

U.S. House of Representatives
Committee on Energy and Commerce
Subcommittee on Oversight and Investigations
“Post Katrina Health Care: Continuing and Immediate Needs in the New Orleans Region,
Part II”

August 1, 2007

Testimony of C. Ray Nagin
Mayor, City of New Orleans

I. Impact of Katrina

- Hurricane Katrina caused unprecedented damage in New Orleans and the Gulf Coast region.
- New Orleans is experiencing increased mortality and mental health problems.

II. What We Are Doing Now

- The \$100 million in DRA funds will help restore and expand access to primary health care in the New Orleans region.
- The City of New Orleans will use the \$4 million earmarked to staff two stationary clinics and two mobile clinics to provide critically needed services.
- The State of Louisiana is using the additional \$35 for recruitment and retention of medical personnel.

III. Ongoing Challenges and Immediate Needs

- The shortage of specialty care physicians is a particular problem.
- Many citizens lack access to key technologies and treatments.
- Emergency department overcrowding taxes Emergency Medical Services and police.
- There is a severe shortage of mental health services.

IV. Importance of VA Hospital

- VA Hospital downtown is one of the most important Post-Katrina recovery projects for the region.
- Location provides numerous advantages: central in the region, convenient for travelers, in easy access to many other facilities allows for synergy with other institutions.
- Better care will result from cutting-edge research.
- VA Hospital in downtown New Orleans has regional support.

V. Conclusion

- Solutions to immediate needs are important while long-term projects are developed.
- New Orleans can become a 21st Century city.

**U.S. House of Representatives
Committee on Energy and Commerce
Subcommittee on Oversight and Investigations
“Post Katrina Health Care: Continuing and Immediate Needs in the New Orleans
Region, Part II”**

August 1, 2007

**Testimony of C. Ray Nagin
Mayor, City of New Orleans**

I am C. Ray Nagin, Mayor of New Orleans, one of America’s most beloved and culturally distinctive cities, and a city which is facing the challenge of recovering and rebuilding smartly, soundly and strategically after the worst natural and man-made disaster to occur in the United States of America. As we rebuild, we want to ensure that our citizens will have even better access to services and opportunities than they did in the past. One of the most important of these is access to quality healthcare, to which every citizen is entitled.

To Chair and Congressman Bart Stupak, Ranking Member and Congressman Ed Whitfield, Vice Chair Charles Melancon, distinguished members and guests of the House Committee on Energy and Commerce Subcommittee on Oversight and Investigations: Thank you for calling this hearing today on the progress and continuing challenges we face in providing basic and quality health care that our citizens need and deserve. We are grateful for your support of our recovery efforts during the last two years. And we thank the American people and our friends throughout the world for their donations of resources, labor, prayers and positive thoughts as we rebuild.

Most of all, I want to thank you for following up on the issues and needs discussed in your March hearing on this topic. The attention that you brought to these issues has helped us begin to repair critical aspects of our health care system, which was decimated by Hurricane Katrina and the subsequent flooding.

I. The Impact of Hurricane Katrina

I would like to take a few moments to talk about the great strides we have made in our recovery and to discuss the significant challenges that remain. Hurricane Katrina and the subsequent flooding caused unprecedented damage in New Orleans and the Gulf Coast region. Thousands of residents lost their lives. The uninsured property losses from Katrina are estimated to be in excess of \$60 billion. Residential damage in New Orleans alone was \$14 billion. Every level of our health care delivery system was affected. Every hospital and medical facility in Orleans Parish was shut down and since the storm only four of the eight hospitals have reopened, most at decreased capacity. The City of New Orleans Health Department, which employed more than 200 health professionals, lost more than 60 percent of its staff and closed eight of its 13 clinics.

The impact that Hurricane Katrina had on people's lives is also evident in the increased mortality and mental health problems that New Orleans is experiencing. Dr. Kevin Stephens, the City's Health Director, stated in his article in the American Medical Association journal "Disaster Medicine and Public Health Preparedness," that obituaries published for New Orleans residents – some of whom were still displaced – increased 47 percent during the first six months of 2006. Even state statistics showed a 20 percent increase in deaths in Orleans Parish for the same period, a still alarming death rate almost

twice the national one of 8.1 deaths per 1,000 residents. Federal, state and local health leaders must strive to identify the causes of this crisis and develop appropriate interventions to end it. A copy of the article is attached for your review.

II. What We Are Doing Now

Since your March hearing on this issue, Secretary of Health and Human Services Michael Leavitt invoked his authority under the Deficit Reduction Act (DRA) of 2005 to make \$100 million available to restore and expand access to primary care in the Greater New Orleans area. We appreciate that \$4 million of these funds were earmarked specifically for the City of New Orleans Health Department.

