research highlights

Virus Related to Smallpox Rising Sharply in Africa

IN THE WINTER OF 1979 the world celebrated the end of smallpox, a highly contagious and often fatal viral infection estimated to have caused between 300- and 500 million deaths during the 20th century. Smallpox was defeated through an aggressive worldwide vaccination campaign – a campaign that ended in 1980, with the virus having been eradicated. But a UCLA School of Public Health-led research team has found that the elimination of the smallpox vaccine had an unintended side effect.

In the *Proceedings of the National Academy of Sciences*, Dr. Anne Rimoin and colleagues reported that 30 years after the mass smallpox vaccination campaign ceased, rates of a related virus known as human monkeypox have increased dramatically in the rural Democratic Republic of Congo, with sporadic outbreaks in other African nations and even in the United States.

Until 1980, Rimoin notes, the smallpox vaccine provided cross-protective immunity against monkeypox, a "zoonotic orthopoxvirus," meaning it can be passed from animals to humans. Symptoms of monkeypox in humans include severe eruptions on the skin, fever, headaches, swollen lymph nodes, possible blindness and even death. There is no treatment.

Once the smallpox vaccination program ended, new generations of people who were "vaccine naïve" were exposed to the monkeypox virus in the Democratic Republic of Congo over time, and the number of people who became infected gradually increased. But the increase went unnoticed because the nation has little or no health infrastructure and thus no way to monitor the spread of such diseases.

The results were startling, showing a 20-fold increase in human monkeypox in the Democratic Republic of Congo since smallpox vaccinations were ended in 1980.

As a result, monkeypox was thought to be very rare. Rimoin's research shows, however, that it has become quite common.

Rimoin travels frequently to the Democratic Republic of Congo (DRC), where she has established a research site to study and track cross-species transmission of the disease (see the profile on page 8). For their recent report, Rimoin and her colleagues conducted a population-based surveillance in nine health zones in the central region of the country between 2006 and 2007, gathering epidemiologic data and biological samples obtained from suspected cases. They then compared the current, cumulative incidences of infection with data gathered in similar regions from 1981 to 1986. The results were startling, showing a 20-fold increase in human monkeypox in the DRC since smallpox vaccinations were ended in 1980.

Because it is unlikely that smallpox vaccinations would be resumed, Rimoin is calling for improved health care education in the Democratic Republic of Congo and better disease surveillance. There is an urgent need to develop a strategy for reducing the risk of a wider spread of infections, she says.

One in Four California Children Has Never Seen a Dentist

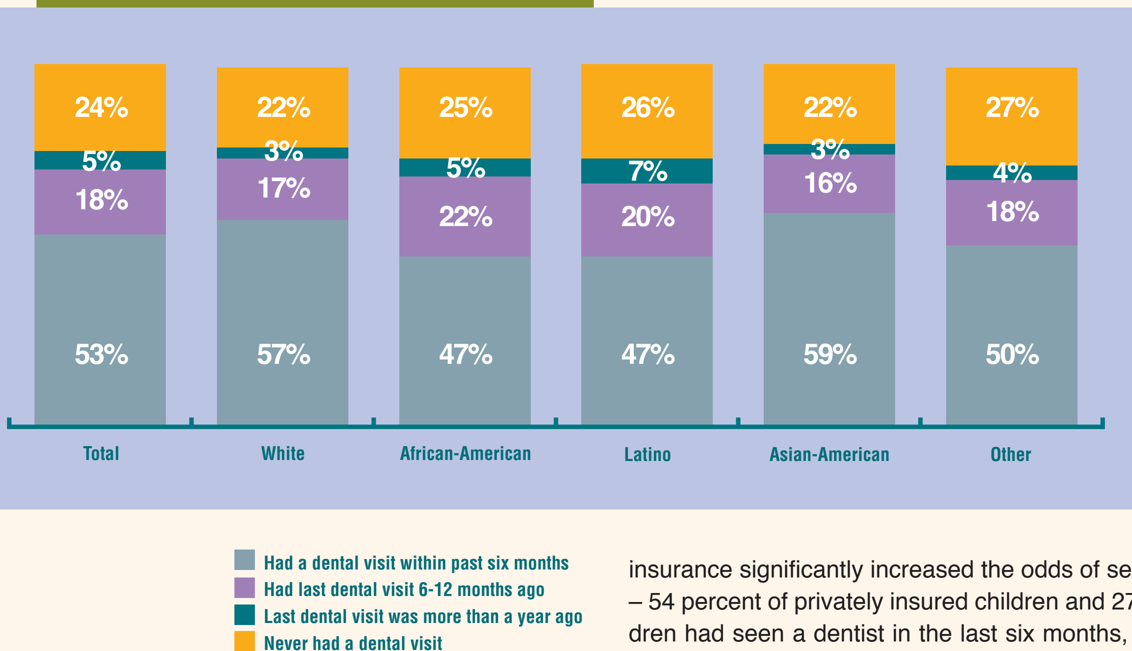
NEARLY 25 PERCENT OF CALIFORNIA CHILDREN have never seen a dentist, and for those who have, disparities exist by race, ethnicity and type of insurance when it comes to the duration between dental care visits, according to the findings of a study by Dr. Nadereh Pourat, professor of health services at the UCLA School of Public Health and director of research for the Center for Health Policy Research.

