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Phil Bronstein
Editor and Executive Vice President

To the Judges:

On the map of infant death, Tuli Hughes lives in a red zone.

Within yards of her house in San Francisco's most impoverished corner, six babies have died in four years. And Hughes herself has suffered five doomed pregnancies.

Yet the Fijian-American mother resides in a city that studies have ranked the lowest in the nation in infant mortality. Within a few miles of her home, survival rates for babies are among the highest in the United States, but the infant mortality rate in her ZIP code compares with that of Bulgaria or Jamaica.

Twenty years after U.S. health officials vowed to solve the glaring health disparities that leave babies in certain neighborhoods at far greater risk of death than the general population, the San Francisco Chronicle set out to examine why they had failed.

Reporters Erin McCormick and Reynolds Holding began with a database of 10 years of deaths in California, which they obtained from the state. They separated out infant deaths (before age 1), sorted them by ZIP codes and then built a computerized map, which traced California birth and infant death data to show the ZIP codes where the 10-year infant mortality rates were the worst.

Then the reporters sought to explain what was behind the vast disparities — both by analyzing the data for such factors as cause of death, prenatal care and medical risks and by seeking out and telling the stories of disconsolate families in those ZIP codes.

What started as pure database research evolved into tightly woven narratives that delved into the lives of individual families to uncover a set of systemic problems long overlooked by the medical community.

The research stretched from the inner cities of the San Francisco Bay Area, where multi-million dollar efforts to get prenatal care to every mother have failed to lower the infant death rates, to polluted farmlands of the Central Valley, where Hispanic babies are dying at rates far in excess of what is expected for that usually resilient ethnic group.

901 Mission Street · San Francisco · CA 94103 · ph: (415) 777-7761 · fax: (415) 957-1013

The result was a package of stories that illuminated and explained for the public the complex mysteries that have confounded health researchers for years.

The research showed that, in concentrating national efforts on medicine and technology, health care leaders have overlooked evidence that pollution and the stress of inner-city life may be a threat to many newborn babies.

It also found that some of the medical marvels that can aid the survival of the smallest and sickest babies — infants born as many as 16 weeks early — fail to reach more than 1,000 of the infants who die in California each year because of a breakdown in the state's health care delivery system.

One of the stories took readers into a neonatal intensive care unit where, in the face of the nation's rising rates of premature births, doctors and nurses must make daily decisions on which babies can be saved and which should be allowed to die.

The series received a groundswell of support from health officials, doctors and researchers in California and around the nation. It gave California residents a hands-on tool for understanding the often-overlooked problem of infant mortality — an interactive web site that allowed them to personally research infant deaths for individual ZIP codes.

The Chronicle is pleased to nominate Erin McCormick and Reynolds Holding for the Price Child Health and Welfare Journalism Award.

Sincerely,

Phil Bronstein
Editor
San Francisco Chronicle

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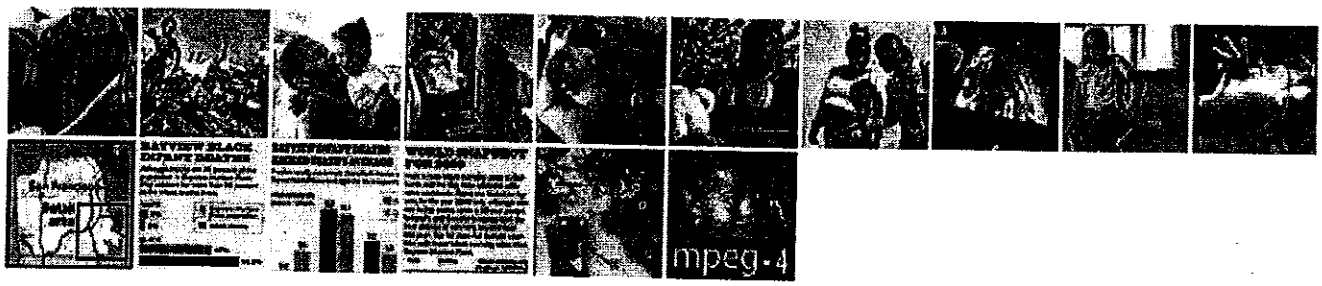
TOO YOUNG TO DIE

Part One: Life's Toll

- Erin McCormick and Reynolds Holding, Chronicle Staff Writers

Sunday, October 3, 2004



In Bayview-Hunters Point, the stress created by environmental problems, racism, poverty and crime may explain why so many babies die young. Infant mortality is twice as high here as in the rest of San Francisco.

In a bungalow at the back of an alley between industrial warehouses in San Francisco's Bayview-Hunters Point district, a young woman cried out in pain.

"Take me to the hospital," 22-year-old Tuli Hughes called to her husband, Walter, on the evening of April 6, 2001.

The baby was coming.

It was barely the fifth month of Hughes' pregnancy -- way too early for the infant girl she was carrying to have a chance at a healthy life.

The mother had been through this before. Three times she had lost babies to miscarriages. A fourth infant -- baby Joseph -- was born early with a fatal birth defect and died within minutes.

"I thought it was just me," Hughes recalled recently. "I thought I was alone."

But she is not alone. The Bayview-Hunters Point ZIP code where Hughes has lived her entire life has one of the highest infant mortality rates of any ZIP code in California. It is a long-neglected neighborhood in the southeast corner of San Francisco -- beset by poverty, joblessness, crime and environmental issues. The area's infant mortality rate is one more striking statistic that reflects the disparity between its residents and those in the rest of San Francisco.

Bayview-Hunters Point has an infant mortality rate comparable to Bulgaria or Jamaica, while San Francisco has been cited in studies as having the best infant mortality rate among large U.S. cities, even with the death rate of Bayview-Hunters Point included. Babies are 2.5 times more likely to die in their first year there than those in other areas of San Francisco, a Chronicle analysis of 10 years of state data shows.

How can a few miles make such a difference?

The answers are complicated, but the facts are clear.

Bayview-Hunters Point, like most areas with extremely high infant mortality rates, is poor and has a large minority population. But statistically, researchers say, the heightened risks associated with being poor and with being a minority (particularly an African American) don't account for the extra-high infant mortality rates in these areas.

Entire groups at risk

The answer, some experts believe, lies in the cumulative toll levied by stress from neighborhood conditions -- ranging from violent crime, drugs, slum housing, a dearth of grocery stores, a lack of political clout and living in a dumping ground for

industrial pollutants.

"Neighborhoods can put entire groups of people at risk," said Jennifer Culhane, a researcher who has studied reproductive health at Thomas Jefferson University in Philadelphia. "Neighborhood conditions may be so onerous that they literally get under residents' skin."

Half a block from Tuli Hughes, around the concrete barriers set up to keep drug dealers from hot-rodding down her street and past the police checkpoint that guards the entrance to the Alice Griffith public housing projects, neighbors Cheryl and Bakari Fields lost their twins after premature births one year before.

Three doors from them, another mother went into early labor with her twins 10 months before that. One baby survived only two minutes; the other hung on to life in the hospital for a month and a half before dying of respiratory failure.

A year before that, just around the corner, in a public housing unit overlooking the contaminated remains of the now-closed naval shipyard, a 3-month-old boy died of sudden infant death syndrome.

And, as Tuli Hughes rushed to the hospital to give birth to a daughter weighing only 1 pound, another neighbor, Patrina Council, was just coming home with her baby boy, Jyimeir. Born prematurely, he had spent his first four months in a hospital neonatal intensive care nursery -- and he was not yet out of danger.

All these families thought they were facing their crises alone. They didn't realize that their children's stories were part of a grim statistic that has confounded experts studying the problem of premature birth and infant mortality on local, state and national levels.

The Chronicle analysis of California births and infant deaths between 1992 and 2001 identified infant mortality hot spots in isolated ZIP codes up and down the state. In the Bay Area, babies living in Bayview-Hunters Point and in troubled pockets of Richmond and Oakland were roughly twice as likely to die in their first year as those in the rest of the state.

Throughout California and the nation, researchers say, stubborn islands of elevated infant mortality like these are keeping the United States from matching the infant survival rates of Canada, France, Japan and dozens of other countries that spend much less on health care than we do.

In the late 1980s and early 1990s, the United States began a campaign to reduce its infant mortality rate to a level similar to those of other industrialized nations. The effort concentrated on medical care, ensuring pregnant women access to prenatal care and redoubling efforts to save sick babies through high-tech intensive care.

But the nation did little to address the day-to-day inequities that follow residents of these neighborhoods from cradle to grave.

"We know that healthy babies come from healthy moms and healthy moms come from healthy communities, so you can't just apply a quick fix." said Dr. Michael Lu, a professor at UCLA, who studies disparities in infant health.

Bayview-Hunters Point, which accounts for 4 percent of San Francisco's population but 15 percent of its infant deaths, is not a healthy community.

According to the 2000 U.S. Census, a third of children younger than 5 live below the poverty line -- $17,603 for a family of four -- in one of the most expensive cities in the nation. Half of these children have only one parent in the home.

Much of the housing is rundown and infested with insects and mold, particularly in city-owned public housing, where many units are boarded-up and abandoned.

Crime and violence are common. Of the 130 homicides committed in San Francisco last year and the first seven months of this year, 25 -- or 19 percent -- occurred in Bayview-Hunters Point. Last year, a stray bullet killed a 7-week-old baby as he slept in his uncle's arms inside a house.

Jobs are scarce, and some residents say drug sales are the area's major industry. According to the 2000 Census, the unemployment rate for the Bayview is 9 percent, almost twice the 4.6 percent rate for the city.

In addition, this corner of San Francisco is home to almost all the city's polluting industries, including the main power and sewage treatment plants and the now-closed Hunters Point Naval Shipyard -- a Superfund cleanup site where the military once experimented with radiation.

Studies show that residents of the area face elevated rates of asthma, diabetes and cervical and breast cancer.

"It's chaos out here," said Espanola Jackson, a Bayview community activist. "We have been San Francisco's dumping ground for decades."

A family home

Like many parents in the neighborhood, Walter and Tuli Hughes don't consider Bayview-Hunters Point an uncomfortable place to call home.

Along with others in the area, they complain about the smell of sewage wafting up from the streets when water levels are high and the strange odors that ooze up from the ground in the evenings. And they sometimes worry about the gunshots they hear at night and the drug dealers and users who congregate around the liquor stores.

One night Walter Hughes heard gunfire and learned later that a neighbor's 18-year-old son had been shot while working on a car in the garage. The baby shot while cuddled in his uncle's arms in the back bedroom of his family's home lived four blocks away.

But Tuli Hughes was born in this neighborhood and has lived in the same house with her big, extended Samoan family since she was 12. Walter, an African American, was raised in Bernal Heights. He's been around the Bayview pretty much all the time since he fell in love with Tuli on their first date, on the night before her 18th birthday. They were married the next year, in what they now fondly describe as an act of defiance against Tuli's protective parents.

"Her parents were really strict, and I was always kidnapping her," Walter said. "They would say, 'What's going on here? You guys aren't married.' So one day we said, 'Oh yeah?' " They had sneaked off to City Hall and tied the knot.

Beyond race

The neighborhood has been a hub for San Francisco's black community since the 1940s, when thousands of families migrated from the South to take advantage of jobs at the then-thriving naval shipyard. While the jobs lasted, it was a vibrant community, with a neighborly spirit. Family businesses sprouted up along Third Street. Churches were packed on Sundays, according to Jackson, who moved to the area in 1948.

In recent years, high housing costs and a lack of jobs have driven many blacks out of the area and out of San Francisco altogether. According to the 2000 Census, blacks are no longer a majority in the Bayview-Hunters Point ZIP code, 94124. In place of those who left, many Asian/Pacific Islanders and Hispanics moved in.

In Bayview-Hunters Point, each of these groups -- blacks, Asian/Pacific Islanders and Hispanics -- face infant mortality rates above what is expected for their races in California. Not enough white babies were born in Hunters Point over a 10-year period to accurately calculate their mortality rate.

The infant mortality problem in Bayview-Hunters Point goes beyond the bounds of race.

This is consistent with the findings of dozens of researchers who have studied how stressful neighborhoods affect health.

Philadelphia researcher Culhane discovered that the difference between birth outcomes for black women and white women was almost one-third less when the women lived in the same neighborhoods.

"I believe the solution is deeply rooted in social inequities," Culhane said. "We're going to have to look at interventions that are not within the medical domain. They're about neighborhood quality, housing quality, political clout, participation in the labor force and, ultimately, addressing racial and ethnic discrimination."

Researchers such as Culhane said it's difficult to say that any individual baby died because of neighborhood stress, but when one

looks at the known factors -- age of mother, drug or alcohol abuse and smoking, for instance -- they don't add up to enough of a discrepancy to account for the amount of infant death that is occurring.

The breadth of these issues leads some infant mortality experts to discount the stress theory as interesting but impractical.

"There's something there, but can you fix it?" said Karla Damus, a professor at Albert Einstein College of Medicine in New York. "Who wants to wait that long?"

One approach is just to plow ahead, said Dr. Rajiv Bhatia of the San Francisco Health Department. He runs a program designed, in part, to reduce stress in Hunters Point by improving the neighborhood. He concentrates on creating affordable homes and keeping people from being evicted.

"On one level, it's very simple," he said. "Poverty kills. But researchers want to know why poverty kills, and stress gives them a handle on that. Where I am is, poverty kills, so I want to work on poverty."

Premature birth

When Tuli and Walter Hughes arrived at Saint Luke's Hospital on the evening of April 6, 2001, doctors confirmed that their baby's tiny head was already on its way out of the mother's cervix.

Doctors had Tuli put her legs in the air in hopes that it might slow things down.

While the number of preterm births in the United States has risen dramatically in recent years, doctors have been unable to find a way to prevent premature labor or stop it once it begins.

A full-term baby spends 40 weeks in the womb. Doctors told Tuli and Walter Hughes that, at only 22 weeks of gestation, their baby had no viable chance of survival. In studies done during the mid-1990s, researchers found that all babies born this early died before 6 months of age.

So, even though the baby might be born alive, most hospitals will not use interventions, such as inserting breathing tubes, to try to save an infant this premature. Hospitals typically recommend taking no action to save a baby born at less than 500 grams -- about 1 pound 2 ounces -- or less than 24 weeks gestation. Many refuse to intervene before this point.

Tuli's labor could not be stopped.

The baby girl was born at 10:35 a.m. the next day. She was little bigger than a kitten. She had tiny hands, tiny toes and tiny facial features, all beautifully formed but impossibly small. A doctor placed her in Walter's arms so he and Tuli could hold her and talk to her as they said goodbye.

"I knew it was coming, but I couldn't believe it," Walter Hughes said. "She was trying to breathe; she was gasping. I said, 'Put her in an incubator or something.' "

Then, together, the parents held the daughter they had named Angel as she struggled for life and finally died.

Stress hormones

In all, 66 babies less than a year old died in Hunters Point between 1992 and 2001, a mortality rate of 11.8 per 1,000 births. Of those infants, 43 -- or 65 percent -- were African American.

Prematurity and sudden infant death syndrome were the major causes. Babies with low birth weight were 17 times more likely to die than those weighing at least 51/2 pounds.

In Bayview-Hunters Point and throughout the nation, the number of infants being born early is on the rise.