We will use this money to provide staffing for clinics set to open within the next few months. The first clinic will open in New Orleans East and will provide primary and obstetrical services. Since Hurricane Katrina, the only public clinical services in New Orleans East have been provided at a temporary site staffed by Operation Blessing, a faith based nonprofit.

The second clinic funded by this grant will be Mandeville-Deteige in the Gert Town neighborhood adjacent to Xavier University. This clinic experienced severe flooding after Hurricane Katrina, but will be repaired to partner with Xavier University and its renowned School of Pharmacy. The Mandeville-Deteige Clinic will reopen as a primary care clinic offering pharmacy services.

In addition to the clinic openings, the DRA funds will enable us to operate a mobile dental clinic and a mobile vision and hearing clinic. These health services are

critically needed by our citizens, many of whom were insured before Hurricane Katrina but have since lost their jobs, insurance and security.

Another concern, which your committee highlighted and which additional DRA funding is helping to address, is the need to attract and retain medical professionals to our region to fill critical shortages of doctors, nurses and other medical staff. Secretary Leavitt has made an additional \$35 million available to tackle this problem. These funds, along with an earlier \$15 million grant, are being administered by the Louisiana Department of Health and Hospitals and will provide incentives for retaining and recruiting health care professionals.

III. Ongoing Challenges and Immediate Needs

A particular problem is created by the shortage of specialty care physicians. With the closure of Charity and other area hospitals, many specialty care physicians such as oncologists, hematologists, orthopedists and cardiologists have left the region. This affects the speed with which people who have insurance can obtain services and makes it almost impossible for the uninsured and indigent to receive specialty care. Because of the reduction in access to primary care, many illnesses are much more severe by the time the patient seeks emergency help, making specialty care essential to reducing mortality and enhancing the quality of life.

We also remain concerned that no solution is imminent that would guarantee our poorest citizens access to key technologies and treatments. For example, with Charity

Hospital closed, uninsured patients with cancer or other illnesses requiring surgery or ongoing special treatment can receive emergency care, but will need to travel out of the area to another public hospital facility for chemotherapy, radiation or other life-saving interventions. If they have no money for transportation or lodging, they will not be able to get treatment. In order to address this issue, we must create a system in which the uninsured and underinsured have access to appropriate care regardless of their income.

This decreased access to primary care and mental health services is severely impacting hospital emergency departments throughout the region. Before Katrina, the state fulfilled its mandate to provide urgent medical and mental health care through Charity Hospital, the largest single point of entry in the state. With Charity and several other hospitals still closed, the emergency department inpatient bed capacity of the region comprised of Orleans, Jefferson, Plaquemines and St. Bernard Parishes is now just more than half of pre-Katrina capacity. For mental health beds, the capacity is about one-third.

This is far less than adequate for our population. According to the Greater New Orleans Community Data Center, the population of New Orleans alone is now approximately 66 percent of pre-Katrina levels, or about 300,000 people. If our residents continue to return at the current rate, we will be at 78 percent of our pre-Katrina population by the end of the year, which is consistent with projections I made just after the storm. This further demonstrates the need for significant increases in availability of services.

At the same time, the reality of the post-Katrina environment has led to a dramatic increase in the need for mental health services. The stress of survival and life in a

damaged region has increased the rate of Post Traumatic Stress Disorder and aggravated existing mental and physical health problems. Because few outpatient drug treatment centers and detox beds are available, people with addictive disorders who are in crisis also seek treatment in our already overtaxed emergency rooms, contributing to further delays and longer wait times for service.

Since the ancillary services that would form the continuum of care to appropriately move mental health patients out of the emergency departments are not in place, Emergency Medical Services (EMS) offload times are at an all-time high. In June, paramedics with the New Orleans EMS department spent more than 300 hours with patients waiting for their transfer to emergency department staff. This can have a negative impact on the patient's outcome and can cause the availability of fewer paramedics for responding to other medical and traumatic emergencies, an increase in overall response time, and additional costs. Because of increased offload times, the department has experienced additional personnel costs of nearly \$107,000 and unbilled revenue of \$855,000 since January.

In addition, police must contend with long delays when they are called to respond to situations involving mentally ill individuals in crisis. Police are responding to approximately 200 crisis mental health calls per month. Two officers must respond to each call, which in June averaged a 71-minute wait in emergency departments per mental health call. This time would be better spent fighting violent crime.

This situation must be fixed now. University Hospital recently opened 20 detox beds and the state has committed to implementing certain other critically needed services,

including 20 adult acute psychiatric beds and a crisis intervention unit for the New Orleans region. But these steps will still not address all of the immediate mental health needs of our region, and we are pushing for the urgent implementation necessary to produce reductions in the amount of time that emergency medical officials and police spend waiting in emergency departments.