For the study, published in the July issue of the journal *Health Affairs*, Pourat and co-author Dr. Len Finocchio of the California HealthCare Foundation examined barriers to dental care in nearly 11,000 California children ages 11 and under using data from the 2005 California Health Interview Survey, the nation's largest state health survey, conducted by the Center for Health Policy Research. Among their findings: Latino and African-American children with all types of insurance were less likely than Asian-American and white children to have visited the dentist in the previous six months, or even in their entire lifetime.

The researchers also found that Latino and African-American children in public insurance programs, including Medicaid and the Children's Health Insurance Program (CHIP), went to the dentist less often than white and Asian-American children with the same insurance coverage. Overall, children with private insurance saw a dentist more often than those in Medicaid or CHIP.

"Lack of dental care continues to be a significant problem for American children, and our findings suggest that having insurance isn't always enough," says Pourat. "We need to address the other barriers that keep children from getting the help they need."

Time Since Last Dental Visit Among California Children Younger than 11 Years of Age



The authors noted that the findings raise concerns about Medicaid's ability to address disparities in dental care access. Ultimately, they argued, more strategic efforts are necessary to overcome systemic barriers to care, including raising reimbursement rates paid to dentists who serve the Medicaid population and increasing the number of participating Medicaid providers.

Despite the disparities, having any form of dental insurance significantly increased the odds of seeing a dentist on a regular basis – 54 percent of privately insured children and 27 percent of publicly insured children had seen a dentist in the last six months, compared to 12 percent of children without dental coverage.

"The data tell us that Medicaid and CHIP have improved children's ability to get dental care," says Pourat. "However, both programs need to do more to reduce disparities." (More on this topic can be found in the article on page 4.)

Same-Sex Couples in California Face Sizable Health Insurance Inequities

WHILE CALIFORNIA IS GENERALLY WELCOMING to individuals of all sexual orientations, employers in the state tend to discriminate when it comes to same-sex partners and health care, according to a UCLA School of Public Health study.

Dr. Ninez Ponce and colleagues are the first to show a large gap between employer-sponsored dependent coverage received by heterosexual employees

and lesbian and gay employees. Their study, whose findings were published in the journal *Health Affairs*, concludes that sexual-orientation disparities are greater than previously thought. Partnered gay men living in California, for example, are only 42 percent as likely as married heterosexual men to receive employer-sponsored dependent health insurance, while partnered lesbians have an even smaller chance – 28 percent – of getting coverage compared to married heterosexual women.

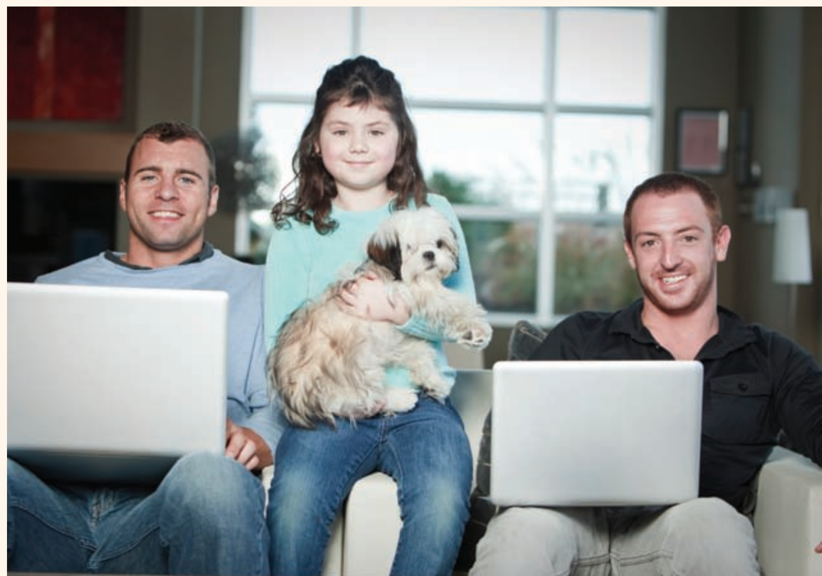
The report used data from the California Health Interview Survey. The researchers combined three years of adult surveys: 2001, 2003 and 2005. The final sample included 63,719 women and 46,535 men between the ages of 18 and 64. Of the sample, 51 percent of lesbians and 38 percent of gay men reported being in a partnered or married relationship, compared with 64 percent of female and 64 percent of male heterosexuals.