The rate of prematurity in the United States jumped 13 percent between 1992 and 2002, with a record high of 480,812 babies born prematurely in 2002, or 12.1 percent of all live births, according to the National Center for Health Statistics.

"It's the No. 1 cause of newborn deaths, and we don't know why preterm births happen," said Dani Montague, director of the Northern California chapter of the March of Dimes.

Studies have shown that personal factors such as smoking, being older than 35, drug use, domestic violence, infections and diabetes can put a mother at increased risk of going into labor early.

But researchers have found that such factors fail to explain as much as half of preterm births. For many women who go into preterm labor, the cause is a complete mystery.

Researchers are trying to measure how a combination of neighborhood and lifetime stressors can result in hormonal changes in pregnant women. Culhane and UCLA professor Lu, among others, believe these hormones may cause early births, and their presence can explain the high number of premature babies in neighborhoods like Bayview-Hunters Point.

"When you talk to these women, they don't necessarily say they're stressed," Lu said. "This is how they grew up. They may accept (their living conditions) as part of their daily lives. But they may walk around with high levels of stress hormones."

In a study published in 1999, Calvin Hobel, a doctor at Cedars-Sinai Medical Center in Los Angeles, took blood samples from 524 pregnant women and measured them for corticotropin-releasing hormone. He found that women who had preterm births also had significantly elevated levels of the hormone, which is believed to be released by the brain during stress. Corticotropin is believed to be associated with the onset of labor.

Research being conducted by Culhane is looking at whether stress affects the way pregnant women's bodies fight infections. Culhane collected blood samples from pregnant women in Philadelphia and looked at how their blood cells responded to bacterial invasions that might typically cause an infection.

Though the study has not been published, preliminary results suggest that pregnant women with elevated stress hormones react differently to bacteria in a way that might put them at increased risk for preterm labor.

Generations of stress

Lu and other researchers have taken a particular interest in the racial gap between blacks and whites. They focus on the grinding stress -- from factors like segregation and racism -- that blacks may face over a lifetime.

"For about 20 years we thought, if we could just get women to prenatal care, that would address all these issues that women are facing on a daily basis," Lu said. "What we're seeing now is that you really need to start before the women get pregnant. We believe a long time before."

In a paper published last year, Lu suggested that research should look at the stress a mother experiences during her whole "life-course," beginning with her own development in the womb, or even stretching back to encompass the intergenerational effects of the stress her grandmother may have experienced.

He cited studies showing that mothers who were themselves born at low birth weights are much more likely to give birth to low-birth-weight babies. He pointed to other research conducted in Scotland in the 1950s, which showed that lower-class women who married into a higher social class experienced a greater chance of infant mortality than those who had been in that higher class all their lives.

"They suggest that it may take more than one generation to equalize socioeconomic disparities in birth outcomes," said the 2003 article, co-written by Dr. Neal Halfon of the UCLA School of Medicine and Public Health.

Eight babies lost

Within yards of each other, around the barracks-like Alice Griffith Housing Projects -- also known as Double Rock -- five families have lost a total of eight babies.

On weekday afternoons, crowds of jobless young men congregate around cars parked in the streets, while children play in the long grass of vacant fields that old-timers say are landfills made of garbage. The abandoned cranes of the Hunters Point Naval Shipyard loom on the horizon.

A year before Angel Hughes was born and died, a similar tragedy befell Cheryl Fields, a neighbor who lived in Alice Griffith public housing maybe 200 steps from the Hughes' house just outside the project. She was 32 with three children entering their teens at the time.

Fields didn't go into premature labor. She faced another common cause of premature birth, a maternal illness called preeclampsia. Basically, her pregnancy suddenly made her so sick near the end of her sixth month that the only way doctors could save her life was to deliver her twin babies immediately by cesarean section, even though they were too tiny to survive.

After the C-section, Fields was so ill that doctors wouldn't let her hold the babies. They died in their older brother's arms.

While she said the pain has lessened over the years, Fields will never forget her two lost "angels." A photo of them, their bony faces nestled together in a white blanket, decorates her front parlor. She and her husband, Bakari, wear tattoos with the baby's names on their arms.

"My son (Armani) lived two hours. My daughter (Amari) lived an hour," Cheryl Fields said. "The thing that upset me the most was I didn't even get a chance to hold them."

What Patrina Council went through may have been even harder. Five months before Tuli Hughes went into labor with Angel, Council's baby, Jyimeir, was born 51/2 months into her pregnancy, weighing 1 pound 12 ounces. Doctors consider that to be the edge of viability.

He began his first days of life on a ventilator in a hospital neonatal intensive-care ward. It took him more than four months to grow enough and become stable enough to leave the hospital.

The 21-year-old Council brought him home to the four-bedroom public housing unit she shared with her four sisters and three children.

Council, who had her first child at age 13 and her second at 19, said baby Jyimeir came home with six different medications and was so fragile that she was afraid to take him outside.

He lived a little more than a month.

"He was asleep upstairs one day and he just stopped breathing," Council said. "I came downstairs, and when I went up to check on him, he was already blue."

An autopsy showed that he died of respiratory arrest from having been born prematurely.

The data collected on infant deaths in California does not include any indication of whether maternal drug use was a factor in those deaths. But in at least one of the eight deaths in this neighborhood, there seemed a possibility that drugs had played a rule. One 3-month-old boy died of sudden infant death syndrome after having been born to a mother who was addicted to crack cocaine.

There is constant talk in the neighborhood about the young men being killed by gunfire in Bayview-Hunters Point. But few people discuss infant deaths, said Marie Harrison, an environmental activist and longtime resident of the area.

"There's a taboo on conversations about people who lose their little babies," she said. "The mother is usually made to feel she's done something wrong, so she won't talk to her neighbors. There's no support."

A living Angel

Tuli and Walter Hughes' long struggle with early births and infant deaths has a happy ending. Her name is Alyanna Angel Hughes, and she is now a healthy 1-year-old.

Cheryl and Bakari Fields are happy parents as well. Their daughter Aneiyah -- 7 pounds 2 ounces -- was born July 6, and though Cheryl endured complications from a C-section, she and Aneiyah are now doing fine.

Tuli Hughes, now 25, was able to carry Alyanna through a full-term pregnancy, with the help of doctors at California Pacific Medical Center, who discovered that some of her problems were caused by a weak cervix that was causing her to lose babies early. Such a condition is often the cause of miscarriages, but it is usually detected and treated before causing multiple infant deaths in women with access to good health care. There was no explanation for the defect that killed her baby Joseph just after birth.

As the Hugheses recounted the stories of their lost infants in a living room packed with framed photos of nieces and nephews and cousins and uncles, they paused occasionally to nuzzle the baby's soft cheek or tickle her belly.

"She's going to be pretty spoiled," beamed Walter Hughes, 28, who said he's not sure they're brave enough to try for another. "One out of 6 -- those are pretty rough odds."

E-mail Erin McCormick at emccormick@sfchronicle.com.

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URL: http://sfgate.com/cgi-bin/article.cgi?file=/c/a/2004/10/03/MNINFANTMO.DTL

TOO YOUNG TO DIE
PART TWO: TOXIC LEGACY

- Reynolds Holding, Erin McCormick, Chronicle Staff Writers
Monday, October 4, 2004

Babies born in neighborhoods afflicted by pollution -- from smog to pesticides -- are more likely to die before their first birthday.

That warm April midnight, Leslie Guttierez lay in silence at Kern County Medical Center, hugging her newborn twins. She had named them Marie and Mariah, but she called them her two little angels, because they were no longer of this world.

Guttierez was young and healthy. She did not smoke or drink or take drugs. She had received the care of a doctor and nurse since early in her pregnancy. She was Hispanic, an ethnic group with a very low rate of infant mortality. No one had a clue why Guttierez's infants died.

"It was," she said, "almost like something was in the air that took my babies."

Or in the water or the ground.

Guttierez lives in rural Kern County, by several measures one of the most polluted counties in the nation. Dense smog, agricultural waste and unknown doses of dangerous chemicals create an environment that ranks third worst among U.S. metropolitan areas for ozone and daily particle pollution, according to the American Lung Association.

Kern County also contains four of the 10 California ZIP codes with the highest rates of infant death from 1992 through 2001, according to a Chronicle analysis. Guttierez's hometown of Shafter, ZIP code 93263, ranked No. 2.

Although dirty air and water cannot explain any one death, new research suggests that the risk of infant mortality -- death before the age of 1 -- is dramatically higher for women who live amid heavy pollution. Studies published in the past few years link pesticides, carbon monoxide and tiny airborne particles with birth defects, prematurity, low birth weight and respiratory ailments that can lead to an infant's demise.

"It means," said UC Berkeley Professor Kenneth Chay, co-author of a 2003 study on air pollution and infant death, "that there are a huge set of health benefits from cleaner air that have been ignored."

Almost two decades since the United States began a campaign against infant mortality, the cost of ignoring those benefits is beginning to emerge.

Public health officials tried to reduce the infant death rate by stressing better medical care rather than a cleaner environment or healthier urban neighborhoods. Today, the overall rate is down, from 10.6 deaths per 1, 000 births in 1986 to 7 in 2002. But under the World Health Organization's 2002 rankings, the latest available, the United States was 36th among 196 countries. Although national figures show that Hispanic babies typically have even better survival rates than whites, infants in the rural

Kern County ZIP codes that include Shafter, Lamont and McFarland are an exception. Over the 10- year period examined by The Chronicle, the Hispanic infant-mortality rate was twice as high for those Central Valley ZIP codes as it was for California.

"It's shocking that it's that high," said Dr. Elena Fuentes-Afflick, a UCSF professor who has studied infant mortality rates among Hispanic women.

Kern health officials say they run countywide programs to prevent infant deaths, but they were unaware of the high death rates among Hispanics in the county's rural ZIP codes until notified by The Chronicle. While researchers have connected pollution and infant mortality elsewhere, no one has studied these ZIP codes.

"This problem wasn't known before," Chay said. "It raises real questions about what the causes are. As a public policy matter, trying to find some answers may be important, not just to these towns, but to other areas as well."

Effects of air pollution

The first suggestions of a link between pollution and newborn deaths came from London, where the number of infant deaths doubled during a weeklong weather inversion that trapped noxious smog in December 1952.

It was not until the 1990s, though, that researchers developed scientific evidence that bad air could kill babies. In 1995 and 1997, two studies from China found close associations between air pollution and premature and low- weight births. A 1999 study of the Czech Republic connected high levels of air particles with infant deaths from respiratory problems. The same year, a study from Mexico City showed the number of infant deaths rising several days after sharp increases in air particles, ozone and nitrogen dioxide.

In the United States, substantially lower levels of pollution obscured the connection between air quality and infant death. Still, such a link "made a lot of sense," said Dr. Beate Ritz, professor of epidemiology at UCLA School of Public Health, "because we already knew that air pollution increased adult mortality, especially among the elderly and people with cardiovascular problems."

Ritz and other researchers have established that polluted air increases infant mortality in the United States as well as abroad. But the potential dangers from other sources of pollution -- contaminated wells, toxic dumps, dairy farms -- remain a mystery.

From the cab of his Chevy pickup, Tom Frantz, a high school teacher, environmental activist and son of a Kern County almond farmer, points out one pollution problem after another.

Driving down a county road lined with cotton fields and almond orchards, Frantz gestures to the crescent of barren mountains surrounding Kern to the east, south and west. The rounded peaks are barely visible through the smog.

"We're in a bowl here, there are mountains all around us, so the air pollution all gets trapped," he said. "Smog all the way from Sacramento blows down and just stays here."

With trapped vehicle emissions and agricultural pollutants ranging from dust to pesticides, Kern and the rest of the San Joaquin Valley threaten to overtake Los Angeles as the smog capital of the nation, Frantz explained.

The smell of manure fills the air as Frantz drives his truck along a sprawling dairy farm where thousands of Holstein cows huddle in huge, muddy enclosures. Along one side is a small mountain of feed covered in plastic held down with old tires. The gases from cattle urine and manure produced by these farms mix with the air to worsen the smog problems, Frantz said. Until this year, dairies were not subject to clean air regulations.

"The pollution from these dairies is worst in the winter," he said, "because tons of ammonia evaporate into the air and mix with fog to become dangerous particles of ammonium nitrate" that can lodge in people's lungs.

Frantz points out the cotton, grape and almond fields that dot the area. Here, the pesticides change with the seasons. In April, farmers spray herbicides to clear their fields for planting. In May, hormones are applied to make the grapevines bloom. In June, agricultural crews use a chemical fungicide to prevent fruit from rotting. In August, they add sulfur to get rid of mildew.

Though many Kern residents share Frantz's concerns, a substantial portion of them believe agriculture gets a bad rap.

Loron Hodge, 65-year-old executive director of the Kern County Farm Bureau, remembers growing up in Tulare County and helping his father in the alfalfa fields.

"I never had any adverse reactions," he said. "Now, why would I have such a good life? I don't think you can explain it. There are people who adapt to this valley and people who do not."

Hodge said he finds it "difficult to grasp" that infant deaths would be connected to agriculture. "My opinion is that we are seeing more pollution in the valley because we have more people coming, bringing their automobiles," he said. "The frustration we (farmers) have is that we get this broad brushstroke that says agriculture is doing bad things, when all we want to do is provide food and fiber to the people we serve."

A family tragedy

Off the truck-choked lanes of Route 99, down the Elmo Highway through hazy acres of cotton and grapes, left at the tire shop, Carlos Hernandez lives with his wife, Manuela, and their daughter, Mireya.

They live in McFarland, "cancer town," site of a childhood-cancer cluster from 1975 through 1995 and, now, the ZIP code with the eighth-highest infant mortality rate in California.

State investigators found no environmental cause for the cancers, but the infant deaths are harder to dismiss. They approach a rate seen in Tonga, Fiji and other developing nations. Hernandez makes light of the pollution around him -- "I figure, whatever you're going to die of" -- but cannot account for what happened to his son.

Carlos Jr. arrived in March 2003. He was a bruiser, at three weeks "so big and long that I couldn't lay him on my arm no more," said Hernandez, short but strong himself.

Everyone loved Carlos Jr. He was his grandfather's "Little Buddy" and his father's dream fulfilled.

One day after Father's Day last year, at his grandfather's home nearby, Carlos Jr., 3 months old, began to fall asleep as aunts and uncles and sisters passed him from lap to lap. Hernandez carried him to the bedroom.

"I kept going back, three or four times," to check him, Hernandez recalls. The last time, "my brother went in and my brother said he didn't see him there. I went in and said he's right there."

There, but no longer breathing.

"I just dropped to the ground. I didn't know what to do, so I took him to the hospital, but ..." Hernandez's hand goes to his brow and jars the bill of his 49ers cap. He begins to sob. Manuela Hernandez sits next to him, lips quivering, her words locked inside because she cannot speak English.

The doctors at the hospital could not offer any answers. They told them it was just something that happens.

But researchers are finding that it sometimes happens because the air contains too much microscopic dust, called particulate matter 10 microns wide or less, or PM10.

In 1997, federal environmental experts published a study showing that air rich in particles increased the death rate from sudden infant death syndrome - - 26 percent for babies of Carlos Jr.'s age and birth weight. The amount of particles in the areas studied ranged from 11.9 to 68.8 micrograms per cubic meter. The findings squared with research on infants in Taiwan, Korea and the Czech Republic and with studies linking adult mortality to high particle levels.