IV. Importance of VA Hospital

I appreciate the opportunity this hearing gives me to highlight one of the most important Post-Katrina recovery projects in the region - the proposed construction of the Veterans Affairs Medical Center in downtown New Orleans. The VA Hospital has traditionally played an important role in providing quality health care for the hundreds of thousands of veterans living throughout the Gulf Coast, as well as the thousands who visit New Orleans as tourists and for special events and conventions. We look forward to its continuing to offer that level of services in downtown New Orleans, complementing the existing synergy of many components of the downtown medical district, and bringing major economic investment to the regional economy.

A. Location

In 2006, the Veterans Administration committed to creating a partnership with the Louisiana State University teaching hospital that would bring state-of-the-art medical

care to downtown New Orleans. They signed an agreement with LSU to work together on plans for new medical facilities for both institutions.

The proposed new downtown location, which we support, is only blocks from the site of the VA Hospital that was in service prior to Hurricane Katrina. It is centrally located in the metropolitan region, which is home to veterans living within commuting distance to the facility. In addition, it is on major public transportation routes for those who do not have vehicles, and is easily accessible for the many homeless veterans who are in critical need of its care. For those veterans and their families who travel to receive its services, the location is close to hotels, restaurants of all kinds, and cultural attractions.

The area where the new hospital would be located is within a legislatively created medical district, encompassing more than 30 public, private, and not-for-profit organizations, including facilities of several colleges and universities (LSU, Tulane, Xavier, Delgado), several hospitals, two medical schools, nursing schools, medically related offices and businesses, and associated biotech companies. The physical proximity of institutions allows for sharing of expensive and ever-changing technologies and diagnostic equipment. It also encourages human interaction and intellectual exchanges that can lead to more accurate diagnoses, varied treatment approaches and important scholarly and medical research and discovery.

B. Bioscience Research

Pre and post Katrina, the area's bioscience institutions have been conducting cutting-edge research in areas such as gene therapy, cancer biology, peptide pharmaceutical design, and infectious diseases. Federal and private grant funding in New Orleans exceeded \$180 million in 2003 and was growing substantially as New Orleans based institutions capitalized on their core strengths. In fiscal year 2005, the New Orleans area accounted for \$129.8 million in awards from the National Institutes of Health, representing 74 percent of the total amount awarded within the entire state of Louisiana.

One of the recent signs that our recovery has turned the corner and that the medical district plays a major role in our recovery is the beginning of construction of the Louisiana Cancer Research Center. This project was slowed down by Katrina, but is back on track with a safer and smarter building design. The \$94 million Center is being built in the downtown medical district by a consortium of Louisiana State, Tulane and Xavier Universities. It will be a center for treatment, teaching and research, and is a prime example of the economic engine our downtown medical district has become.

The cutting-edge research taking place at these institutions will allow us to provide the highest level of care to our veterans.

C. Regional Support

This downtown medical district location for the VA Hospital has the support of a coalition of regional partners, including the New Orleans Regional Planning

Commission, the New Orleans City Council, and the Downtown Development District, each of which unanimously approved resolutions to keep the hospital downtown. In addition, the Louisiana chapter of the American Legion, with more than 1,000 delegates in attendance at its recent annual meeting, also unanimously supported the downtown New Orleans location. We ask for your support in ensuring that this facility is built in downtown New Orleans and that it is constructed as soon as possible.

This critical hospital facility, which we hope will be co-located with the new LSU teaching hospital, will take several years to construct even on the quickest timetable. In the meantime, all avenues must be explored for providing mental and physical health services to address the urgent immediate needs of our veterans and all of our citizens. Quick action is necessary, first and foremost for our veterans' healthcare, and for the benefit of our entire region.

V. Conclusion

My administration will continue to work toward and advocate for solutions to immediate critical health care concerns while supporting the long-term projects and vision of a premier medical delivery system that will serve all citizens regardless of income. In spite of unprecedented challenges presented in the aftermath of the largest natural and manmade disaster in our country's history, we have made great strides in re-establishing the health care systems that the citizens of the Gulf Coast deserve. With your continued support, we will not only return to pre-Katrina capacity, we will become a 21st Century model of health care for the nation.

Thank you for this opportunity to come before you today. The recovery of New Orleans is underway. We look forward to continuing our partnership with you as we work to fully restore one of America's greatest cities.

RESEARCH

Excess Mortality in the Aftermath of Hurricane Katrina: A Preliminary Report

Kevin U. Stephens Sr, MD, JD, David Grew, MSPH, Karen Chin, MSPH,
Paul Kadetz, MSN, MPH, P. Gregg Greenough, MD, MPH, and
Frederick M. Burkle Jr, MD, MPH, DTM

ABSTRACT

Background: Reports that death notices in the *Times-Picayune*, the New Orleans daily newspaper, increased dramatically in 2006 prompted local health officials to determine whether death notice surveillance could serve as a valid alternative means to confirm suspicions of excess mortality requiring immediate preventive actions and intervention.