“We found no strong evidence to suggest that California employers are discriminating in providing health insurance to gay and lesbian workers as individuals,” says Ponce, an associate professor at the school. “However, we did find that employers were setting coverage rules for dependents that favored legally and heterosexually married employees.”

The authors noted that most of the data were collected before full implementation of the California Insurance Equality Act of 2005; they expect that the law, once fully enacted and combined with the federal Patient Protection and Affordable Care Act, may alleviate some of the disparities documented in their study.

But they also noted that the way government agencies and employers define dependents, and the federal taxation of health benefits for a same-sex spouse or partner, continue to be “a relevant underlying structural determinant of whether or to what extent sexual-orientation minorities will have more equal access to employer-sponsored insurance.”

Achieving universal coverage, Ponce says, "will depend in part on remedying inequalities in state and federal marriage-related rules."



Partnered gay men living in California are only 42 percent as likely as married heterosexual men to receive employer-sponsored dependent health insurance, while partnered lesbians have an even smaller chance – 28 percent – of getting coverage compared to married heterosexual women.

Nanoparticles in Common Household Items Cause Genetic Damage in Mice

TITANIUM DIOXIDE (TIO2) NANOPARTICLES, found in everything from cosmetics and sunscreen to paint and vitamins, cause systemic genetic damage in mice, according to a comprehensive study conducted by researchers at UCLA’s Jonsson Comprehensive Cancer Center and School of Public Health.

The TiO2 nanoparticles induced single- and double-strand DNA breaks and also caused chromosomal damage as well as inflammation, all of which increase the risk for cancer. The study, published in the journal *Cancer Research*, was the first to show that the nanoparticles had such an effect, according to Dr. Robert Schiestl, a Jonsson Cancer Center scientist and professor in the School of Public Health, who was the study’s senior author.

Once in the system, the TiO2 nanoparticles accumulate in different organs because the body has no way to eliminate them. And because they are so small, they can go everywhere in the body, even through cells, and may interfere with sub-cellular mechanisms, Schiestl’s team noted.

In the past, these TiO2 nanoparticles have been considered non-toxic in that they do not incite a chemical reaction. Instead, it is surface interactions that the nanoparticles have within their environment – in this case, inside a mouse – that is causing the genetic damage, Schiestl says. They wander throughout the body causing oxidative stress, which can lead to cell death.

It is a novel mechanism of toxicity, a physicochemical reaction, that these particles cause in comparison to regular chemical toxins, which are the usual subjects of toxicological research. “The novel principle is that titanium by itself is

chemically inert," Schiestl explains. "However, when the particles become progressively smaller, their surface, in turn, becomes progressively bigger and in the interaction of this surface with the environment, oxidative stress is induced. Given the growing use of these nanoparticles, these findings raise concern about potential health hazards associated with exposure."

The manufacture of TiO_2 nanoparticles is a huge industry, Schiestl notes, with production at about 2 million tons per year. In addition to paint, cosmetics, sunscreen and vitamins, the nanoparticles can be found in toothpaste, food colorants, nutritional supplements and hundreds of other personal care products.

"It could be that a certain portion of spontaneous cancers are due to this exposure," Schiestl says. "And some people could be more sensitive to nanoparticle exposure than others. I believe the toxicity of these nanoparticles has not been studied enough."

Only 61 percent of home kitchens received scores that would give them an A or B grade, compared to 98 percent of L.A. County restaurants. Twenty-five percent received a C, and 14 percent scored lower than the 70 percent required for a passing grade.

Many Home Kitchens Not Making the Food-Safety Grade

MOST PEOPLE ASSUME that when they are experiencing food poisoning the culprit is something they ate outside their home. But a study co-authored by a UCLA School of Public Health faculty member in his role as director of the Los Angeles County Department of Public Health suggests that home kitchens are more prone to causing foodborne infections than most people realize.

Publishing in the *Morbidity and Mortality Weekly Report* of the Centers for Disease Control and Prevention, Dr. Jonathan Fielding and colleagues detailed findings from a study of approximately 13,000 Los Angeles County adults who voluntarily completed an online quiz on their home food-handling and preparation practices. Based on a scoring system adapted from that used for restaurant grading in the county, only 61 percent of home kitchens received scores that would give them an A or B grade, compared to 98 percent of L.A. County restaurants. Twenty-five percent received a C, and 14 percent scored lower than the 70 percent required for a passing grade. "If they got below a C, I'm not sure I'd like them inviting me to dinner," Fielding says.