Measurements are unavailable for particles in McFarland, but nearby Bakersfield ranks No. 3 nationally in particle pollution, just behind Visalia (Tulare County) and Los Angeles, according to the American Lung Association. According to the California Air Resources Board, the average amount of particles in Bakersfield over the past three years was about 60 micrograms per cubic meter.

Whatever took his son does not much matter to Hernandez now. He still grieves hard, visiting the grave once a week in Delano

(Kern County) and keeping Carlos Jr.'s room just the way it was.

He draws strength from his family and, most of all, from 6-year-old Mireya.

On a particularly difficult night, they sat together remembering.

"She said, 'Don't cry, Daddy. My little brother is with God, and he's already a little star, watching over us. We can sit at night and look at the sky and see him,' " Hernandez said.

'Something's wrong'

Thirty miles southwest of McFarland in Kern County is Buttonwillow, population 1,266. Its skies routinely fill with the dust of tilled earth and air-dropped pesticides, but its environmental notoriety stems from the deaths 12 years ago of two babies born without brains within eight months of each other. The occurrence of two cases in one year creates a rate 25 times higher than expected for Kern County, according to the California Birth Defects Monitoring Program.

Mary Helen Mendez and other residents suspected the nearby hazardous waste dump. They tried to force the dump's closure by marching through town, but their efforts failed after investigators found nothing to explain the deaths.

Still, with her son and husband sickened by asthma and other ailments, she knew something was wrong with this place. In 2001, they moved northeast across Interstate 5 to Shafter, and it was there that her problems grew worse.

Mendez, 29, was pregnant. She said she was happy at first, living in a one-bedroom apartment and working at a computer in a pistachio warehouse. She quit when the season ended during her fifth month of pregnancy.

"I was healthy," she recalls, "but it was confusing because I was so big."

Much to her surprise, Mendez was pregnant with twins.

On the evening of Oct. 2, she began to feel queasy. By 9 p.m., she was in pain. Her husband hustled her to the hospital, and at midnight she delivered two boys.

"All the scariness and sadness and pain," she said, "went away."

But both sons, Jesus and Jorge, were three months early and weighed less than 2 pounds. They had to stay behind when Mendez left the hospital on Oct. 3.

"That night, I got a phone call from the hospital," she said, furiously wiping her sudden tears, "telling us to come down."

When she arrived, the doctors "were explaining a bunch of medical terms, and I looked into his (Jesus') bed and he wasn't there," Mendez said. "I told my husband, 'Something's wrong, he's not in the incubator,' and he said, 'Yes he is,' and I said, 'No, it's covered,' and that's when they told me my son was dead."

In 2000, three years after the federal study connecting SIDS with air particles, UCLA Professor Ritz and three colleagues published research showing that a pregnant woman's exposure to high doses of particulate matter, as well as carbon monoxide, could cause premature birth. In 2002, they published a second study linking ozone and carbon monoxide with heart defects in newborns.

The researchers studied babies born from 1987 to 1993 in Los Angeles, Orange, Riverside and San Bernardino counties, and Ritz cautions that it is unclear whether the effects were caused by the substances themselves or by undetected toxins that accompany those substances in the air.

In 2001, Shafter exceeded national ozone standards for 30 days, longer than most communities measured in neighboring Los Angeles County. Ozone is not measured in Buttonwillow, and carbon monoxide and air particles are not measured in either Buttonwillow or Shafter.

But the ozone and daily levels of air particulate pollution in the Bakersfield metropolitan area are ranked third worst in the nation in a 2004 study by the American Lung Association.

No one knows whether pollution contributed to Jesus' death, but Ritz's research suggests a connection between bad air and his brother Jorge's problems.

Several days after his birth, Jorge was rushed to UCLA for an operation to close a hole in his heart. Later, he spent three weeks at a Fresno hospital with lung problems that developed into pneumonia. It would be the first of three bouts with the virus.

Now 2, Jorge has chronic lung disease and frequent ear infections. He is deaf in his left ear and very rarely talks.

"Jorge, he just studies people. That's how Jorge is," Mendez said as she chased her little boy pedaling through the parking lot of the apartment complex. "He went through a lot, and at the moment, I don't want any more babies."

Poisoned wells

Tom Frantz swings his truck back toward Shafter and pulls into a dirt road running between a cluster of plywood shacks, each about the size of a one- car garage. Children play by the alley, and laundry hangs above bare patches of soil. The area, known as Myrick's Corner, started as a migrant worker camp during the 1930s "Okie exodus" described in John Steinbeck's "The Grapes of Wrath."

The one-room houses have been rebuilt on the foundations of the old tent cities, Frantz said. Now they are occupied exclusively by Hispanic migrant workers.

"People rent these for something like $400 a month. Sometimes there are as many as 15 to a house," he said.

Until the mid-1990s, Myrick's Corner and a similar immigrant community on the southwest edge of town, Smith's Corner, got all their water from shallow wells polluted by agricultural chemicals.

City officials sent letters to residents warning them not to drink the water because it was contaminated with nitrates. A component of fertilizer, nitrates cause "blue baby syndrome," a potentially fatal condition that limits the body's ability to distribute oxygen.

Residents successfully lobbied to get their homes connected to the cleaner water system that serves Shafter proper. Still, they fear their health has been damaged by the polluted water and the pesticides sprayed in nearby cotton fields and almond orchards.

"Whenever they spray, we can smell it. We try to run inside, but it causes headaches," said Sonya Garza, a Smith's Corner resident whose teenage brother suffers from leukemia and whose 44-year-old mother suffers from cirrhosis of the liver, though she has never used alcohol or drugs.

"We don't know what these chemicals do to us," she said.

Stench of chemicals

Leslie Guttierez grew up just north of Shafter, in Wasco, in a labor camp beside the dog-food plant and the four ribbed silos storing charcoal.

"It would stink," said Guttierez, 18. "There was a lot of pollution that would make us sick all the time."

When Guttierez turned 12, her father, a garlic picker, moved the family to a subsidized house he had built near the center of Shafter. It took awhile for Guttierez to warm to her new neighborhood, but then she met Alonzo.

He was five years her senior, dark and sweet and still two years away from the farm accident that would take his right hand. They dated a year before Guttierez found out that she was pregnant in November 2001.

She was only 16, and the news did not sit well with her father. He "wouldn't talk to me for like three weeks," she said. "He was

just crying."

But when an ultrasound revealed that Guttierez was having twins, a grandson and a granddaughter, her father hugged her "and said he would always be there to help me."

Guttierez received lots of help, from her relatives and her doctor and a nurse who visited her home. But all the help in town could not prevent the pains that, in her fourth month, gripped her back. She took to her bed for a few weeks, and the pains went away, only to return about one month later.

The doctor said the pains were normal, but they got worse. And in the dead of night, while she and Alonzo were staying at her sister's house, she felt she could suffer no longer.

"I went into the bathroom," Guttierez said, "and I hit my knees because my mom had told me to do that for the pain. Then I felt the baby's head, and all of a sudden the little girl came out. I picked her up, and she was alive, and we called an ambulance. Then I passed out."

Since Guttierez lost her twins two years ago, the evidence linking pollution and infant death has grown stronger. In April 2003, UC Berkeley Professor Chay and his colleague published their study of substantial air pollution reductions that resulted from a decline in manufacturing during the recession of 1981 and 1982. They found that the decreased pollution may have prevented as many as 2,500 infant deaths nationally.

In October, UCLA Professor Janet Currie and a colleague published research showing that air particles, carbon monoxide and, to a lesser extent, nitrogen dioxide from vehicle exhaust contributed to infant mortality throughout California in the 1990s. But the researchers also estimated that an additional 1,366 infants survived because the air actually grew cleaner over that decade.

Guttierez and Alonzo were married three weeks after their twins died. They buried the twins in the Shafter Cemetery, in a quiet grove with other infants.

They visited the cemetery on a recent afternoon, during the funeral of their friends' 2-year-old, who had been hit by a car.

They turned from their twins' grave and walked toward the tent that sheltered the small white casket of their friends' son. Alonzo joined the gathered crowd, but Guttierez, 10 weeks pregnant, stood at a distance.

"I can just imagine," she whispered, "how that mom feels."

Incident at Weedpatch

No one saw the plume of noxious gas that drifted over the apartments and shacks of the Lamont farming community known as Weedpatch on the evening of Oct. 4, 2003. But its effect on residents was immediate.

Children playing on the grass around their apartments ran inside with their eyes burning. Babies vomited. Parents, with tearing eyes and burning throats, scrambled to shut windows as a pungent, sweet chemical odor, similar to that of flypaper, exploded into their nostrils.

"I called 911 and said, 'What's happening to us? What's going on?' " said Flora Bautista, a mother of five, who was in her apartment in Weedpatch that evening. Within minutes, she said, her elementary-school-age children were vomiting, eyes stinging, so violently ill that they were rolling on the ground in pain.

After hundreds of people were evacuated from the community, residents learned what had happened.

A pesticide application company, hired by the owner of a nearby onion farm, had injected a highly concentrated fumigant into the soil in an attempt to sterilize it. The chemical, which leaked into the air and drifted into the homes of Weedpatch, was a 100 percent solution of chloropicrin, the active ingredient in tear gas.

Gabriela Cornejo, 19, was visiting her mother in Weedpatch that evening. She was one of more than 130 people who complained about being sickened by the fumes.

"Suddenly, I couldn't breathe right," she said. "I started feeling dizzy. I'm like, 'What's happening to me?' "

Two days before the pesticide drift incident, Cornejo realized she might be pregnant with her second child. Two days after, still feeling a little sick from the exposure, she went to the doctor to confirm the pregnancy and asked how the chemical might affect her baby. The medical staff couldn't answer her question.

Four months later, "out of nowhere," she said she suddenly started to bleed. She called her doctor, who told her to go to the hospital immediately.

Her baby didn't survive long enough to be considered a live birth. It was miscarried in its fourth month of gestation.

Cornejo, a lifelong resident of the Lamont area, said she'd never been exposed to agricultural chemicals before this. She is one of more than a hundred victims of the Oct. 4 drift who have joined a lawsuit against the pesticide spraying company and the farm owner. Western Farm Service, the pesticide company, agreed to pay $60,000 to settle state and county allegations that it violated pesticide-handling rules.

Dale Dorfmeier, an attorney representing Western Farm, said that, "to the best of our present knowledge," all precautions and legal permits required to apply the pesticide safely "were followed on this job." He said the drift was caused "by changed atmospheric conditions" rather than by the company's actions.

After the company was told about the drift, he said, its employees "did all they could" to solve the problem.

In Kern County, pesticide drifts happen with some regularity. There were 120 reported pesticide drifts -- resulting in 418 reports of illness -- in the 10 years between 1992 and 2001, according to the California Department of Pesticide Regulation. In these cases, chemicals from an agricultural site drifted off to sicken people in adjacent areas. There were another 353 reports of pesticide exposure incidents in which 417 workers complained of being sickened by pesticides at their work site.

Yet almost nothing is known about the long-term health effects of most pesticides on adults, much less how they affect pregnant women and babies.

Materials-handling advisories describe chloropicrin as "highly toxic" and a "powerful irritant," which can attack the liver, heart, kidneys, lungs and stomach, and can cause death in high enough doses. Studies have shown that exposure to it increases mortality in rats, but there are few studies on its long-term effect on humans.

In March, in one of the few studies that have looked at how pesticides affect unborn children, Columbia University researchers found that pregnant women in New York exposed to high levels of two pesticides had significantly smaller babies than their neighbors.

After the pesticides were restricted, baby size increased in the neighborhood. Both pesticides -- chlorpyrifos and diazinon -- are often used on fields in Kern County.

Cornejo's attorney, Jeff Ponting of the nonprofit group California Rural Legal Assistance, said he cannot know for certain what caused Cornejo's miscarriage.

"But to be exposed to something like this, and to become violently ill as a result of that exposure, seems likely to have a negative effect on a pregnancy," he said.

Cornejo said the incident has left her fearful.

"Where we live, it's all farmland," Cornejo said. "Now, this makes me wonder, 'What if this happens again?' "

'Kind of scared'

Early this year, Carlos and Manuela Hernandez thought they might get a second son.

Manuela was pregnant, and for two months she endured the nausea that she assumed was part of the experience. In her ninth

week, though, her doctor measured her girth and concluded that the fetus had not grown.

Two weeks later, Manuela went with her husband to get measured again.

When they returned from the doctor's office, it was clear that the news was not good. Manuela was silent. Carlos Hernandez took a seat on the couch and started toying furiously with a small Cat in the Hat doll.

The fetus had stopped growing, he said. The doctor called that afternoon to tell them that it had to be removed.

"We got to try again," Hernandez said, "at least so my daughter can stop thinking about her little brother."

In late February, Mary Helen Mendez, who had lost her son Jesus, found out that she was also pregnant. She was unsure how another child might fit with a household already strained financially and emotionally.

"I'm kind of scared," she said.

And on April 24, Leslie Guttierez gave birth to 7-pound 2-ounce, flush- with-health Clarissa.

Guttierez marveled at how easy the delivery was. A little back pain around midnight, a nudge to Alonzo that it was time, a drive to the hospital and, within about an hour, a new baby girl.

"It was," Guttierez said, "the happiest day of my life."

THE SERIES

SUNDAY: High-stress neighborhoods can doom infants.

TODAY: Pollution linked to infant deaths.

TUESDAY: Going door-to-door to save young lives.

WEDNESDAY: Flawed health care system costs babies' lives.

THURSDAY: A hospital where miracles occur daily.

This series is available online at SFGate.com. To obtain infant death statistics for neighborhoods by ZIP code and track the infant death rate by county over the past decade, go to sfgate.com/infantmortality/.

E-mail Erin McCormick at emccormick@sfchronicle.com.

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TOO YOUNG TO DIE

Part Three: Fighting Back

- Reynolds Holding, Erin McCormick, Chronicle Staff Writers
Tuesday, October 5, 2004

Fresno -- Working one-on-one with mothers has helped elevate Fresno from a hot spot of infant death to a model for better care. Determined to keep babies alive in their first year and beyond, nurses frequent Fresno's high-risk neighborhoods to help women through pregnancy, childbirth and motherhood.

Neng Lee parked just beyond spying range of the tattered house in ZIP code 93706, a neighborhood with more infant death than anywhere else in this city. Weighted with health records and a baby's scale, she crossed the parched yard, the scrap-strewn porch, into a shadowed room.

The Hmong woman lived here.

It is too dangerous to reveal her name. Too dangerous for her and for Lee. The danger, circling warily in the room, is her young husband, squat and prone to violence.

Lee, nervous, checked the woman and her tiny son. Him for diet and weight, her for bruises and state of mind. The mood grew so tense that Lee and the woman had to communicate in writing. They left and went to a nearby McDonald's.

"I'm thinking of going back to school and getting my (nursing) degree," the woman, 19, told Lee with admiration. "I want to be what Neng is."

Lee, also Hmong, is a public health nurse in Fresno. She is also a confidante. A mentor. A nag. A 5-foot, rock-willed guardian angel whose efforts to care for her clients and their babies go far beyond her job description -- and far beyond the traditional ways of delivering prenatal care.