Methods: Monthly totals of death notices from the *Times-Picayune* were used to obtain frequency and proportion of deaths from January to June 2006. To validate this methodology the authors compared 2002 to 2003 monthly death frequency and proportions between death notices and top 10 causes of death from state vital statistics.

Results: A significant increase in the proportion of deaths was seen compared to the known baseline population.

Discussion: Death notices from local daily newspaper sources may serve as an alternative source of mortality information. Problems with delayed reporting, timely analysis, and interoperability between state and local health departments may be solved by the implementation of electronic death registration. (*Disaster Med Public Health Preparedness*. 2007;1:1-1)

Key Words: excess mortality, natural disasters, hurricane Katrina, public health system, death notice surveillance, mortality data, health statistics

Editors' Note: After not experiencing a major public health emergency in almost 100 years, the US is relearning the stark realities that occur when a public health system is compromised and the pulse of a community is temporarily lost. In the chaotic aftermath of Hurricane Katrina the impact on health, through its influence on infrastructure and the determinants of health, subtly began to rear its ugly head. When the daily capacity to evaluate and monitor health indices fails, as it has in New Orleans, morbidity and mortality remain unnoticed and uncounted. Predictably, vulnerable populations suffer the most.

Stephens and his colleagues, alerted by the concerns of the citizenry, again took the pulse of the community and found that the rate of death notices, as just 1 "imperfect" measure of excess mortality, was suspiciously elevated. Is this an ideal population-based study? No, but both the question and the strength of this preliminary report are something that disaster medicine specialists have been struggling with for decades. What do we need to know to prevent needless mortality and morbidity while the public health system is recovering? How do we derive the essential information to guide health relief efforts and measure the interaction between the human host and the compromised environment to prevent further harm when the traditional system of assessing mortality is debilitated? The entire postdisaster surveillance system may have only 1 person doing essentially all of the tasks. What does this lone person do when resources are limited?

Our disaster medicine colleagues who respond to catastrophic public health emergencies worldwide have educated us on the nuances of the prolonged effect that such disasters have on the community. Following the prototypical wars that destroyed their countries' public health infrastructure, the decay factors that cause preventable deaths continued for many years after the shooting had stopped. Years later, retrospective studies recorded many more deaths from indirect causes, and those that suffer the most typically are women, children, old people, and people with disabilities. Ninety percent of excess deaths were preventable.

The US is not a developing country, but the uncomfortable reality of the public health impact and management of Katrina is painfully similar. The authors' study has exposed that glaring deficiency—that an attentive and proactive surveillance and response mechanism is justifiably obligated from state and federal agencies.

Excess Mortality in the Aftermath of Hurricane Katrina

How can dependable mortality data be accessed when the usual means of data collection have been profoundly disrupted? Mortality data and health statistics reports provide public health officials with critical insight into the health status of a population. These data provides key information for public health research, facilitate long-term surveillance, and are commonly the basis for health interventions.¹

AQ: 1 The National Association for Public Health Statistics and Information Systems is partnering with the National Center for Health Statistics in a cooperative agreement to upgrade all 50 states from paper-based to electronic death registration systems (EDRS).² A nationwide EDRS will facilitate rapid reporting and interoperability between local, state, and national health agencies, and will streamline the vital records request process (G. Land, personal communication, July 7, 2006). This system is not currently in place to address the immediate public health issues from future disasters in Louisiana.³

AQ: 2 Under normal circumstances, mortality rates are derived from death certificates registered at each state's office of vital records. Before Hurricane Katrina, the Louisiana Department of Health and Hospitals issued an annual health report card, which included statistical reports across various health indices, serving as an overall evaluation of Louisiana's health. The most recently released health report card was submitted to the state legislature in March 2006 for the 2005 report; however, all of the mortality data presented in the state's report date from 2003.⁴

The Louisiana Department of Health and Hospitals Office of Vital Statistics is responsible for processing requests for vital record certificates, including birth, death, and marriage certificates, as well as generating statistical reports.⁵ The department's ability to function at full capacity was interrupted by Hurricane Katrina. Only 80% of vital record certificates were moved from the flooded basement of the New Orleans State Office Building to a floor higher in the building before the flooding. The majority of these certificates were birth records. The Office of Vital Statistics is operating at nearly half the pre-Katrina capacity, with a reduction from 87 employees to a current staff of 51 employees. Furthermore, a majority of this workforce is temporary and/or new employees. Although the staff has been significantly reduced, the requests for documents have markedly increased from 300,000 requests in 2004 to 534,936 requests within the last year.⁶ Operations for the Office of Vital Statistics have been relocated from New Orleans since the storm and are now divided between Baton Rouge⁶ and Metairie.⁷ Consequently, the ability of the Louisiana Depart-

ment of Health and Hospitals Office of Vital Statistics to generate accurate and timely statistical reports, in light of these myriad factors, is compromised.

