics that did not close, service provision following Hurricane Katrina was significantly affected.

Given multiyear IPP LA data sets and the disruption in STD services following Hurricane Katrina, we sought to describe and compare CT/GC testing volume and positivity in two broad geographic areas: New Orleans and surrounding parishes versus areas outside of New Orleans less affected by this natural disaster. Our populations of interest include all men and women tested for CT/GC at STD clinics, as well as women aged 29 years and younger tested at FP clinics. These three sets of patients were selected because they constituted universally screened client populations within LA's IPP.

Objectives

Assess CT/GC testing volume and positivity within New Orleans and surrounding parishes (NOLA) compared to the rest of Louisiana before (January 2004 – June 2005, Time 1) and after (January 2006 – June 2007, Time 2) Katrina. These IPP comparisons before/after the hurricane were assessed in three populations:

- Women, aged 29 years and younger, tested at FP clinics;
- Men tested at STD clinics; and
- Women tested at STD clinics.

Methods

All LA IPP sites use a common lab request/data form. Information collected includes: age, race, ethnicity, specimen collection date, laboratory test type, and chlamydia and gonorrhea test results. Records are forwarded quarterly from participating public health laboratories to the state's STD Prevention and Control Program. Quarterly and annual data sets are also sent to the Center for Health Training—the Region VI IPP infrastructure and data management contractor.

Annual data files were accessed for Calendar Years 2004, 2005 and 2006—along with records from January through June 2007. Records for analyses were selected from clinics identified as FP and STD provider types. The file was further constrained to include two 18-month time frames: January 2004 through June 2005 (Time 1) and January 2006 through June 2007 (Time 2). The six month period July 2005 through December 2005 was dropped for two reasons: 1) to insure comparable seasonal periods when assessing service delivery before and after Katrina; and 2) to approximate time frames when service delivery had stabilized as routine or normal, i.e., eliminating the period directly following Katrina when crisis conditions existed.

For Time 1 and Time 2, 199,721 CT/GC tests were analyzed. Eighteen NOLA FP/STD clinics closed or curtailed testing after Katrina. CT/GC trends in testing volume and positivity were calculated for three populations within and outside NOLA. Positivity was calculated by dividing the number of positive tests by the total number of tests that were either positive or negative. Among the variables collected, univariate predictors of chlamydial infection were identified by odds ratios and 95% confidence intervals that were significant at p-value <0.05.

Results

Background characteristics

FP clinics—Women, aged 29 years and younger

Of the 115,235 FP tests, 59% were collected during the 18 months prior to Hurricane Katrina (Time 1). Virtually all (99%+) tests were nucleic acid hybridization tests (Gen-Probe, San Diego, CA). Overall 9% of tests came from clinics within New Orleans and surrounding parishes (NOLA). About 2% occurred among women aged 10-14 years, 28% among female clients aged 15-19 years, 44% 20-24 years, and the remaining 26% aged 25-29 years. Approximately 10% were non-Hispanic Whites, 55% non-Hispanic Blacks, and Hispanics accounted for 35% of test records. CT and GC positivities were 7.2% and 1.8%, respectively (see Table 1).

Overall, CT positivity was significantly associated with client age and race/ethnicity. CT+ was highest among adolescents aged 15-19 years (10.7%), followed by 10.3% in teens aged 10-14 years. This compares to CT+ in women aged 20-24 years (7.0%) and those aged 25-29 years (3.6%). Non-Hispanic Black women had the highest CT positivity (10.7%), followed by non-Hispanic Whites (3.1%) and Hispanics (3.0%).

GC positivity was also associated with client age and race/ethnicity. GC+ was highest among adolescents aged 10-14 years (3.0%) and trended down across older age categories (15-19 years: 2.6%; 20-24 years: 1.7%; 25-29 years: 1.0%). Non-Hispanic Black women had the highest GC positivity (2.9%), followed by Hispanics (0.5%) and non-Hispanic Whites (0.4%).