Lee and her colleagues, the core of Fresno County's nurse home-visit program, have helped transform Fresno from a capital of newborn death to a model for maternal and infant care. In the Hmong woman's neighborhood, the infant death rate dropped by more than a third between the five years 1992 through 1996 and the five years 1997 through 2001, according to a Chronicle analysis. The program started in 1995. Although many reasons account for the drop, early prenatal care is a significant factor, the analysis shows.

But among this state's pockets of high infant death, Fresno is an exception.

Almost two decades after resolving to lower its high rate of infant mortality -- death before the age of 1 -- the United States has largely failed. The overall rate is down, but the nation still ranks 36th worldwide, and the racial gap has widened.

Many experts blame a strategy that stressed medical intervention over social and environmental solutions. Part of that strategy sought to make pregnancy care and early infant care universally available through expanded public health insurance. But in many cases, the help never reached the people who needed it most: immigrants, inner-city residents, women too scared or isolated to seek a doctor's help.

San Francisco, for example, spends millions on clinics, publicity and outreach for the residents of Bayview-Hunters Point, a neighborhood with an infant mortality rate that rivals Bulgaria's. But almost 28 percent of the babies who died there from 1992 through 2000 were born to women who failed to receive early prenatal care, a Chronicle analysis shows, and the absence of such care nearly tripled an infant's chance of dying in the neighborhood.

In Fresno's poorest section, less than 16 percent of the babies who died during that period had mothers who never got early care, and the percentage has dropped steadily. Nurses have saturated this and other high-risk neighborhoods with offers to help pregnant women. The nurses are unwilling to take no for an answer -- or to end their support once the baby is born.

But saving babies "is not just about getting mothers health care," said Connie Woodman, the recently retired director of maternal, child and adolescent health in Fresno. "It's about old-fashioned, door-to-door case finding and social support."

The support, she stressed, makes all the difference for mother and child. It can help a young mom find work, inspire her to get a degree, smooth her path through immigration, or protect her from deadly abuse.

Across town from Woodman's old office, in a faded-gold Saturn, public health nurse Diane Keyes gripped her ringing cell phone. It was Rosa, a Latina Keyes nurtured through a harrowing pregnancy just a few months before. Keyes bought her a bus ticket to Texas the day after Rosa's husband again threatened to kill her.

"Rosa?" Keyes asked, pausing. "Are you crying? Your husband's lawyer told you to bring your children back? She might be lying. She might not even be a lawyer."

"Rosa," Keyes pleaded, "don't come back until you talk to a lawyer."

Concern over deaths

In the early 1980s, a foreign rival and a children's advocate shook America's complacency over its rate of infant death.

The rival was Japan, an economic star that further provoked American envy by reducing its infant mortality rate from one of the world's highest to its lowest. The activist was Marian Wright Edelman, the founder of the Children's Defense Fund and a force for getting health care coverage to every pregnant woman.

In 1985, the federal Institute of Medicine responded with a report recommending "enrolling all pregnant women in prenatal care" as the best way to prevent premature and low-weight births, the primary factors in most infant deaths. The report advocated expanding Medicaid, a state-run insurance program for low-income patients, to "maximize the possibility that poor women will ... be able to obtain prenatal care."

In 1989, the institute's recommendations became federal law, and states began to expand their Medicaid programs. In 1994, insurance covered more than 95 percent of pregnant women in California, according to the state Department of Health Services, and by 2000, the results were in.

"After more than a decade of impressive public health efforts to improve the health of infants at birth in the United States," declared a paper published by the Institute of Medicine, "health status indicators indicate that little progress has been made."

But the paper, by UCSF Professor Carol Korenbrot and consultant Nancy Moss, also noted that results varied widely with "the quality of content and delivery" of prenatal care -- particularly the success in actually getting women care rather than just making it available to them.

In Fresno, the evidence indicated real progress.

Helping the moms of 93727

In the morning light, the streets are all but vacant in ZIP code 93727, the McKinley corridor, a zone of high crime, plentiful drugs, and a 10-year infant-death rate of 8.5 percent, placing it among the top 10 percent for ZIP codes in the state, where the average is 6.1, according to a Chronicle analysis.

"They all come out in the afternoon and just stand around, smoking," Lee said as she passed the Checks Cashed, the Video City, the strip-mall signs on the way to her first appointment.

This day, she had her minivan, but when she drives the car emblazoned with the county logo, "they yell, 'What house you going to? Whose baby you take away today?' " Lee said.

Lee helps mothers rather than takes babies, and LaQonya Williams greeted her with soft eyes and a broad smile as they settled on the couch for a session.

Williams, 24, came perilously close to losing her baby, now an adorably devilish 2-year old named Eric. She was single, depressed, living with her parents and out of work. Her intended fiance revealed that he was gay, and she developed preeclampsia, very high blood pressure that threatened herself and her baby. She spent the final months of pregnancy in bed, Lee ministering to her with good food and better advice.

After Williams delivered, Lee set her up with public assistance, subsidized housing and a course of study at Fresno City College.

"I thought I was going to lose it," Williams said, "and then Neng came to my door."

Lee's manner is warm but strict. She questioned Williams about keeping her home dry to prevent asthma. She asked about school, mice, birth control, sunblock for Eric and toilet training.

She took notes, delivered handouts, and presented Eric with a new book. An hour later, she was on her way to the next client.

"You want the best for them, but you cannot tell them, 'You have to do this,' " she said. "The patient has to be in control. It's hard at first, but now I am used to it. LaQonya is doing well."

Send out the nurses

In 1989, as Congress was passing bills to finance universal pregnancy care, former public health nurse Connie Woodman took charge of Fresno's fight against infant death.

"I had to start somewhere," she said, "and the only thing I knew to do was to start sending public health nurses out."

Over the next eight years, Woodman and her staff "put on a full-court press," she said. They gathered data on race and poverty by census tract, consulted doctors and health-provider groups, singled out impoverished neighborhoods and, finally, went "door to door, asking pregnant women whether they were in prenatal care and did they need assistance."

The goal from the start was to create "the expert insider," Woodman calls it, a nurse who would "become bonded with the family" and teach women "how to take care of themselves."

What makes that goal so elusive is the failure of most cities to reach the homeless and victims of domestic violence or drug abuse.

"Prenatal care is available to everyone in San Francisco," explained Mildred Crear, director of Child and Maternal Health for the San Francisco Department of Health. "There are some reasons people might be resistant to care. They may be afraid the system will come down on them or take their babies away."

For Fresno, the breakthrough came in 1997, when the U.S. Justice Department chose it and five other communities nationally to replicate a program first tested in the late 1970s in Elmira, N.Y. Designed by David Olds, a professor of pediatrics at the University of Colorado, the program trained and dispatched nurses to high-risk, unmarried, first-time mothers and their children. Care began in the woman's third month of pregnancy and continued through the child's second birthday.

The program required the nurses to attend training with Olds for a week in Denver and to follow a detailed script while visiting clients every two weeks or so. The benefits ranged from fewer infant deaths and injuries to deferred pregnancies and more education for pregnant women.

Most test communities let the program run its course. But Fresno used its own money to expand the program in 1998 from four to 26 nurses and to combine it with the county's own, similar effort called Babies First. Today, about 40 nurses, each with 25 clients, regularly visit homes, while six workers look for pregnant women who may need maternal and infant care.

Last year, those nurses reached 592 low-income, high-risk pregnant women and 493 infants younger than 2. More than three-quarters of the women began prenatal care during their first trimester. Of 220 live births, only one was very low weight -- less

than about 3 pounds 6 ounces. All survived.

Dangerous existence

The Hmong woman's neighborhood is among Fresno's poorest, an area with almond orchards to the south, plaster-board bungalows to the north, and the sixth- highest infant mortality rate among almost 1,000 California ZIP codes analyzed by The Chronicle.

The woman's 1-year-old is small but healthy now, no small feat considering her youth and stressful life and what Lee says is the Hmong culture's disdain for prenatal care. Married at 17, moved from Wisconsin to Fresno on the pretense of a vacation, forced into backbreaking chores at her in-laws' home, she endured a pregnancy riddled with risk.

"I was bleeding and very sick," she said. "It was scary."

Lee took her on at the suggestion of a local clinic the woman had visited. Lee quickly diagnosed anemia, a condition she said is often linked to a traditional Hmong diet of meat and rice, and gave the woman prenatal vitamins. More therapeutic was the assurance and friendship that Lee would soon provide.

"When I had questions, she would answer them," the woman said. "Like, how was I supposed to feel? I was feeling very strange. I was anxious." One night, in the course of a beating at home, the woman called 911, and the police put her husband in jail. He stayed only a night or two, but the experience earned him a criminal record and dismissal from his job. There would be retribution, as evidenced by a small scar that the woman said came from a blow to her cheek.

The baby's birth brought some relief as her husband's family celebrated their first son's son. The woman was happy, too, although she soon began to yearn again for another life and place.

"I don't like this town," she said. "It's too dangerous, and I don't want my son to grow up here."

Basics of prenatal care

At the threshold of another traditional Hmong home, Lee stepped over a row of shoes. A close heat from a boiling pot pervaded the room where Lee Vang, 19, sat with her baby, a chubby 10-month-old named Kaylin. Vang was pregnant again.

She is a challenge, Lee said, despite her compliant nature and her husband's steady support. Vang was born in Thailand and married at 16. Her first pregnancy ended in miscarriage, automatically increasing the risk of future attempts.

Lee pressed for information. She asked about any troublesome discharges, the fetus' movements, brushing Kaylin's teeth. Lee seemed satisfied with the answers until she asked whether Vang had been taking her prenatal vitamins.

"Why did you decide to stop?" Lee wanted to know. Vang, eyes averted, offered that she takes an iron pill, but Lee was not appeased. "The vitamin," she said, "is just as important as the iron pill."

For the next hour, Lee weighed and measured Kaylin, and gave advice to Vang. In the back of her mind, though, she was aware that her words may have been of limited use in this neighborhood of casual violence.

Only a few weeks before, Vang's husband was working on his car in the driveway with Kaylin playing close by. Gunshots rang the noontime air, and her husband, grabbing Kaylin, ran into the garage. For hours, the police barricaded the street, leaving Vang stranded at school, uncertain of her family's safety.

"I told him," Vang recalled, "don't take my daughter out front anymore. She can only go as far as the doorstep."

Changing demographics

The threat of stray bullets aside, maternal and infant care can do only so much to keep fragile babies alive. Even in Fresno, where prenatal care is an article of faith, health officials acknowledge that measures such as the nurses' home visits may not fully account for the drop in infant deaths.

"Over the last 10 years, there has been a big shift in the demographics of Fresno," Woodman said. "So how much of the improvement is due to that shift, and how much to a real change in services is difficult to say."

The shift is toward more Latinos, who have a relatively low infant mortality rate, and away from African Americans, whose rate is about two times higher.

Still, in ZIP code 93706, where Vang lives, babies of women who got early prenatal care were half as likely to die as those who didn't, a Chronicle analysis shows. The infant mortality rate is 12.4 deaths for every 1,000 births, more than twice the state rate.

The care is getting through for many reasons. But the biggest may be the efforts of Diane Keyes, a public health nurse who has worked that ZIP code since 1992.

Persistence and courage

The files, a 2-foot stack of creased manila, balanced on the roof of the Saturn sedan. With more files in her arm, Keyes awkwardly opened the driver's door, and seconds later, the street was strewn with paper.

With the help of co-workers having a smoke nearby, the files made it into the car, comically stuffed with notebooks, toys, wet naps, a baby scale and miscellaneous paraphernalia.

Keyes had started her rounds.

They begin at House, a clinic and homeless shelter. The iron gates opened, and Keyes began a search for pregnant women. She came to Yolanda, a tall African American dressed in pajamas. Yolanda was eight months pregnant, homeless and disoriented.

"I can help you get a doctor and housing," Keyes said, handing Yolanda her card.

Next was a tattooed 24-year-old, street name Yoyo. She lost premature twins several years ago, then had two sons, and now was five months pregnant. She told Keyes that she had threatened to move to Tennessee if her fiance, 41, didn't straighten up and get a real job.

After offering her help, Keyes headed to the next appointment, describing the neighborhood as she drove.

"Down here," she said, her voice gentle and guileless, "most of the prostitution is organized by husbands and boyfriends, and guys will pay more if they don't have to use a condom. I hear a lot of, 'When I was 7, my mom sold me to buy drugs.' "

Keyes pulled up to a house near "the U," a cluster of stucco shacks and trash, and knocked on the door of Deborah, 44, a long-term heroin addict on methadone. "She's a wonderful person," Keyes said, "but she has health problems."

There was no answer at the door. Keyes, undeterred, left a message from her cell phone, promising to return.

Missed appointments are common among Keyes' clients, usually the poorest and most troubled in Fresno. She started 16 years ago caring for drug babies and became one of the first nurses to visit women's homes. Her persistence is matched by her lack of fear, a trait that sometimes worries her husband, Bob, a police captain in nearby Clovis, and her daughter, Alyssa, an ebullient ninth-grader.

At the Economy Inn, a motel for the down-and-out in northeast Fresno, her knocks again went unanswered. An expression of rare frustration passed across her face, and she laughed, recalling the advice that one of her husband's colleagues gave her.

"He told me not to go into these types of places," she said, "because they have the kind of men there who will take you home and make you their pet. "

Talking to Diane

In the late afternoon, a visit to Juana Castillo came as a kind of relief.

The setting was inauspicious: a corrugated storage shed behind a house, surrounded by fallow fields. Inside, a wall separated bedroom from living area, where Keyes sat at a table with Castillo, her husband and George, a dimpled 3- month old.

Castillo was bright and fiery, her story an inspiration. She grew up in Mexico, helping her mom and eight siblings sew pants and raise pigs. One day, she and her mother went to church in the city and got lost because her mother, who could not read, took the wrong bus. They had no money to get home.

"That day made me feel that that would never happen to me," Castillo said. "So no matter what, I had to be somebody."

She finished school, got married, joined a bank and worked herself into an executive post. Her first child brought her joy and, at three months, anguish. He died of German measles. She would later have six miscarriages.

Castillo's husband moved to Fresno and, pregnant, she followed, only to be turned back by immigration officers in Los Angeles. They accused her of dealing drugs, and they shredded her visa. A few months later, she walked unnoticed through a turnstile in Tijuana, boarded a bus and never looked back.

Castillo gave birth, then became pregnant again and sought help. At a mall downtown, a health agency's display for pregnancy care caught her eye.

"I was looking for anything that said 'babies,' " she said. "I didn't want to lose my baby again, and I needed someone to say, 'Do this, don't do that.' "

In Castillo's eighth week of pregnancy, Keyes came to her door, speaking flawless Spanish. Days later, Castillo miscarried. Again, she became pregnant, and with Keyes' nurturing patience, brought the baby, Stephanie, to term.

"When I talk to Diane," Castillo said, "the way she speaks, her smile, I think, 'How can this woman be so nice?' I need to do something to be like her. So calm, so quiet, so soothing."

Keyes turned her attention to George. How's he doing with the baby formula? Is he burping OK? Can he hear well? She told Castillo that every child's personality is different, that George is very easygoing because his needs are met. She tested George's development by seeing if he could hold a rattle. George grabbed the toy and stuffed it in his mouth. Everyone giggled.

The visit ended, and Castillo said how much she likes Keyes. But as Keyes walked to her car, it is Castillo who got all the credit.