The floodwaters caused by Hurricane Katrina have had a lasting impact on the health system of New Orleans and its surrounding parishes. Only 15 of 22 area hospitals have reopened, with less than half the number of prestorm beds.⁸ A significant portion of the population is still living in substandard conditions, contributing to the reported pervasive, unmitigated stress among residents.^{9,10} As such, health officials fear there will be increases in morbidity and mortality.⁸ Given the compromised mechanism for registering local deaths, there is a demonstrated need for alternative means of generating mortality information and indices. Death notices in the *Times-Picayune*, the greater New Orleans daily newspaper, increased dramatically in 2006.¹⁰ In the absence of an EDRS and current, verified vital statistics from the state, the present study attempts to use extrapolated daily newspaper death notices as a valid

alternative to the conventional but deficient registration system, and in so doing, determine a workable mortality rate for greater New Orleans in the aftermath of Hurricane Katrina.

METHODS

The source for 2006 mortality data was the *Times-Picayune*, which maintains a Web site that contains a 6-month backlog of death notices.¹¹ The *Times-Picayune* receives death notices via a passive data collection mechanism: funeral directors and families of deceased not using funeral homes may submit death notices via e-mail or fax. Death notices for the years 2002 to 2003 were obtained from the NewsBank, Inc, online database through the New Orleans Public Library¹² to establish a baseline mortality rate. Death notices from the *Times-Picayune* were counted per month for the years 2002 to 2003 and for the months of January to June 2006.

For a standard of comparison, the number of deaths were obtained from the Louisiana Office of Public Health, State Center for Health Statistics for the greater New Orleans area that includes Orleans, Jefferson, Plaquemines, Saint Bernard, Saint Charles, Saint James, Saint John the Baptist, Saint Tammany, Tangipahoa, and Washington parishes. Monthly mortality data representing the top 10 causes of death for the greater New Orleans area was obtained for the years 2002 to 2003 from the Louisiana Department of Health and Hospitals Health Statistics Center. These datasets were extrapolated from data available on the department's Web site.¹³ Top 10 causes of death is used in place of total mortality because data on total mortality were not available at the parish level.

“The significant increase in proportion of deaths in the first 6 months of 2006 supports the civilian population's suspicions about the enduring health consequences of the hurricane.”

In a stable, open population, an estimate of the mid-year population serves as the denominator of a mortality rate. Therefore, mid-year population estimates were used for denominator data for the 2 baseline years, 2002 and 2003.¹⁴ At the time the present study was carried out, the only population estimate available for greater New Orleans was from January 2006.⁹ Therefore, this population was used to represent the denominator for the mortality calculations from January to June 2006.

To limit the effects of potential confounders on the results, the authors excluded death notices that reported an out-of-state death, an out-of-greater New Orleans (but still within Louisiana) death, a death that occurred during Hurricane Katrina but was reported after January 1, 2006, or a duplicate entry death. Because removing all of these entries would require reading each death notice in detail, the authors sampled 1 week of death notices in the middle of each month, totaled the number of death notices that satisfied exclusion criteria, and averaged the number over the 6-month period.

To determine whether the newspaper death notice and official state datasets were correlated, the authors compared mortality rates during the period of 2002 to 2003 for each dataset. To detect any significant change in mortality across 2002 to 2003, mortality rates from 2002 were compared to 2003 for each data source. These analyses were performed separately. Death notices were compared with death notices and state data were compared with state data across the 2-year period to test the integrity of the data source. Mortality rates derived from the *Times-Picayune* death notices in the first 6 months of 2006 were compared with those from 2002 to 2003 (pre-Katrina). Data entry and tests of statistical significance and correlation were done using Microsoft Excel 2002 (Microsoft, Inc, Redmond, WA).

RESULTS

Total death notices from January to June 2006 and death notices meeting exclusion criteria during the same period are described in Table 1. The resulting number for mortality rate calculation is included in Table 2.

Average monthly mortality rates for 2002 to 2003, calculated from Louisiana state data and *Times-Picayune* death notices using the greater New Orleans pre-Katrina population estimates from those years, are compared in Figure 1. The *r* value for correlation between the mortality rates derived from the 2 datasets is .6563, representing a significant (large positive) correlation.

The strong correlation gave validity to the death notices as a reasonable alternative to determine post-Katrina mortality and make comparisons with pre-Katrina mortality. A base-

line average of deaths per month from January to June and the mortality rates based on pre-Katrina greater New Orleans population estimates are compared with mortality rates during the same months in 2006 on the post-Katrina greater New Orleans population estimate. Confidence intervals for mean mortality rates were calculated for both periods (Table 2). The unpaired Student *t* test was used to test significance between the sample means. The *t* value was calculated to 3.94, statistically significant at *P* < .005.