STD clinics—Male patients

For the three year period before and after Katrina, 61% of the 25,780 STD clinic tests performed during the two time frames were done with male patients (n=15,701). As with FP sites, virtually all tests used GenProbe PACE 2 technology. In contrast to FP results, 80% of tests came from clinics within New Orleans and surrounding parishes (NOLA). Less than 1% occurred among men aged 10-14 years, 11% among male clients aged 15-19 years, 30% 20-24 years, 20% in men aged 25-29 years, and the remaining 39% were aged 30 or older. Approximately 4% were non-Hispanic Whites, 86% non-Hispanic Blacks, 10% Hispanics, and less than 1% were from other racial categories. CT and GC positivities were 11.0% and 16.9%, respectively.

Overall, CT positivity was associated with client age and race/ethnicity. CT+ was highest among adolescents aged 15-19 years (19.1%)—compared to 16.6% in men aged 20-24 years, 11.3% for those aged 25-29 years, and 4.2% for men aged 30 or older. Non-Hispanic Blacks had the highest positivity (11.9%), followed by non-Hispanic Whites (6.3%), and Hispanics (5.6%).

GC positivity was also associated with client age and race/ethnicity. GC+ was 26.6% among adolescents aged 15-19. This compares to 19.9% GC+ in men aged 20-24 years, 18.2% in those aged 25-29 years, and 11.3% among men 30 or older. Non-Hispanic Black men had the highest GC positivity (19.0%), with other racial/ethnic groups significantly lower—non-Hispanic Whites (4.9%), and Hispanics (4.1%) (see Table 2).

STD clinics—Female patients

For the three year period before and after Katrina, 10,079 STD clinic tests were performed with female patients using primarily GenProbe PACE 2 technology. Overall, 77% of tests came from clinics within New Orleans and surrounding parishes (NOLA). Less than 1% occurred among women aged 10-14 years, 16% among female clients aged 15-19 years, 34% aged 20-24 years, 19% among women aged 25-29 years, and the remaining 30% were aged 30 or older. Approximately 4% were non-Hispanic Whites, 85% non-Hispanic Blacks, 10% Hispanics, and the remaining records (<1%) were other racial categories. CT and GC positivities were 10.9% and 7.5%, respectively.

Overall, CT positivity was associated with client age and race/ethnicity. CT+ was high among adolescents aged 15-19 years (23.9%) and trended down in older groups (20-24 years: 13.2%; 25-29 years: 7.9%; 30+: 2.6%). Non-Hispanic Black women had the highest CT positivity (11.7%), followed by Hispanics (7.2%) and non-Hispanic Whites (4.3%).

GC positivity was also associated with client age and race/ethnicity. GC+ was high among adolescents aged 15-19 years (15.1%). This compares to GC+ of 8.0% in women aged 20-24 years, 6.2% for those aged 25-29 years, and 3.3% among women aged 30 or older. Non-Hispanic Black women had the highest GC positivity (8.2%), followed by Hispanics (4.0%) and non-Hispanic Whites (2.2%) (see Table 2).

Table 1: Background characteristics: FP clinics, women age < 30

Characteristic	No.	Percent	% CT positivity	% GC positivity
FP clinics, women age < 30	115,235	100	7.2	1.8
Age group (years)				
10-19	1,919	2	10.3	3.0
20-24	32,783	28	10.7	2.6
25-29	50,862	44	7.0	1.7
30+	29,678	26	3.6	1.0
Race/ethnicity				
NH White	11,921	10	3.1	0.4
NH African-American	62,677	55	10.2	2.9
Hispanic	39,793	35	3.0	0.5
Geographic area				
Within NOLA	105,177	91	7.1	1.7
Outside NOLA	10,058	9	8.3	2.1
Time period				
Before Katrina	66,972	58	7.5	1.7
After Katrina	48,263	42	6.8	1.9