"She ought to be a motivational speaker," Keyes said.

Seeking a happy ending

In the past few months, the clients of Neng Lee and Diane Keyes have, in their own ways, come far.

LaQonya Williams works for the Internal Revenue Service, policing tax returns for mistakes and exaggerations. Lee Vang's new baby, Laureen, is healthy, and the family recently moved into its own apartment across from a grassy schoolyard in Clovis.

Keyes never heard from Yolanda or Yoyo. But Castillo and her family vacated the storage shed and live in a modern home with a well-tended lawn next door. George is healthy and energetic, despite a small heart murmur that Keyes said bears watching.

Rosa, against Keyes' advice, returned to Fresno with her children, but she is safe and living at a home for abused women, Keyes said. A hearing on the custody of her children is pending.

Eventually, life became unbearable for the young Hmong woman. Her husband accused her of sleeping with his brother and drove her to a field to show her where he would bury her.

The Hmong clan leaders tried to mediate, and they counseled patience.

But one morning, while her husband was at work, the woman packed her clothes, called a friend to pick her up, and left. She was so desperate to escape that she left her infant son behind, confident that her in-laws would take good care of him.

"I felt good," she said. "I didn't know where I was going, but I knew I had to leave, or I would never have a chance to leave again."

She stayed in a women's shelter and then moved in with the ex-wife of her husband's cousin. She sees her son during the day and brings him back before her husband gets home.

The woman said she is happy because she is able to do "all the things I couldn't do when I was married." But life without her son "is a burden. Every time I think about it, he has no mother ..." She could not finish before her head dropped and the tears came.

Lee, sitting close by, patted her shoulder and told her to be strong. "I am very proud of you," Lee said.

The woman had something she wanted Lee to see.

On a lined piece of notebook paper that she kept by her bed, the woman had written a list. It contained 10 goals, several of them checked: "Leave," "Get license," "Freedom."

A few she had yet to accomplish. There is No. 8, "Get my LVN or RN," and, finally, No. 10.

"Happy life 4-ever," it said.

THE SERIES

SUNDAY: High-stress neighborhoods can doom infants.

MONDAY: Pollution linked to infant deaths.

TODAY: Going door-to-door to save young lives.

WEDNESDAY: Flawed health care system costs babies' lives.

THURSDAY: A hospital where miracles occur daily.

This series is available online. To obtain infant death statistics for neighborhoods by ZIP code and track the infant death rate by county over the past decade, go to sfgate.com/infantmortality/.

E-mail Erin McCormick at emccormick@sfchronicle.com.

TOO YOUNG TO DIE

Part Four: Flawed System

- Reynolds Holding, Erin McCormick, Chronicle Staff Writers
Wednesday, October 6, 2004

The fast growth and varied quality of intensive care units for newborns mean more of the sickest are born where they are less likely to survive.

Until his final breath, there was good reason to believe that Kelsey Russell would live.

Twenty-six pound, 5-month-old, identical twin Kelsey Russell.

The obstetrician thought he could save him, without the help of an expert in handling risky births. The delivery room team at the local hospital thought it could save him, despite the loss of precious hours in getting Kelsey to intensive care. The intensive care specialists thought they could save him, though they knew that Kelsey would struggle with the trauma his delivery caused.

But in the cool morning hours, with a whispered "Uh," Kelsey stopped breathing.

"There was no good reason for this child to die," said his mother, Mary Hall of Moreno Valley (Riverside County).

Like Kelsey, hundreds of infants die every year in California because of breakdowns in a statewide system that requires the transfer of high-risk newborns and pregnant women to qualified specialists and intensive care units, health care experts say.

The system, a hybrid of state regulation and medical standards, is undermined by competition in the state's multibillion-dollar business of saving babies, say doctors and health care economists. It is a business so lucrative that in recent years scores of California hospitals have opened $2, 000-a-day neonatal intensive care units, which vary widely in quality.

If the system worked as intended, one economist estimates, the state's infant mortality rate could be cut by 25 percent.

Almost 20 years after starting a campaign to reduce infant mortality -- death before the age of 1 -- the United States has made remarkably little progress. The overall rate is down, but under the latest World Health Organization rankings, the United States is 36th among 196 nations.

Although the reasons are complex, many health care experts blame poorly executed policies that seek medical solutions to a largely social problem. While trying to provide intensive care for infants and pregnancy care for women, they say, health care leaders all but ignore powerful evidence that pollution and the stress of inner-city life could doom a newborn child.

"We did everything we were supposed to do in medicine to improve birth outcomes," explained Carol Korenbrot, an adjunct professor at UCSF. "That we mostly failed says a lot about our ignorance."

Still, health experts say, medicine and technology could have saved many more infant lives.

Over the past few decades, nothing has reduced infant mortality as much as technological and medical advances that keep very small babies alive. A 2002 study published by the American Academy of Pediatrics found dramatically higher survival rates for premature, low-weight infants born at top-level hospitals with the most experience and expertise at handling sick babies.

A newborn weighing less than 1,500 grams -- about 3 pounds 5 ounces --

has a much better chance of survival when born in a top-level hospital with a neonatal intensive care unit serving an average of

15 or more babies a day.

Yet, many fragile infants never reach those hospitals, despite state standards and regulations requiring that they do.

"If I was a dictator and I was able to reorganize hospitals and concentrate services any way I wanted," said Ciaran Phibbs, a Stanford University health economist and an author of the study, "I'm guessing I could reduce infant mortality (in California) by a quarter."

Plan to save babies

In the early 1960s, when UCSF and other university hospitals opened the first neonatal intensive care units, insurers considered such care experimental and refused to cover it. But the units soon proved that even very sick babies could thrive when sophisticated equipment monitored their vital signs and nurses and doctors cared for them around the clock.

In 1972, the nation's top birth experts met in San Francisco to decide how the few existing units could serve more babies. They recommended organizing hospitals into geographic regions across the nation. Each region would contain at least one hospital with a unit qualified to receive high-risk patients from surrounding hospitals. Four years later, the plan -- called regionalization -- became the centerpiece of a national strategy for getting high-risk mothers and babies proper levels of care.

Eventually, California created 11 regions and a hospital-rating system with three levels of neonatal intensive care: intermediate, community and regional -- or, as they are commonly known, levels one, two and three.

Level-one hospitals could provide more complex care than basic hospitals. Level twos could keep babies on ventilators but generally could not perform major surgery. Level threes offered the highest level of care, including major surgery for newborns.

Transfers within regions were more a professional duty than a legal obligation and depended largely on a physician's judgment. But for at least a decade, the system worked. A 1985 study sponsored by the Robert Wood Johnson Foundation of Princeton, N.J., showed death rates plummeting as the most qualified hospitals doubled their share of the sickest babies in parts of Los Angeles and other areas of the nation.

California tried to maintain quality by strictly limiting the number of neonatal intensive care units that could receive Medi-Cal funds, the state insurance program for low-income patients.

"We were very cautious about which (units) we certified," said Dr. Esmond Smith, head of California Children Services through 1985. Too many units "would dilute the programs and dilute the quality of care."

Infant ICUs everywhere

But increasing competition for health care dollars soon caused the number of intensive care units to soar.

Obstetricians demanded them as protection against malpractice suits that blamed injuries to newborns on substandard care.

Other doctors demanded the units as places to practice neonatology, a new, high-paying subspecialty that focused on treating fragile infants.

Pregnant women demanded them as evidence of a hospital's competence to deliver babies -- and to care for family members who became sick in the future.

HMOs and other managed-care organizations demanded the units as part of full-service packages that hospitals needed to win contracts for serving health plan members.

Many hospitals readily met these demands because of "the halo effect," said Cheree Kruckenberg, vice president of the California Healthcare Association, a hospital trade group. Having a neonatal intensive care unit "creates the impression that this hospital must be of good quality."

Costs and rewards

In the Bay Area, it costs between $125,000 and $200,000 per bed to set up the equipment and other physical parts of a neonatal intensive care unit, according to a 2002 article in the Rand Journal of Economics.

Yet the number of hospitals with neonatal intensive care has grown nationally much faster than the need for their services. Between 1986 and 2002, the number of neonatal intensive care beds doubled in California, from 1,245 to 2,893, according to the National Perinatal Information Center, while the number of births grew by only 10 percent.

Saving babies has even gone Wall Street. Pediatrix, a $550 million national medical group for neonatal doctors, began offering its stock publicly in 1995. Today, it has 540 physicians operating neonatal intensive care units in more than 200 hospitals across 30 states, including California.

"What is the motor that generates this (growth)?" asks Dave Gagnon, president of the National Perinatal Information Center. "It's money."

Because intensive care is so effective in improving infant survival, insurers generally reimburse more of a bill for such care than for other types of hospital care. Gagnon said those reimbursements can reach $5,000 a day, excluding physician charges. Fragile infants also stay in the hospital longer than most patients, he said, on average more than 46 days for very small babies. Those babies often produce more than $230,000 in revenue.

Kruckenberg of the California Healthcare Association said profits did not drive the sudden proliferation of the neonatal intensive care units.

"I would very much question the financial incentive argument," she said. "Oftentimes, hospitals open these units at a loss, just as a community service. "

Profit figures are virtually impossible to obtain because accounting rules give hospitals such broad latitude in allocating costs and income across their operations, say Phibbs and other health care experts.

Top-level hospitals, though, typically lose money on the first week of care for the sickest babies, break even on the second week, and make money thereafter, according to one executive at a hospital with a large level-three unit. Other fragile newborns, even those covered by Medi-Cal, are generally profitable from day one, the executive said.

But there are not enough of any of these patients to go around, so hospitals and doctors "keep mothers and babies they shouldn't," said Dr. Michael Lu, a professor at UCLA, "causing a breakdown in regionalization" and undermining its goal of saving more babies.

Doctors usually can detect problems in the womb early enough to ensure that mothers deliver at the right hospitals. But many babies do not reach those hospitals until after birth, because lower-level hospitals want to profit from deliveries, Phibbs and other experts say.

"When you make a referral, you are giving away business, and in a health care environment that is increasingly squeezing providers, you can only give away so much business," Phibbs said.

Some obstetricians fail to transfer risky pregnancies to perinatologists, specialists in handling high-risk pregnancies, because they do not want to lose patients or the income they produce.

Obstetricians who do not deliver a patient's baby lose more than half their $1,089 fee under Medi-Cal. Payment schedules under private insurance vary, but financial penalties also are substantial for not handling a pregnancy through birth.

"Providers tend to hold on to babies and not have moms deliver at the appropriate place because they don't want to give up the patient," said Dr. Marian Dalsey of the California Department of Health Services. Transferring to the appropriate level of care "is better for the baby, but unfortunately it is not better for the obstetrician."

In the early 1990s, a majority of babies with very low birth weight were born in large level-two or level-three hospitals, a Chronicle analysis shows. By 2000, the majority were born in level-one or small level-two hospitals or hospitals without neonatal intensive care.

"We're shifting births from lower mortality settings to higher mortality settings," Phibbs said.

He estimated that more than 1,000 of 5,000 infants and viable late-term fetuses die ever year in California because they or their mothers are not referred to the proper level of care.

Over the course of a year, The Chronicle conducted scores of interviews, examined dozens of medical studies, analyzed birth and death data, and reviewed extensive court files involving many cases that were resolved after years of developing the facts. The Chronicle found that the system can break down at each stage of bringing a child to life, from pregnancy through delivery through a stay in a neonatal intensive care unit. The breakdowns often begin when a problem occurs in the womb.

Kelsey's struggle

Kelsey Russell and his twin, Casey, shared one embryonic sac, a rare condition that raises the risk of strangulation by umbilical cord. Their mother, 18-year-old Mary Hall, developed pre-eclampsia, a condition in which pregnant women suffer dangerously high blood pressure, which could have killed her if it hadn't been treated.

According to court records and interviews with Hall, her doctor and hospital officials, she went into full-term labor on Oct. 15, 1997, at Moreno Valley Community Hospital, which lacks a neonatal intensive care unit.

Hall's blood pressure soared. Two seizures shook her body. Obstetrician Iheanacho Emeruwa delivered Casey, almost lifeless, and then tried to deliver Kelsey, the cord wrapped around his neck. No luck. Emeruwa eventually performed a cesarean section, and an ambulance whisked the twins 20 miles to a hospital with intensive care.

Casey regained his health and left two days later. But Kelsey's esophagus had collapsed, requiring surgical insertion of a breathing tube. Blood had pooled at the back of his brain. Erbs palsy, the result of a stroke at delivery, had rendered his left arm useless.

Within months, Kelsey was dead of pneumonia.

In pregnancies involving twins, and especially twins who share an embryonic sac, medical experts advise consultation with a perinatologist. Recent research shows that a perinatologist can dramatically improve the health and survival rates of fragile newborns.

In a study of 681 babies born prematurely at Desert Regional Medical Center in Palm Springs from 1992 through 2001, doctors associated with St. Luke's-Roosevelt Hospital Center in New York found that the death rate doubled for those babies who did not receive perinatology care until after five months' gestation. The doctors estimated that premature infants spent 10 fewer days in intensive care when they received perinatology care before five months' gestation.

In Hall's case, a perinatologist might have detected her problems and solved them with blood-pressure medication and an earlier delivery by cesarean section. When delivered by C-section at about 32 weeks gestation, babies who share an embryonic sac and are otherwise healthy have "about the same chance of survival as any baby of that age, well into the high 90 percent range," said Dr. John Larsen, chair of the department of obstetrics and gynecology at George Washington University Medical Center in Washington, D.C.

Emeruwa said he never consulted a perinatologist because he felt qualified to "take care of high-risk pregnancies." In an interview, he blamed ultrasound reports for not mentioning the sac and nurses for failing to draw his attention to Hall's blood pressure.

But on Jan. 24, 2000, a Riverside County court held Emeruwa responsible for Kelsey's death and for 60 percent of a more than $1 million judgment.

Tough birth procedure

Sometimes the failure to meet evolving standards can prevent a timely transfer.

The state classified Community Hospital of San Bernardino as a level-one site with a five-bed neonatal intensive care unit that could deliver only limited services. Alicia Ramirez decided to have her third child there.

Although she had delivered twice by cesarean section, Ramirez wanted this baby born vaginally.

The procedure making vaginal births possible for women who have undergone cesareans poses dangers -- especially for women who have endured two such births. Medical standards state that the procedure should occur only at hospitals with high-level units and with surgeons immediately available.

Community Hospital of San Bernardino did not meet the standards.

Early on Nov. 6, 2000, Ramirez went to the hospital for delivery. The doctor examined her at 8 a.m. and then disappeared, according to court testimony. During the day, Ramirez was in labor so slow that nurses began pumping her with pitocin, a drug that stimulates contractions.

At 5:30 p.m., the doctor returned to find Ramirez's uterus ruptured and the fetus' heart rate faint. He delivered the baby girl by cesarean and saw that a detached placenta had cut off blood flow. With no surgeons or high- level unit available, he arranged her transfer to St. Bernardine Medical Center. The baby survived but had suffered severe brain damage, according to court records.

In June, a San Bernardino jury issued a $7.7 million judgment against the doctor, Ramirez's midwife and several nurses for malpractice. Community Hospital of San Bernardino settled the suit for a confidential amount, and its representatives did not return calls for comment.