The post-Katrina mortality rate for the first 6 months of 2006 was approximately 91.37 deaths per 100,000 population; compared to the pre-Katrina population mortality rate of 62.17 deaths per 100,000 population, this represents an average 47% increase from the baseline mortality, suggesting a marked increase in indirect (excess) deaths postdisaster (Figure 2). Although the confidence interval around the 2006 mean is wide, there is little overlap with the 2002 to 2003 confidence interval, suggesting a significant difference in the mortality distributions between the 2 populations.

DISCUSSION

The significant increase in proportion of deaths in the first 6 months of 2006 supports the civilian population’s suspicions about the enduring health consequences of the hurricane. This major natural disaster resulted in a severe compromise of the public health infrastructure, the loss of health care facilities and the ability to deliver care, and a chaotic shift in a major metropolitan population. Furthermore, it disabled the ability of the

state to perform optimal evaluation and monitoring studies. Such sequelae characteristically prolong public health emergencies and allow for conditions that are ripe for indirect effects leading to increased mortality and morbidity, data that are often unnoticed and uncounted.

Excess death studies, especially those performed during large-

“death notice monitoring provided real time mortality information well ahead of official state health information mortality data.”

TABLE 1

| Frequency of Death Notices by Inclusion and Exclusion Criteria, 2006 | | | | | | |
|--|---------|----------|-------|-------|------|------|
| | January | February | March | April | May | June |
| Total death notices | 1589 | 1301 | 1418 | 1214 | 1194 | 1185 |
| Excluding Katrina deaths | 1558 | 1270 | 1387 | 1183 | 1163 | 1154 |
| Excluding out-of-LA deaths | 1427 | 1139 | 1256 | 1052 | 1032 | 1023 |
| Excluding duplicate entries | 1206 | 918 | 1035 | 831 | 811 | 802 |
| Excluding out-of-10 parish deaths | 1108 | 820 | 937 | 733 | 713 | 704 |

T1
T2

F1

F2

Excess Mortality in the Aftermath of Hurricane Katrina

TABLE 2

| | 2002–2003 | | | | 2006 | | | | |
|------------------|------------------|----------------------------------|-------|---------------------------------|---------------|----------------------------------|-------|---------------------------------|--|
| | Av No. of Deaths | Total NO Metropolitan Population | % | Mortality Rate (deaths/100,000) | No. of Deaths | Total NO Metropolitan Population | % | Mortality Rate (deaths/100,000) | |
| Jan | 1037.5 | 1,481,393 | 0.070 | 70.04 | 1108 | 914,745 | 0.121 | 121.13 | |
| Feb | 864.5 | 1,481,393 | 0.058 | 58.36 | 820 | 914,745 | 0.090 | 89.64 | |
| Mar | 986.5 | 1,481,393 | 0.067 | 66.59 | 937 | 914,745 | 0.102 | 102.43 | |
| Apr | 887 | 1,481,393 | 0.060 | 59.88 | 733 | 914,745 | 0.080 | 80.13 | |
| May | 885 | 1,481,393 | 0.060 | 59.74 | 713 | 914,745 | 0.078 | 77.95 | |
| Jun | 865 | 1,481,393 | 0.058 | 58.39 | 704 | 914,745 | 0.077 | 76.96 | |
| Mean with 95% CI | | | | 62.17 (95% CI 52.31–72.02) | | | | 91.37 (95% CI 56.44–126.30) | |

Abbreviations: NO, New Orleans; CI, confidence interval.

scale public health emergencies, risk inherent loss of the stringent evaluation and monitoring standards that are expected during less chaotic times. Whereas death rate reports may prove alarming, they must first alert decision makers to rally resources to intervene where prevention of further deaths are most likely and to develop robust evaluation and monitoring programs to identify and verify the exact nature of possible excess mortality and the most vulnerable of sub-populations experiencing mortality and morbidity. There is an urgent need to understand the etiology of the problem so that local, state, and federal health agencies can better prepare for and anticipate future public health emergencies. The present study raises this concern in the post-Katrina greater New Orleans population and suggests an urgent need for further study to investigate the causes and age distribution of these excess deaths. It is a call to action to federal and Louisiana state health authorities to direct the necessary resources to determine and monitor these causes.

Immediately following disasters, public health officials need reliable sources of mortality information to determine direct and indirect consequences, particularly when traditional health information systems are debilitated. In this study, an alternative source of mortality information—death notices published in the daily metropolitan newspaper, the *Times-Picayune*—was found to correlate highly with mortality data from the conventional state health information system in the pre-Katrina population. The authors believe that this study validates this alternative source in this population. Furthermore, death notice monitoring provided real-time mortality information well ahead of official state health information mortality data, giving impetus to the Louisiana health departments to adopt an interoperable statewide EDRS to rapidly assess and monitor mortality.