Table 2: Background characteristics: STD clinics, male and female patients

Characteristic	No.	Percent	% CT positivity	% GC positivity
STD clinics, male	15,701	100	11.0	16.9
Age group (years)				
10-19	1,744	11	18.0	26.4
20-24	4,656	30	16.6	19.9
25-29	3,188	20	11.3	18.2
30+	6,113	39	4.2	11.3
Race/ethnicity				
NH White	684	4	6.3	4.9
NH African-American	13,373	86	11.9	19.0
Hispanic	1,501	10	5.6	4.1
Geographic area				
Within NOLA	3,097	20	10.0	16.6
Outside NOLA	12,614	80	10.5	17.0
Time period				
Before Katrina	11,330	72	11.1	15.9
After Katrina	4,371	28	10.6	19.6
STD clinics, female	10,079	100	10.9	7.5
Age group (years)				
10-19	1,701	17	23.9	15.4
20-24	3,446	34	10.9	16.0
25-29	1,932	19	7.9	8.2
30+	2,999	30	2.6	3.3
Race/ethnicity				
NH White	423	4	4.3	2.2
NH African-American	8,073	80	11.7	8.2
Hispanic	994	10	7.2	4.0
Geographic area				
Within NOLA	2,284	23	10.5	7.5
Outside NOLA	7,795	77	11.0	7.5
Time period				
Before Katrina	7,153	71	10.2	6.7
After Katrina	2,926	29	12.6	8.3

Results, continued

Time 1 and 2 comparisons—Before and after Hurricane Katrina

FP clinics—Women, aged 29 years and younger

Client age distribution was relatively stable across pre/post-Hurricane Katrina periods. During Time 1 30% were aged 15-19 years and 44% were 20-24 years old; in Time 2 26% were adolescents 15-19 years and 45% were 20-24 years. The racial/ethnic testing composition changed over time, with non-Hispanic Whites dropping from 15% of tests during Time 1 to only 3% in Time 2 while Hispanics increased from 28% to 44% before/after Katrina.

Consistent with Katrina's well-publicized impact on health program service delivery, testing within NOLA was 13% of all Time 1 tests and only 2% of Time 2 tests. Overall CT positivity was 7.5% at Time 1 and 6.8%, Time 2; GC positivity for Time 1 and Time 2 was 1.7% and 1.9%, respectively (see Table 3).

FP CT+ within NOLA sites fell from 8.7% at Time 1 to 5.2% following Katrina. This trend was similar for CT tests done outside of New Orleans (7.4%, Time 1 to 6.9%, Time 2). FP GC positivity was relatively low throughout the three year period and across geographic areas. FP GC+ within NOLA sites from Time 1 to Time 2 was 2.1% and 1.6%, respectively. Outside of NOLA, GC+ in FP clinics was stable before and after Katrina (1.6% and 1.9%).

STD clinics—Male patients

Age and racial/ethnic distributions were relatively stable across pre/post-Hurricane Katrina periods among men seen at STD clinics. In Time 1 40% were aged 30 or older and 87% were non-Hispanic Blacks, compared to Time 2 when 36% were age 30+ and 83% were non-Hispanic Blacks.

Testing within NOLA was 89% of all Time 1 tests and only 58% of Time 2 tests. Overall CT positivity was 11.1% at Time 1 and 12.6%, Time 2; GC positivity for Time 1 and Time 2 was 15.9% and 19.6%, respectively.

STD male CT+ within NOLA sites fell from 10.8% in Time 1 to 9.4% following Katrina. This trend was similar for CT tests done outside of New Orleans, except overall positivities were higher (14.1%, Time 1 to 12.2%, Time 2). STD GC positivity among male patients was high during both time periods and in both geographic areas. GC+ within NOLA went from 16.3% before Katrina to 19.7% for 2006 onward (Time 2). GC+ outside of New Orleans went from 12.4% during Time 1 to 19.4% in Time 2.

STD clinics—Female patients

Age distributions were stable across pre/post-Hurricane Katrina periods among women seen at STD clinics. In Time 1 16% were aged 15-19 years and 33% were 20-24 years, compared to Time 2 when 16% were adolescents aged 15-19 years and 37% were aged 20-24 years. The racial/ethnic distribution varied across time periods. Non-Hispanic Blacks accounted for 87% of Time 1 tests and 81% of Time 2 records. Hispanic testing activity accounted for 8% at Time 1 and increased to 16% at Time 2.