Reluctance to transfer

At level-two hospitals, the resistance to transfers can be strong.

When Rachelle Phillips of Murrieta (Riverside County) was five months pregnant, an ultrasound revealed a hole in her fetus' midsection. Through it protruded the baby's liver and intestines.

The defect was serious but, in the right surgical hands, correctable. Phillips, a professional researcher, went about finding the best hospital for her baby's birth.

She discovered that UCLA Children's Hospital had the area's top-rated neonatal intensive care unit. But she was already a patient at Kaiser Hospital in Riverside, and the HMO assured her that its level-two hospital in the San Bernardino County town of Fontana could make her baby right.

In the early afternoon of Jan. 13, 2000, Phillips gave birth by cesarean section to a girl, Renea. Several hours later, surgeons inserted the protruding organs into Renea's body.

But three hours after the surgery, a bruise appeared on the baby's tiny thigh. Pressure was building in Renea's stomach, and she would need a second operation.

The next day, a surgeon performed the operation, but Renea's condition worsened. Finally, doctors transported her to UCLA.

On Jan. 15, Renea Phillips died of massive organ failure.

In issuing a $1 million award against Kaiser Foundation Health Plan in 2002, an arbitrator found that its doctors "failed to appreciate the warning signs" and "did not immediately take the necessary steps" to save Renea.

Kaiser spokesman Jim Anderson said the Fontana hospital was qualified to care for Renea: "The surgeon has successfully performed the same operation on other infants previously. This was an isolated case that resulted in a tragic outcome for the family."

But according to guidelines issued by the North Coast Perinatal Access System, the region that includes hospitals in San Francisco and counties along the northern California coast, level-two hospitals like Fontana are "Not (an) appropriate level of care" for major surgery such as Renea's.

Medical experts say the rise of managed care and HMOs undermined regionalization by discouraging the transfer of babies

outside health plan networks. Rather than move a woman with a high-risk pregnancy to a top-level university center such as UCLA, companies hired specialists and upgraded their own hospitals.

"It's just more expensive for them to transfer people out" of their system, said Dr. Susan Sniderman of San Francisco General Hospital.

Kaiser, the nation's largest HMO, generally sends pregnant women to the proper level of care within its system, experts say. For the riskiest patients, it sometimes arranges treatment at a university medical center such as UCSF.

But not for Sonia Ovalle.

Ovalle, 38, was a Kaiser patient expecting her second child. She loved children, spending most weekdays baby-sitting in Brisbane and evenings doting on her 10-year-old daughter, Monica, at home.

On Oct. 27, 1997, her pregnancy in its eighth month, she went to Kaiser Hospital in San Francisco for a routine prenatal checkup.

"Later that day," recalls her husband, Victor Ovalle, a postal worker at San Francisco International Airport, "she called and said to come on down and they were going to explain things to me."

The doctors said Sonia Ovalle had very high blood pressure induced by her pregnancy. They wanted to keep her in the hospital for 24 hours, just to be safe.

Over the next few days, her blood pressure continued to rise.

Her life and the life of her fetus in danger, Ovalle would have to deliver immediately. But the neonatal intensive care unit at Kaiser, a level- three site with 19 beds, was full. High-level units at UCSF, San Francisco General Hospital and California Pacific Medical Center were only minutes away.

Kaiser, though, decided to keep Ovalle within its system. Her doctors sent her by ambulance to the Kaiser Hospital in Hayward, about 45 minutes away. Victor Ovalle was in the front seat, worried about the dense, Friday evening traffic.

Sonia Ovalle suffered seizures on the way and arrived in Hayward comatose. An emergency cesarean section saved her son, Victor Andres, but doctors declared Sonia Ovalle brain-dead and, the next day, removed life support. Victor Ovalle said he went into shock.

"How is it," he asks, "that she goes to a doctor's appointment and she never comes back home?"

Kaiser spokeswoman Kathleen Barko said the UCSF unit was full at the time. UCSF confirmed its unit was full but said it accepts all emergency cases or helps find an appropriate alternative.

Barko said she believes the units at the other two hospitals were "full or approaching fullness." Neither hospital can confirm that information.

In May 2001, Victor Ovalle and his two children won a settlement of $400, 000 in their lawsuit against Kaiser.

A matter of definition

The system for rating neonatal intensive care units is poorly regulated and easily abused. Many states differ from California in how they rate the units, and the nation's doctors often refer to the American Academy of Pediatrics' ratings, which also vary from California's.

This lack of uniformity has led some hospitals to "pretend to have a higher level of care than they really do," said Dr. Lu at UCLA.

In the case of William Warden, this lack of clear regulations may have cost him his life.

Elizabeth Warden, an attorney from Newport Beach (Orange County), learned six years ago that she was having triplets and would need to deliver at a hospital with level-three care.

She and her husband, also a lawyer, toured and interviewed local hospitals and chose Saddleback Memorial, a medical center in nearby Laguna Hills that advertised as having a "level III" neonatal intensive care unit.

Two of the Warden triplets were delivered healthy, but 3-pound 12-ounce William struggled from the moment of birth.

After William was in the Saddleback intensive care unit for 11 days, his liver began to bleed. A catheter had apparently nicked it, according to court testimony, and a surgeon was called from a nearby hospital to repair the damage.

But it took the surgeon six hours to arrive, and William was dangerously weak by then, court records say.

Finally, at Warden's insistence, William was transferred to Cedars-Sinai Medical Center in Los Angeles. But his injuries were so severe that his kidneys soon shut down. In June 1998, after one month of life, baby William died.

Warden and her husband filed a lawsuit that accused William's doctors of malpractice and Saddleback Memorial of misrepresenting its level of care.

As early as August 1989, Saddleback was telling state health officials that it provided "level III care," even though its intensive care unit was rated a level two under state guidelines. In a 1991 letter to Saddleback, a state health official warned the hospital that the "term tertiary, formerly known as level III, has been retained for regional (top level) units only."

But an Orange County Superior Court judge said the definition of a level three was not precise enough for him to find that the hospital had intentionally misled the Wardens. He did, though, award the Wardens $1.9 million for the malpractice of the hospital and William's doctors.

Dr. Ronald Naglie, head of neonatology at Saddleback, said, "The type of care and level of care that went on with (Warden's) babies was ... appropriate. "

He calls the hospital "a community level three," but said, "A lot of this is very vague. We just tell people what we do here, that we take care of any size premature baby and we don't do complex heart surgery."

'I should have known'

For a while, Kelsey Russell got better after he was transferred to the top-level unit at Loma Linda University Children's Hospital in January 1998.

He began to track movement with his eyes, and the blood drained from the back of his head. Nurses and doctors "were surprised at how well he was doing, " said his father, Tim Russell. "He was so cute. He was always smiling."

On March 18, after intensive training on the finer points of oxygen tanks, throat suction, drug doses, feeding tubes, cardiopulmonary resuscitation and car seats, Mary Hall was allowed to take Kelsey home.

Three days later, at 9 a.m., Hall started running the bath for Kelsey when she sensed that something was wrong.

"I ran into his room," she said, "and I realized I had taken his (vital signs) monitor off." She listened in horror as he drew his last breaths. She started CPR and emergency workers arrived, but after a few final breaths, Kelsey succumbed to pneumonia.

Hall visits his grave now, twice a month, at the Olivewood Cemetery in Riverside, about 30 minutes from her home. She said she is eager to go because "I felt closer to him than to my other child, simply because he needed me so much."

And there is, she said, a lot of apologizing to do.

Even though medical experts and a jury verdict confirmed that Kelsey would not have died had he received proper professional care from the start, Hall said, "I felt as if it was my fault. I trusted my care to other people, and it was like I should have known

better. I should have known he never belonged in this level-one hospital, because he died."

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TOO YOUNG TO DIE

Part Five: Saving Babies

- Erin McCormick, Reynolds Holding, Chronicle Staff Writers
Thursday, October 7, 2004

The intensive care nursery at UCSF Children's Hospital is a leader in the battle to save the Bay Area's sickest babies. Here doctors perform medical miracles every day.

They called them "Twin A" and "Twin B."

The obstetricians, neonatologists, nurses and technicians who were following the two babies' every heartbeat -- seen as two lines zigzagging across the screen of a fetal heart monitor -- saw no sure way to save their lives.

The babies were entangled in their mother's womb. The smallest twin was not getting enough nourishment through his umbilical cord and was slowly starving. He could die at any moment, a fate that would immediately put his larger brother in dire risk because the circulatory systems of their tiny bodies were interconnected.

But if doctors allowed them to be born now, early in their mother's seventh month of pregnancy, they would both face the life-threatening risks of premature birth and the little one would start life weighing only 2 pounds.

For members of the medical team at UCSF Children's Hospital, life and death issues such as this one confronted in March occur daily.

On the hospital's 15th floor, babies often come into the world to be moved almost instantly through a window in the delivery room wall to the lifesaving interventions of the neonatal intensive care nursery.

Here, it is common practice to have to weigh one baby's life against another's or the life of a mother against her child's. And even to decide that an infant's life will be so filled with illness, disability and pain that it isn't worth saving at all.

For the past 40 years, units like this have been the front line in the nation's battle against infant mortality.

The United States has spent decades trying to lower its infant mortality rate. Over the last four days, Chronicle stories have shown that the nation has emphasized a purely medical approach to curbing infant deaths at the expense of ignoring some deep-rooted contributors to the problem, like environmental contamination and the stress caused by glaring social inequities.

The stories showed that, even within the world of medicine, economic competition between hospitals often prevents sick infants from getting the medical care they need.

But here, in the brightly lit corridors of the 15th floor of UCSF Children's Hospital, America's know-how in combatting infant deaths is displayed at its very best.

A handful of top-level academic hospitals, like UCSF, nurture California's sickest infants as they are transferred from hospitals around the state through a regionalized network designed to get the most critically ill babies to the places most experienced in their care.

Here, miracles occur routinely, but so do the agonizing decisions that define the borders between life and death.

For Yoshita Kondapi, 31, and Sourav Mukherjee, 33, the parents of these two unborn twins, there was comfort in knowing their babies' fates were being debated by some of the top medical experts in the world.

Kondapi had been lying in a hospital bed at UCSF trying to remain as still and serene as possible for two weeks straight. The longer she could keep those babies surviving in her womb, the healthier they would be at birth.

But the plan didn't seem to be working. Her wait had been beset by one near emergency after another. Most recently, the heart rate of the smaller baby, known to the medical team as Twin A, had suddenly plunged. Was he dying?

The team of nurses and doctors had run into Kondapi's room and started inserting IV lines into her arm in preparation for a "crash delivery" -- an emergency cesarean section that gets the babies out of the mother's womb and into intensive care within minutes.

Then, just as suddenly, Twin A's heartbeat had reappeared and stabilized.

Now the medical team was on high alert, debating whether to deliver the babies in a planned and orderly fashion or to wait it out a few more days.

"We can never tell what's going to happen," said perinatal nurse Audra Katz. Her job that evening was to watch the babies' heart rates bleep across the screen of the fetal monitor and flag the team into action at the slightest sign that things might be worsening. "I've had a baby go into distress and be delivered in eight minutes," she said.

Down the hall, in the physicians' quarters across from the nursing station, Dr. Rajita Garg stood on a countertop with a thick black pen updating the board that spelled out the current orders for each of the women whose troubled pregnancies were being monitored by the obstetrical team.

Garg, 27, was the second-year medical resident in charge of Kondapi's case. After another hectic, 12-hour day, she was preparing to go home.

A first-year resident was in charge of all the normal deliveries. As a second-year resident, Garg handled many of the unit's most complicated cases, under the supervision of a team of attending physicians.

Expectant mothers are regularly airlifted to UCSF from around Northern California when it becomes clear that there is something going very wrong.

That day, the unit was particularly busy. Garg had been following the cases of seven mothers whose pregnancies were in various states of distress. Some were in premature labor. Some suffered illnesses that endangered their fetuses and their lives. Others had babies with anomalies that would need immediate intensive care.

She knew that if there was any sign that Twin A was worsening, he and his brother would be delivered during the night. If not, she expected that she would be part of the team delivering him the next day.

"We don't want Baby A to die," she said. "We also don't want the delivery to be a big emergency."

Potential 'catastrophe'

On the other side of the 15th floor in a darkened isolation room of the neonatal intensive care nursery, another set of twins -- premature babies small enough to recline in the palm of a man's hand -- lay nestled together inside a plastic-walled incubator, known by staff as an "isolette." One weighed 2 pounds, 2 ounces at birth. His bigger brother weighed 2 pounds, 14 ounces.

Each of the baby boys had a monitor with a red light strapped to one tiny foot to keep constant tabs on the oxygen in his blood, a diode attached to his chest to follow his heartbeat and another to track his breathing. Each had his own bank of computers reporting the results of these tests on a series of screens above them.

A nurse sat next to them on a stool, watching as they began to stir.

The smaller one yawned broadly beneath the plastic tube that was feeding extra oxygen to his nostrils and stretched outward with arms no thicker than thumbs. His skin was purplish and translucent. It seemed too loose for his baseball-size head, giving his tiny face the wrinkled look of a grimacing old man.

"It's feeding time," said nurse Terry Wright, reaching into the side of the isolette to gently scoop up a baby with the palm of her hand.

Along with the babies' mother, Wright had been these twins' near-constant companion for the five weeks they had spent so far in neonatal intensive care. Tonight, she was on her own, as the mother, Stacey Cross, had returned to her home in the Sierra foothills for a night.

Wright, who has handled thousands of preemies in almost 20 years as a nurse in this unit, sat in a rocker and propped the baby in the crook of her arm.

The infant tried to muster a cry of protest but managed only a prolonged squeak.

"You know that I'm not your mom, don't you?" Wright muttered. She picked up a bottle and tried to coax the baby to suckle. Next to the infant's tiny lips, the nipple looked as big and cold as a steel hammerhead. He stubbornly scrunched his lips tighter.

"He's going, 'What is this? You're not my mommy,' " Wright said. "OK, let's try it again."

These twins, Clayton and Jakob Cross, were stable now despite being in isolation because of a minor infection.

But their journey to UCSF had been just as perilous as the one the Kondapi twins were now facing in the hospital's delivery wing. In their case, it was Mom who nearly died.

It had started five weeks earlier, when Stacey Cross, 30, then six months pregnant with the twins, had gone to the doctor complaining that she felt a touch of the flu.

Her seemingly minor complaint would kick into motion a medical network that reaches to the state's borders and beyond.

She was immediately sent to a small, local hospital for tests. Doctors there quickly realized she was suffering a pregnancy-related illness known as HELLP syndrome. The little-understood but often deadly disease causes a severe drop in blood platelets, the components that allow blood to clot and prevent excessive bleeding.

Cross remembers hearing the doctors' raised voices coming from the room next to her as they got on the phone with the staff at UCSF.

"This is a catastrophe waiting to happen," she heard one doctor say.

Soon Cross was being loaded onto a helicopter and airlifted to San Francisco.

She remembers feeling suspended in time as she lay in the helicopter on a gurney with a team of attendants surrounding her. She didn't feel that bad. Without raising her head she was able to look out the helicopter window and watch the bay come into view.

What she didn't know was that her blood platelets were so low that her organs were on the verge of shutting down, in the first stages of death.

As she was wheeled onto the elevator to the 15th floor of UCSF, doctors were already preparing for the likelihood that there would be only one way to save her life: to deliver her babies, even though she was barely more than halfway through her pregnancy.