From 1999 to 2007, foodborne diseases caused a reported 2,590 hospitalizations and 17 deaths in Los Angeles County – numbers that are considered underestimates given that not all foodborne illnesses leading to hospitalization or death are confirmed by laboratory testing.

In 1998, under Fielding's leadership, Los Angeles County established numeric scores for restaurant inspections and posted grades for these inspections publicly. The initiative was credited with helping to reduce the number of hospitalizations for foodborne infections by 13 percent in the first year. In 2006 the county launched the voluntary Home Kitchen Self-Inspection Program, which includes a quiz aiming to provide feedback and education that will promote safer food hygiene practices at home. The quiz emphasizes such food handling practices as the need to clean and sanitize cutting boards after handling poultry, the safe handling of raw eggs, and appropriate methods for the refrigeration of cooked and uncooked foods.

Fielding's group noted that the results of the quiz can't be used to directly compare conditions in homes with those of restaurants, since they are based on self-reports rather than inspections by trained food safety professionals. But given the likelihood that people more interested and conscientious about food

safety were more apt to take the quiz, the results probably understate the problem. “The findings in this report show that even among interested and motivated persons, food handling and preparation deficiencies occur frequently in the home setting,” Fielding and colleagues wrote.

Centralized Health Care More Cost-Effective, Offers Better Access to Preventive Services

FAMILIES FROM RURAL MEXICO who receive health care from centralized clinics run by the federal government pay up to 30 percent less in out-of-pocket expenses and utilize preventive services more often than families who access decentralized clinics run by states, according to a study by researchers at the UCLA School of Public Health. The findings were published in the September issue of the *Journal of Social Science and Medicine*.

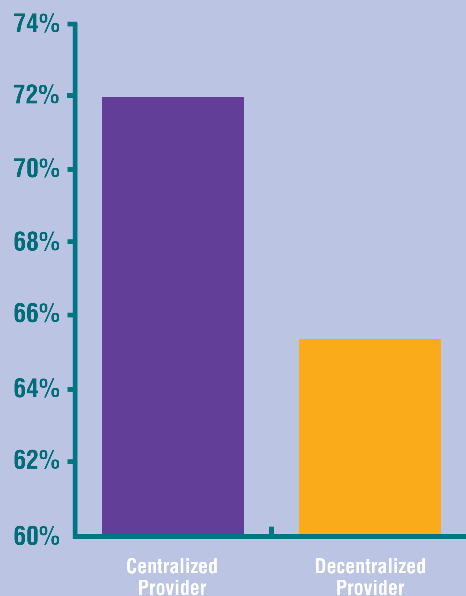
The findings, drawn from a comprehensive survey of 8,889 rural families from seven Mexican states conducted in 2003 by *Oportunidades*, Mexico's principal anti-poverty program, contradict the widely perceived notion that decentralized systems are superior, since local knowledge and resources can be more effectively used to address local needs.

Since the 1990s, centralized and decentralized health care services have co-existed in 17 Mexican states without competing against one another. Because centralized and decentralized organizations rarely operate within the same country during the same time period or cater to comparable populations, Mexico’s health care system provides a rare opportunity to compare the two approaches side by side.

In the study, households serviced by decentralized providers reported higher out-of-pocket health expenditures and lower utilization of preventive services, spending almost 40 percent more out of pocket and utilizing preventive care 7 percent less than households serviced by centralized providers. The households studied showed no differences in terms of age, years of schooling, family size, insurance status, employment, need and most community infrastructure measures.

“The Mexican experience can be useful to other developing countries in Latin America (e.g., Chile or Brazil) and other areas of the developing world (e.g., China, Iran, Turkey) where centralized governments have considered decentralization as a policy mechanism to reform their national health systems," says Dr. Arturo Vargas-Bustamante, the study’s lead investigator and an assistant professor of health services at the UCLA School of Public Health.

Preventive Health Care Utilization by Type of Health Care Provider in Mexico



Vargas-Bustamante suggests that the centralized providers have four attributes that may give them an advantage:

Type of Service. Because the types of services provided to rural populations do not require a high degree of specialization and are relatively homogeneous and less sensitive to local taste and variation, centralized providers may be able offer these services more efficiently.

Quality of Care. Centralized providers have more public resources to provide better services and employ more incentives and monitoring to improve the quality of care.

Experience. In the three decades since decentralization began in Mexico centralized providers may have resolved functional issues that decentralized providers may still be tackling.

Local Capacity. Even if local authorities are closer to their communities and are more familiar with their characteristics and limitations, they still need managerial skills to provide health services that require some level of expertise.