Strengths

The exclusion criteria of this study eliminated 2006 death notices that did not occur in the specified geographic area of the study or within the specified time frame of the study (Table 1). This was done to eliminate death notices that may artificially inflate the 2006 mortality rate calculation. Elim-

FIGURE 1

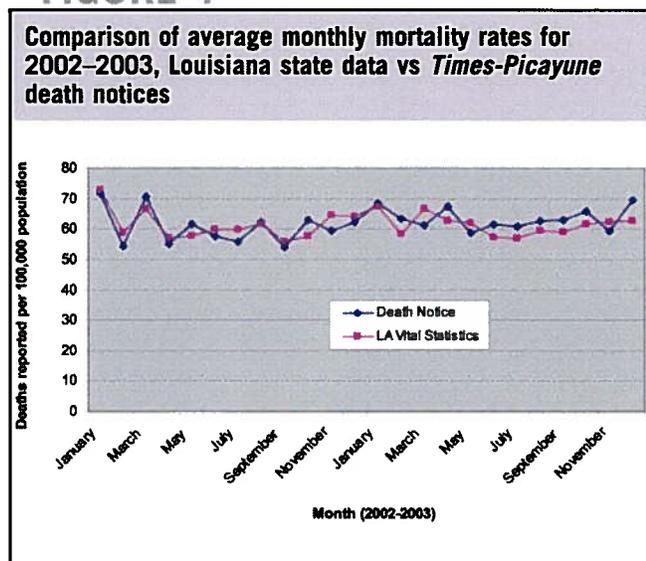
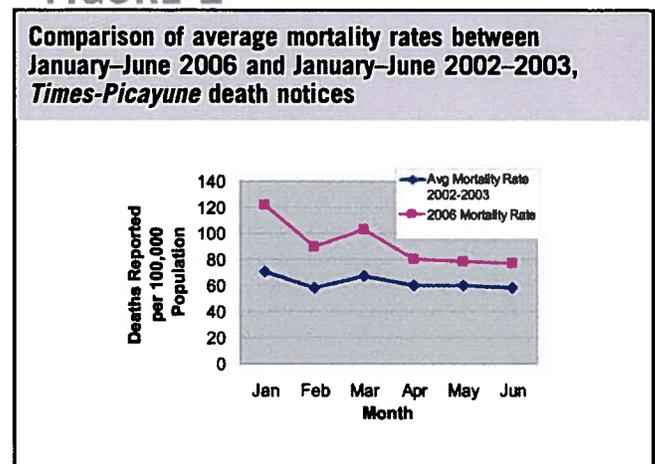


FIGURE 2



inating death notices by using strict exclusion criteria would likely result in a conservative estimation of true mortality rates in the first 6 months of 2006. It should be noted that before Katrina, the *Times-Picayune* offered both paid and free death notices, whereas after the storm they only offered paid death notices. This difference would also likely result in an artificially reduced number of death notices and minimize the likelihood of an inflated mortality rate in the first 6 months of 2006.

Limitations

The data source for current mortality, the *Times-Picayune*, uses a passive data collection system. This would likely result in underreporting of the true mortality because there are deaths that occur in the area that are not published as death notices in the *Times-Picayune*. Underreporting of mortality would result in an underestimation of current mortality rates, making the results of this study even more alarming.

The study source for the population of greater New Orleans provides only an estimate for January 2006, and the authors necessarily used this population estimate in the denominator data for mortality rate calculations for each month of 2006. However, according to recent data, the population of greater New Orleans has been exceptionally dynamic and growing steadily (demonstrated in data collected through May 2006).^{9,15} If the population of greater New Orleans did increase in the first 6 months of 2006, the calculations of mortality rates will overestimate the true mortality rate over the first 6 months of 2006 by virtue of underestimating the true population.

There may be demographic differences, particularly in age distribution, between the pre-Katrina and post-Katrina populations of greater New Orleans. The 2006 population of greater New Orleans may have a disproportionate number of older adults and therefore a higher death rate. The authors did not adjust for age in their mortality calculations. The degree to which changing demographics affected the results of this study cannot be known until further studies investigating the current demographics of greater New Orleans are carried out.

CONCLUSIONS

A significant increase in the mortality rate for the first 6 months of 2006 substantiates the deleterious effects of enduring health consequences resulting from a major disaster. This must be understood as an urgent call for further studies and subsequent interventions. The authors believe that the underlying causes of the increased mortality rates within the greater New Orleans' population are complex, multifactorial, and persistent. This disaster severely compromised the public health infrastructure. It is suggested that a destroyed or poorly recovered public health infrastructure, which normally would be able to identify health problems and protect the health of a population, has in fact contributed to excess mortality.