On Feb. 6, the day after Cross arrived at UCSF, the babies had to be removed from her womb, one naturally, the other by C-section. The big one, Clayton, weighed almost 3 pounds; his little brother, Jakob, was 2 pounds 2 ounces.

Difficult decisions

Dr. Robert Ball is used to delivering grim news.

Several times a week, as a perinatologist who specializes in diagnosing problems in fetuses, Ball ends up having the kinds of

conversations that can strip a family of all sense of control and set them on a roller-coaster ride into the future.

For Yoshita Kondapi and Sourav Mukherjee of Millbrae, that talk came long before Kondapi ended up strapped to a fetal monitor on UCSF's 15th floor.

Halfway through her pregnancy, the first-time mother had been referred to Ball for a detailed ultrasound examination by her regular physician, who was troubled by the discrepancies in the sizes of the identical twins. After looking at the results of the sonogram, Ball sat the parents down in a small office adjoining the ultrasound room.

He explained that the fetuses were experiencing "unequal sharing of the placenta." The smaller one had his umbilical cord linked to his mother's placenta in such a tenuous way that he wasn't getting the nourishment needed to grow. The bigger one was actually getting too much life-sustaining fluid.

The condition would worsen throughout the pregnancy.

"We pretty much knew that at some point the smaller one would run out of gas," Ball said.

In the best case, the doctor explained to the troubled parents, the smaller fetus would be able to hold on long enough so both babies could survive being born, most likely prematurely.

In the worst case, the small twin would die and initiate the death or injury of his brother. Or, in a scenario that Ball explained might be even harder for some families, one or both babies could wind up disabled and need a lifetime of care.

The only way to eliminate the uncertainty would be to terminate the pregnancy, the doctor told them.

"Our role is to provide as much information as possible and then to allow families to make up their minds as to what's right for them," Ball said. "We're going to send them home. And, yes, we'll remember them in six months, but they are the ones who are going to have to live with their decisions."

For Kondapi and Mukherjee -- both computer professionals who had devoured all the information on their babies' condition they could find on the Internet -- the decision was made with their hearts. They would go forward and pray that their twins lasted long enough in Kondapi's womb to have healthy lives in the world.

"You learn the risks," Kondapi said. "Then you live with hope."

'Big ethical dilemma'

The Cross family got no such advance notice.

On Thursday morning, Feb. 5, Stacey and Jess Cross, 31, had started their day fairly normally at their home in rural Sonora (Tuolumne County).

By Friday afternoon, their lives were completely uprooted. Their whole focus was shifted to the neonatal intensive care ward in distant San Francisco, where their tiny babies would spend two months recovering from their early births.

Clayton and Jakob were born at 27 weeks gestation, 13 weeks short of a normal pregnancy. Thirty years ago, this probably would have meant death for both of them -- or at least the beginning of long lives of disability.

But in recent decades, researchers at UCSF and other academic neonatal intensive care units around the world have developed a host of new medical interventions that give tiny babies like these excellent odds for the future.

The babies' treatment began before they left the womb.

As soon as she arrived at UCSF, Stacey Cross received a series of steroid shots to kick-start the babies' lungs into a spurt of rapid development that prepares them for the outside world. These shots, first administered to mothers in preterm labor in 1972 but not adopted as a standard practice until the 1990s, are credited with preventing thousands of infant deaths and disabilities.

At birth, the smaller twin, Jakob, had trouble getting his lungs started and benefited from another important recent lifesaving development: the artificial administration of a naturally made substance called "surfactant" that prevents premature babies' underdeveloped lungs from collapsing as they breathe.

Yet, at only 27 weeks of gestation, Jakob and Clayton Cross were frighteningly close to the point where doctors consider a fetus too young to be "viable for life."

If they had been born three weeks earlier, at 24 weeks, it would have been a matter of debate -- a decision ultimately left to the family -- whether doctors should try to save them or simply let nature take its course.

At 23 weeks, UCSF policy would have been not to try and save them at all.

The policy is backed by studies by UCSF pediatrician Robert Piecuch, who follows premature babies to find out how well they progress through childhood. His team's studies have shown that babies born at 24 weeks of gestation had only the slimmest hope of a normal childhood. Fifty-seven percent didn't survive to be discharged from the hospital. Of the 43 percent who survived, only 1 in 4 showed no signs of neurological or cognitive impairment when followed through two years. Some babies are born so early that they are simply allowed to expire in their parents' arms in the delivery room.

Doctors, nurses, social workers and ethicists at UCSF are conscious of walking an ethical tightrope as they try to help families delineate the difference between saving a baby's life and futilely prolonging the suffering of a dying infant.

"Really, this place is just one big ethical dilemma," said Kimberly Scurr, who started as a nurse at UCSF and now is the administrator in charge of all the services for mothers and infants that comprise the 15th floor.

"We don't want to create babies whose own parents can't care for them," said social worker Stephanie Berman.

Fortunately, the technology has advanced so much that the everyday miracles far outnumber the tragedies.

For Clayton and Jakob Cross, who had special brain scans and eye examinations to assess whether their early births would hinder them later in life, the future looked bright.

"For these guys, the chances that they'll have normal lives are pretty close to 100 percent," nurse Terry Wright said.

She spent many hours in the isolation room as the Cross twins grew stronger.

Wright considers it her primary job to teach parents of tiny premature babies how to take care of their children; the job can be far from straightforward.

Wright helped the babies' mother load a preemie into each arm in what is called the "football hold," so that both babies could nurse at the same time.

Once they were fed, Wright took the bigger twin and began to gently pat him to get him to burp. Stacey Cross cooed at her smaller infant, Jakob, as he drifted off to sleep in her hands.

Suddenly, the alarm attached to one of the monitors went off, filling the room with a shrill "dong, dong, dong."

Jakob's respiration rate had suddenly dropped.

"He's breathing, but it's shallow," Stacey Cross called, lifting the baby upright and patting him anxiously.

Now, a second alarm was ringing, adding an urgent "bing, bing, bing" to the first monitor.

The baby wasn't breathing at all. His face started to turn blue. The second alarm meant the level of oxygen in his blood was dangerously low.

"Come on, Jakey, take a breath," Wright cried, tickling his feet in hopes of jarring him into breathing.

"No blue babies, Jakey," his mother called to him.

"I'm going to pinch his toe," said Wright, who was prepared to go to the next step: using a hand ventilator to revive the baby's breath, if necessary.

But, suddenly Jakob's tiny chest began to rise and fall again. The color started returning to his face, and the monitors stopped their persistent dinging.

"That's it," Stacey Cross cooed. "Go up and down. That's what mommy wants to see. I know it's hard work, but you have to keep breathing."

The mother had been through this drill a dozen times before.

It is common for premature babies to stop breathing, Wright explained, especially when their bodies are busy doing something else, like digesting food.

"His little nose turns bright blue when he needs to breathe," his mother said.

A team for each twin

As he prepared for the births of Kondapi's twins, neonatologist William Carey was gearing up for the likelihood that the smaller one would start life as a very sick baby.

For days, Twin A had been barely holding on to life in Kondapi's womb, his tiny heart straining from the lack of nourishment. He and his larger brother had reached 31 weeks of gestation -- which gave them an excellent prognosis for surviving their premature births. But Twin A was unusually small, weighing only about 2 pounds. And it was unclear if his heart and circulatory system would withstand the vigors of life outside the womb.

Twin A was also facing the wrong way in the womb, so the babies would have to be delivered by cesarean section.

Now, Carey stood inspecting the neat arrangement of stainless steel medical equipment packed into UCSF's "setup room," an area the size of a large kitchen that is connected to the emergency delivery room by a 4-foot window.

On one side of the window, Dr. Garg and her team of obstetricians would be delivering the babies by cesarean section. On the other, a crowd of neonatologists, nurses, respiratory therapists, blood gas experts and other specialists, led by Dr. Carey, would be waiting to resuscitate them seconds after their birth.

"There's two things we'll be worried about here: Are they breathing, and is their blood flowing?" Carey said.

For days, doctors had debated when Kondapi's babies should be born. The birth was scheduled, canceled and rescheduled several times. But when it finally happened, it happened fast.

The nervous mother was placed on a stainless steel table under a bank of operating room lights.

"We'll have you sit on the edge of the table and arch your back like a cat," said anesthesiology resident Tina Chiu, preparing a tray of syringes for the epidural that would be injected near Kondapi's spinal cord.

Chiu's supervisor, attending anesthesiologist Mark Rosen, put a blood pressure cuff on the mother's arm and attached a heart monitor that amplified her heartbeats into the room as a steady "beep, beep, beep."

"There's going to be a pinch as she puts some numbing medication in. After that, it's not so bad," Rosen told the mother.

Kondapi eyed the tray of syringes Chiu was arranging.

"Curious, huh?" said Chiu, holding up a syringe for Kondapi to see. "It's long, but it's very thin."

Kondapi relaxed as the first of the medication was injected into her back.

"It's not that bad," she said.

On the other side of the window in the wall, more than a dozen doctors, nurses and technicians in surgical masks and plastic hairnets were pushing their way into the cramped setup room. Two teams of staffs -- a total of seven people for each baby -- were pulling on latex gloves and donning sterile paper covers over their hospital scrubs. The team members lined themselves up around two stainless steel warming tables piled with soft blankets. Variously, they began preparing an array of medical supplies: thermometers, scissors, clamps, plastic tubing and ventilator parts, to be reachable in a second.

A doctor in the setup room peered through the open window to the delivery room next door and announced to the team that the C-section had begun.

"We should be ready for a small one," the doctor called. "The big one may be first.

"OK, the baby's out. It looks like the big one."

Garg raised her hand into the air.

Through the window, the doctor in the setup room could see tiny blood- covered feet and arms kicking with life, as the baby was lifted out of his mother's open belly.

The baby was quickly wrapped in a towel and passed through the window. He was briefly placed on a scale, which measured him at 1,785 grams (about 3 pounds 15 ounces). His purple skin was still covered in vernix, the protective coating he had in the womb. He let out a tiny "rah, rah, rah" as he was whisked away to one of the warming tables and surrounded by doctors.

"Good cry," someone called out. "His tone's good. Good heart rate." The baby was lost behind the blur of gloved hands.

Now Twin A was passed into the room, his skinny legs splayed like the feet of a caught chicken and his back arched. His body was bright red.

"Here he is," Carey called out.

One set of hands held an oxygen mask to his face. Another placed a thermometer under his arm. Another began strapping a monitor to his foot to measure the oxygen in his blood.

His chest, no larger than a dove's breast, beat rapidly up and down as his tiny lungs worked to take their first breaths. He was so thin that every pencil-thick rib was visible.

For a second, the doctors just watched. Would his heart be strong enough to transition him from near death in the womb to the major task of breathing in the world?

It was.

"His heart rate was actually higher outside the womb than it had been inside," Carey said. "That was our indication that this baby was going to do all right."

Preparing to go home

Stacey Cross remembered how, during the first month she spent watching her babies in the neonatal intensive care ward, her heart seemed to stop every time an alarm went off. And the equipment is so sensitive that false alarms were near constant.

Feeling horrible that her body hadn't been able to carry the twins through a full term, Cross said, she stood by their bedsides imagining how she would feel if they didn't survive -- and mentally willing them to live.

"I felt like it was my responsibility," she said.

Then one day, she realized she had to let them go.

"I stood next to them and said, 'I need you here. I want you here. But, ultimately, this is going to be up to you guys. Whether you survive or not is up to you.' "

That, she said, was the moment she could truly begin loving them.

"That was the turning point for me."

Kondapi and Mukherjee, new parents of infants in the neonatal intensive care unit, were at the point Stacey Cross had been two months earlier.

They had lovingly given Twin A the name Arnav. His bigger brother was named Shayan.

But no sooner had they taken in the miracle of their babies' survival at birth, than they were thrust into the wrenching ups and downs typical of life in a neonatal intensive care unit.

Arnav was beautiful and alive, but for the first week, he couldn't eat.

Every time doctors would try to introduce the tiniest amount of mother's milk into his stomach through a tube fed down his throat, his belly would become distended.

"He was so thin, you could see the loops of his intestines right through his skin," Carey said.

His parents worried that he had contracted the dreaded abdominal infection common to premature babies known to those around the unit simply as "NEC." Necrotizing enterocolitis, a severe infection of the gut, can strike suddenly and kill, even babies who seem to be recovering miraculously.

For that week, Arnav was kept alive with fluids fed through an IV tube.

If doctors fed him more milk, they risked causing even greater problems in his intestines, but without real food, Arnav couldn't grow.

Carey consulted with other specialists and ordered batteries of tests trying to figure out what was going on. Was something blocking the baby's bowel? The tests showed nothing.

Finally, he said, "we had to take a risk."

They fed him a little milk and watched cautiously as his stomach continued to become distended. Miraculously, in a few days, the baby simply seemed to grow out of the problem on his own.

"We were lucky," said the baby's father, Sourav Mukherjee, who had spent every evening watching his babies in the intensive care unit.

In his spare hours, after he went home at night, the first-time father would scan the Internet to learn every detail about parenting premature babies he could unearth.

"It's been a roller-coaster ride, and I don't think we've seen the end of it yet," he said.

In the meantime, life on UCSF's 15th floor continued to roll along on its usual unpredictable course.

In the three weeks after the births of Arnav and Shayan Mukherjee, 132 more babies were born in the obstetrics wing. Twenty-eight of them had to be transferred into the neonatal intensive care unit for further care. Another 18 critically ill babies were airlifted or ambulanced to UCSF by other hospitals, in the hopes that the higher-level medical interventions available here could save them. One baby didn't make it. Another 38 were discharged to go home with their families.

Among those who went home in April were Clayton and Jakob Cross.

Arnav and Shayan Mukherjee were not far behind; they would graduate from the unit three weeks later.

"They have to be able to suck, swallow, breathe and keep warm, plus continue to gain weight, all at the same time," explained Michelle Cathcart, nurse manager of the neonatal intensive care unit. "That's a lot to ask of these little guys."

Nurse Wright, who had spent much of the past two months at Clayton and Jakob's bedside, helped Stacy Cross carry her tiny babies to the hospital's front door. Clayton, now 5 1/2 pounds, was placed around Cross' neck in a sling; the 4-pound Jakob was propped in a vastly oversize car seat.

There was a long hug and a little laughter, and then Wright waved as her latest charges were carried away.

"People ask me if I get attached to the babies," Wright said. "And sure, I do. But practically speaking, what would I do with 4,500 kids?"

SERIES BOX

SUNDAY: High-stress neighborhoods can doom infants.

MONDAY: Pollution linked to infant deaths.

TUESDAY: Going door-to-door to save young lives.

WEDNESDAY: Flawed health care system costs babies' lives.

TODAY: A hospital where miracles occur daily.

This series is available online. To obtain infant death statistics for neighborhoods by ZIP code and track the infant death rate by county over the past decade, go to sfgate.com/infantmortality/.

MILESTONES IN THE BATTLE AGAINST INFANT MORTALITY

The infant mortality rate in the U.S. increased slightly in 2002, after more than 40 years of declines ÷ going back to the earliest year for which the federal Centers for Disearch Control and Prevention have data on the subject. Officials from the CDC blamed the tiny upsurge on an increase in premature births, caused in part by larger numbers of older mothers giving birth and the use of fertility treatments..