Testing within NOLA was 86% of all Time 1 tests and only 57% of Time 2 tests. Overall CT positivity was 10.2% at Time 1 and 12.6%, Time 2; GC positivity for Time 1 and Time 2 was 6.7% and 9.3%, respectively.

STD CT+ for female patients within NOLA sites rose from 10.1% in Time 1 to 13.9% following Katrina. Outside of New Orleans CT+ was relatively stable (10.3%, Time 1 to 10.7%, Time 2). STD GC positivity among female patients was relatively high during both time periods and in both geographic areas. GC+ within NOLA went from 6.8% before Katrina to 10.1% for Time 2. GC+ outside of New Orleans rose from 6.6% to 8.2% during the two time frames.

Table 3: Louisiana IPP before and after Hurricane Katrina: Test volume, CT/GC positivity and geographic area

	Before Katrina	After Katrina	%
FP clinics, women age < 30 years			
Test volume total	66,972	48,263	27.9%
Within NOLA	8,888	1,170	-86.8%
Outside NOLA	58,084	47,093	18.9%
Chlamydia positivity	7.5%	6.8%	-8.3%
Within NOLA	8.7%	5.2%	-40.2%
Outside NOLA	7.4%	6.9%	-6.8%
Gonorrhea positivity, overall	1.7%	1.9%	11.8%
Within NOLA	2.1%	1.6%	-23.8%
Outside NOLA	1.6%	1.9%	18.8%
STD clinics, male patients			
Test volume total	11,330	4,371	-61.4%
Within NOLA	10,102	2,512	75.1%
Outside NOLA	1,228	1,859	51.4%
Chlamydia positivity	11.1%	10.6%	-4.5%
Within NOLA	10.8%	9.4%	-13.0%
Outside NOLA	14.1%	12.2%	-13.5%
Gonorrhea positivity, overall	16.9%	19.6%	3.7%
Within NOLA	12.4%	19.4%	7.0%
Outside NOLA	16.3%	19.7%	3.4%
STD clinics, female patients			
Test volume total	7,153	2,926	-59.1%
Within NOLA	6,121	1,674	72.7%
Outside NOLA	1,032	1,252	21.3%
Chlamydia positivity	10.2%	12.6%	23.5%
Within NOLA	10.1%	13.9%	37.6%
Outside NOLA	10.3%	10.7%	3.9%
Gonorrhea positivity, overall	6.7%	9.3%	38.8%
Within NOLA	6.8%	10.1%	48.5%
Outside NOLA	6.6%	8.2%	24.2%

* Geographic area: within versus outside New Orleans, LA (NOLA)

Conclusions

In the 18 months following Hurricane Katrina, FP and STD clinic patient volumes dropped significantly for IPP CT and GC testing. FP volume fell 28% for female clients aged 29 or younger; male STD testing fell 61% and STD female volume fell 59%. Most of this program reduction was due to dramatic drops at clinics in New Orleans and surrounding parishes. Chlamydia positivity for FP female clients generally fell from pre- to post-Katrina time periods. GC levels in this population were low and stable. In STD clinics male chlamydia levels fell throughout the state, but gonorrhea increased, regardless of geography. For female STD clinic patients, chlamydia increased within NOLA, but was stable in the rest of the state. Gonorrhea in this population increased in both geographic areas.

Chlamydia levels were relatively high among young women tested at FP clinics and very high for both men and women seen at STD sites. Gonorrhea remains a significant issue within STD clinics, but not among young female FP clients. The clearest impact of Hurricane Katrina is simply the major reduction in CT/GC testing at public clinics in the New Orleans area.

Implications

Hurricane Katrina affected FP/STD clinics and client populations differentially. Work is needed to further identify sub-populations by more finely-grained geographic assessment and other risk factors that impact STD service access, testing and positivity. Regardless, the high levels of infection before and after the hurricane suggest that repairing infrastructure and enhancing program implementation should be high priorities for public health in New Orleans and the rest of Louisiana.

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