Finally, the necessity to set standards that will open the lines of communication across public health agencies in the event

of a disaster is clearly indicated.¹⁶ Interagency communication can deteriorate rapidly in the midst of a disaster; each office is often solely focused on meeting its own needs and thereby unavailable to provide information across jurisdictions. Offices were flooded, paper records had to be rerouted, and only a fraction of office staff returned to work. This confluence of events reveals the urgent need for states to adopt electronic reporting systems.

About the Authors

Kevin U. Stephens Sr is with the New Orleans Health Department; David Grew is with the Tulane Medical School and the Tulane School of Public Health and Tropical Medicine; Karen Chin and Paul Kadetz are with the Tulane School of Public Health and Tropical Medicine; and P. Gregg Greenough and Frederick M. Burkle Jr are with the Harvard Humanitarian Initiative, Harvard University.

Address correspondence and reprint requests to Kevin U. Stephens Sr, MD, JD, Director, New Orleans Health Department, 1300 Perdido St, Room 8E18, New Orleans, LA 70112 (e-mail: kustephens@cityofno.com).

Received and accepted for publication April 6, 2007.

ISSN: 1935-7893 © 2007 by the American Medical Association and Lipincott Williams & Wilkins.

DOI: 10.1097/DMP.0b013e3180691856

REFERENCES

1. Steering Committee Report. Toward an electronic death registration system in the United States: report of the Steering Committee to Reengineer the Death Registration Process. *Am J Forensic Med Pathol* 1998;19:234–241.
2. National Association for Public Health Statistics and Information Systems. Web site. <http://www.naphsis.org>. Accessed April 4, 2007.
3. Marek A. Learning the hard lessons of Katrina: why things were even worse than you ever knew. *US News & World Report*. May 28, 2006. <http://www.usnews.com/usnews/news/articles/060605/5neworleans.htm>. Accessed April 3, 2007.
4. Cerise FP. 2005 Louisiana Health Report Card. March 2006. Louisiana Department of Health and Hospitals Web site. <http://www.dhh.louisiana.gov/offices/publications/pubs-275/Health%20Report%20Card%202005.pdf>. Accessed April 3, 2007.
5. Office of Public Health Director. State Registrar/Vital Records and Statistics Web site. <http://www.dhh.louisiana.gov/offices/?ID=252>. Accessed April 3, 2007.
6. Shuler M. Katrina still burdens state registry. February 24, 2007. The Advocate-WBRZ ABC News 2 Louisiana Web site. <http://www.2theadvocate.com/news/neworleans/6053061.html>. Accessed April 3, 2007.
7. New phone numbers for vital records. Louisiana Department of Health and Hospitals Web site. <http://www.dhh.louisiana.gov/news.asp?ID=1&Detail=784&Arch=2006>. Accessed April 3, 2007.
8. Beggren RE, Curiel TJ. After the storm: health care infrastructure in post-Katrina New Orleans. *N Engl J Med*. 2006;354:1549–1552.
9. The Katrina Index. Tracking Recovery of New Orleans & The Metro Area. Greater New Orleans Community Data Center. <http://www.gnocdc.org/KI/KatrinaIndex.pdf>. Accessed April 3, 2007.
10. Weeks L. New Orleans locals think Katrina's toll is still rising: surge in deaths blamed on storm-related stress. *Washington Post*. February 19, 2006:A03.
11. Death Notices & Guest Books. nola.com Web site. <http://obits.nola.com/NOLA/DeathNotices.asp>. Accessed April 10, 2006.
12. New Orleans Public Library. *Newsbank Inc* Web site. <http://infoweb.newsbank.com>. Accessed April 3, 2006.
13. Records and Statistics. State Center for Health Statistics. <http://www.dhh.louisiana.gov/offices/?ID=275>. Accessed April 10, 2006.

Excess Mortality in the Aftermath of Hurricane Katrina

AQ: 4

14. County population estimates. *US Census Bureau Web site*. <http://www.census.gov/popest/counties>. Accessed April 10, 2006.
15. Chapman J, Dailey M. Post-disaster population estimates. <http://www.dhh.louisiana.gov/offices/?ID=88> . Accessed April 10, 2006.
16. Vital Records and Statistics re-engineering. National Association for Public Health Statistics and Information Systems Web site. <http://www.naphsis.org/projects/index.asp?s=0&bid=393>. Accessed April 4, 2007.

AUTHOR QUERIES

AUTHOR PLEASE ANSWER ALL QUERIES

1

AQ1: AUTHOR—FYI: Acronyms deleted because journal style dictates that an acronym is included only when it is used 3 or more times in the body of the article

AQ2: AUTHOR—Original ref 3 works better as an in-text personal communication; ref 3 will be deleted and subsequent refs renumbered

AQ3: AUTHOR—Refs 9 and original 15 are the same, so 15 was deleted and subsequent refs renumbered

AQ4: AUTHOR—The link provided in ref 15 does not currently link to the document referenced. Pls provide a more specific or different link.