1915: A new United States birth registry shows an infant mortality rate of nearly one out of every 10 live births.

1928: The first antibiotic drug ÷ penicillin ÷ is discovered, leading to a leap in the treatment of infections, including many deadly ones in infants.

1930s: Nursery incubators, which had been used sporadically since the late 1800s, are dramatically improved.

1933: First year for which the CDC publishes infant death data from the entire country.

1950s: More than 100,000 babies still die each year in the United States. A common practice for handling premature babies and other very sick newborns is to set them in a corner of the nursery and see if they live or die.

August 9, 1963: John F. Kennedyâs second son Patrick Bouvier Kennedy dies after being born prematurely, causing a national groundswell for efforts to save tiny babies.

1963-1964: The worldâs first neonatal intensive care units open at UCSF and a handful of other universities. Each patient is monitored 24 hours a day by his or her own nurse. A new breed of doctors ÷ neonatalogists ÷ is trying to save babies that previously would have been allowed to perish.

Mid-1960s: The first medical ventilators for infants are introduced. Before this, urses often provided ventilation with hand pumps.

1971: A study by UCSFâs Dr. George Gregory proves that it is possible to prevent lung collapse in newborns with respiratory distress by maintaining ãcontinuous positive airway pressure.ä This discovery leads to the development of dramatically improved ventilators and a major increase in survival rates for premature infants.

Early 1970s: Seeing the often-miraculous life-saving advances being made at neonatal intensive care units, government medical programs and private insurers begin to pay for this kind of care.

1982: UCSF patents a medicinal formulation of a naturallycreated substance called surfactant, which helps to keep the lungs from collapsing. The new treatment, first tested in babies in 1985, dramatically reduces the death rates of premature infants.

1985: The first surgery on a fetus still inside its motherâs womb takes place at UCSF.

1988: Machines that can temporarily perform the work of the lungs and heart are introduced to neonatal nurseries around the country after their first successful test in 1975.

1992: The ãBack to Sleep Campaign,ä a public education program urging parents to put their babies on their backs to sleep, begins. The program ÷ and the resulting change in child-rearing practices ÷ is credited with cutting the incidence of sudden infant death syndrome by two-thirds.

1993: While infant mortality rates continue to drop, the United States begins to see an annual increase in the number of premature births. The March of Dimes attributes about half of the increase to such factors as an increase in the number of older mothers and the use of fertility drugs. But part of the increase remains a mystery.

2002: For the first time in more than 40 years, the infant mortality rate in the United States rises from the previous year, to 7 deaths per 1,000 births.

Centers for Disease Control and Prevention; Dr. Roderick Phibbs of UCSF Childrens Hospital and UCSF archives; ãA Century of Neonatal Medicineä by Dr. Richard C. Lussky; Chronicle research

Todd Trumbull / The Chronicle Source:

CHART:

U.S. INFANT MORTALITY RATE

Deaths per 1,000 births

1933: 58.1

1940: 47.0

1950: 29.2

1960: 26.0

1970: 20.0

1980: 12.6

1990: 9.2

2000: 6.9.

Note: These rates, maintained by the U.S. government, differ very slightly from a year 2000 rate for the United States reported in a chart of World Health Organization rates published in the paper Sunday. The two organizations use slightly different statistical sources and methods.

E-mail Erin McCormick at emccormick@sfchronicle.com.

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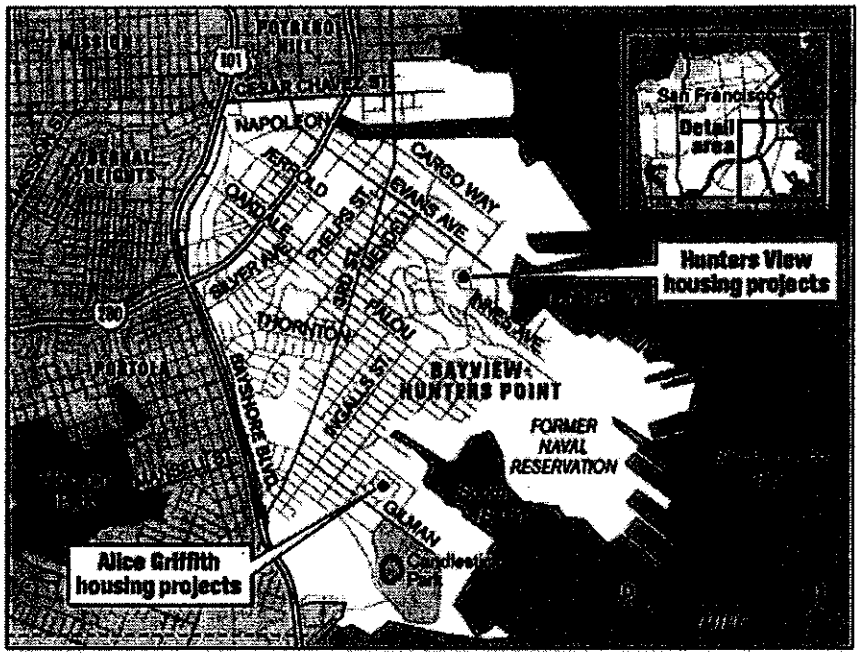
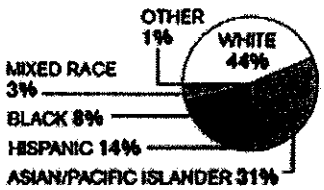
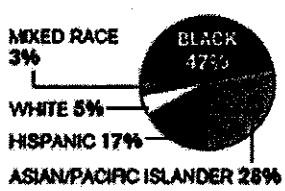
URL: http://sfgate.com/cgi-bin/article.cgi?file=/c/a/2004/10/07/MNGII94D931.DTL

SAN FRANCISCO, BAYVIEW SEEM WORLDS APART

A look at how Bayview-Hunters Point (ZIP code 94124) compares with the city of San Francisco as a whole:



	SAN FRANCISCO	BAYVIEW-HUNTERS POINT
Population	776,733	33,170
Race		
Unemployment rate	5%	10%
Percent of families with children living in poverty	12%	27%
Per-capita income	$34,556	$14,200
Percent of population 25 and older with . . .		
no high school diploma	19%	36%
a college degree	45%	11%
Percent of homes that are owner-occupied	23%	46%
Median home value*	$396,400	$254,100
Median monthly rent	$928	$554
Percent of residents paying 35 percent or more of income on housing	51%	62%
Number of homicides in 2003 and first seven months of this year	130	25

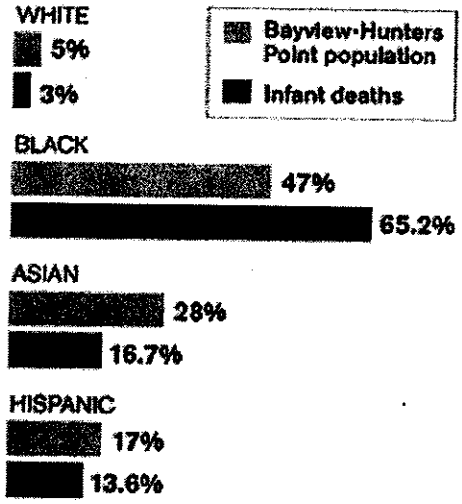
* As reported by occupants or owner-occupants

Note: Data culled from U.S. Census 2000, the latest year for which ZIP code data are available.

Sources: San Francisco Police Department; U.S. Census Bureau; ESRI TODD TRUMBULL/*The Chronicle*

BAYVIEW BLACK INFANT DEATHS

Although blacks are 47 percent of the population in Bayview-Hunters Point, they account for more than 65 percent of the infant deaths there.

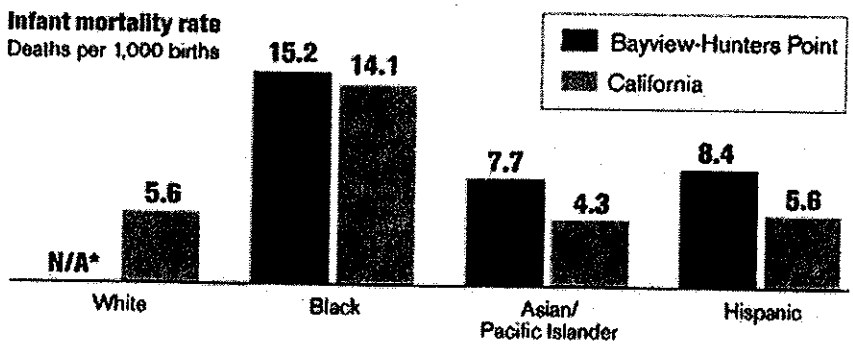


Source: Chronicle research

TODD TRUMBULL / *The Chronicle*

BAYVIEW INFANT DEATHS EXCEED STATE'S AVERAGE

The infant mortality rates for blacks, Asians/Pacific Islanders and Hispanics in Bayview-Hunters Point are each higher than the corresponding statewide rate.



* Not enough white babies were born in Bayview-Hunters Point over a 10-year period to calculate an accurate mortality rate.

Source: Chronicle analysis of California ZIP codes with more than 1,000 births from 1992 through 2001

TODD TRUMBULL / *The Chronicle*

WORLD SNAPSHOT FOR 2000

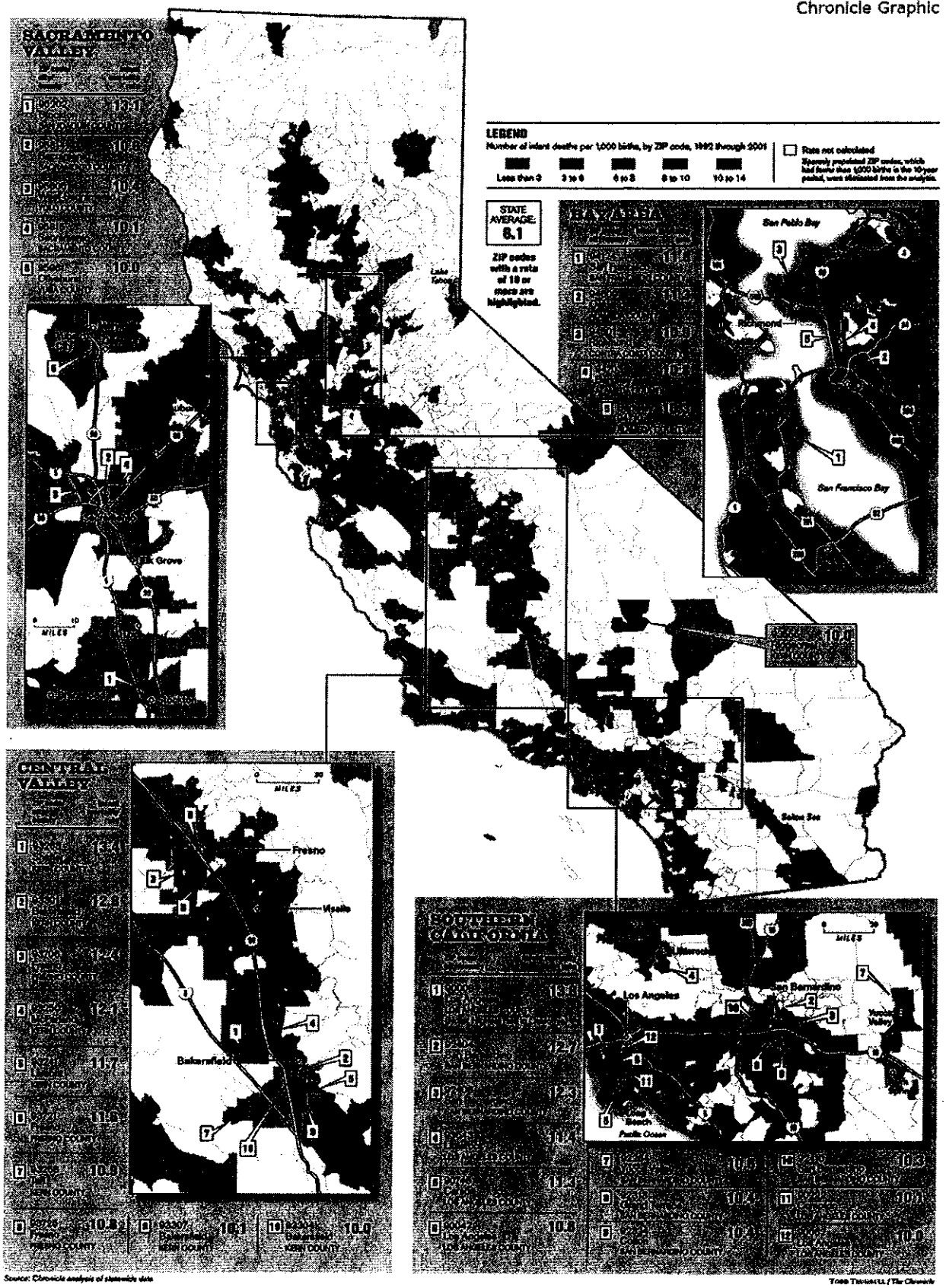
Here is how infant mortality rates in California and the Bay Area compare with rates worldwide. Rates are based on figures for the year 2000 only, although stories in this series cover a 10-year period. Iceland's and Sweden's infants have the best chance of surviving beyond their first year. The list does not include countries with lower infant mortality rates than Bayview-Hunters Point.

Rank	Country	Infant mortality rate (Deaths per 1,000 births)
1 (TIE)	Iceland	2.4
	Sweden	
3	Singapore	2.6
4 (TIE)	Finland	3.2
	Luxembourg	3.2
6 (TIE)	Czech Republic	3.4
	Japan	
8	Norway	3.5
	Marin County	3.5
9	Spain	3.9
	San Francisco	4.0
10	Switzerland	4.1
11	Austria	4.2
12	Slovenia	4.3
13 (TIE)	France	4.6
	Germany	
15 (TIE)	Canada	4.8
	Belgium	
17 (TIE)	Andorra	4.9
	Italy	
19	New Zealand	4.9
20	Australia	5.0
21	Denmark	5.1
22	Netherlands	5.2
	San Mateo	5.3
23	Monaco	5.4
	California	5.4
24 (TIE)	Bahrain	5.6
	South Korea	
26 (TIE)	Ireland	5.8
	United Kingdom	
28 (TIE)	Greece	5.9
	Portugal	
30 (TIE)	Malta	6.0
	San Marino	
32	Israel	6.1
33	Cyprus	6.4
34	Poland	6.7
35	Malaysia	6.9
36 (TIE)	United States	7.5
	Cuba	
	Slovakia	
39 (TIE)	Kuwait	7.7
	Lithuania	
41	Hungary	8.1
42	Croatia	8.2
43	Bahamas	8.3
44	Chile	8.5
45 (TIE)	Belarus	9.2
	Estonia	
47	United Arab Emirates	9.3
48	Latvia	9.4
49	Brunei	9.9
50	Costa Rica	10.0
51	Ukraine	10.4
52	Bulgaria	10.7
	Bayview-Hunters Point	11.0*

* A one-year rate for such a small area is not considered statistically significant, but in this case, it closely tracks the 10-year rate of 11.8.

California Infant Mortality

Chronicle Graphic



Source: Chronicle analysis of statewide data

Todd Thrasher / The Chronicle