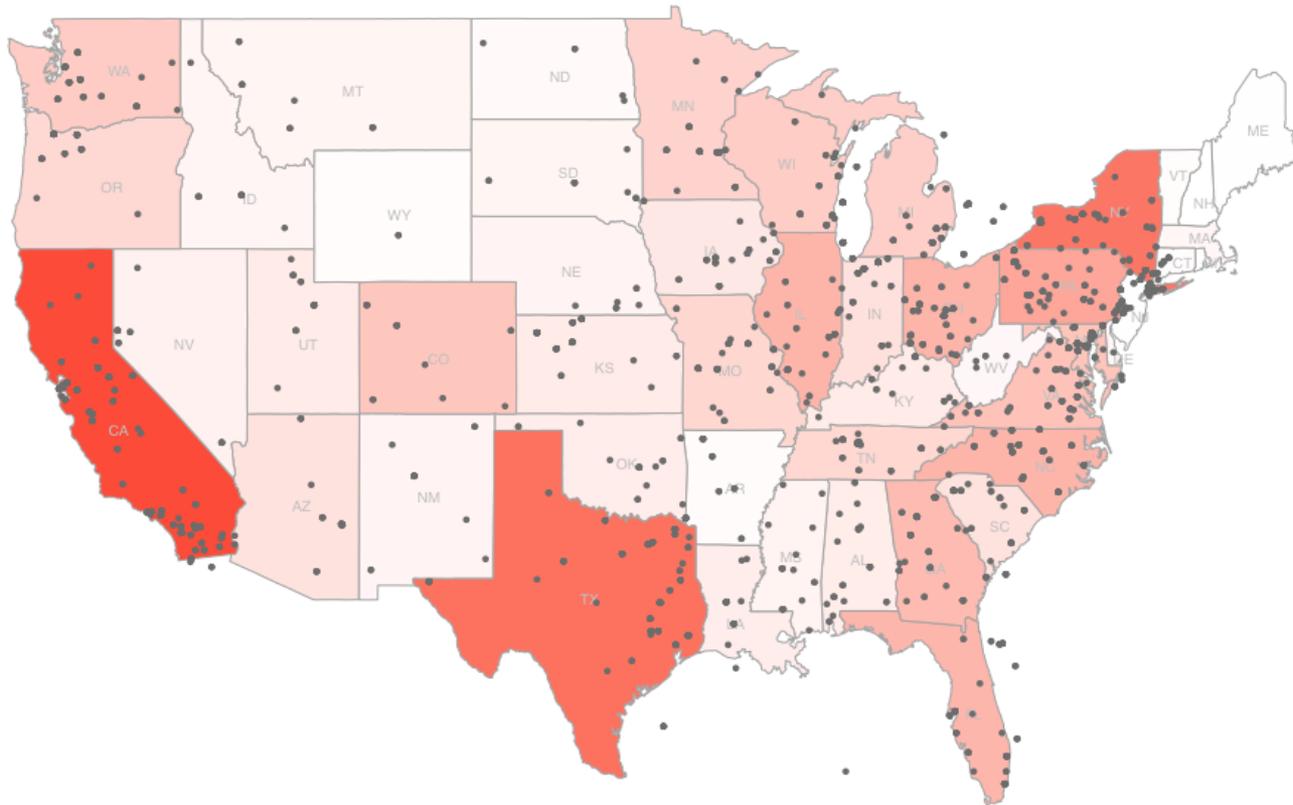


Communities of Interest

PEPH Meeting March 7 & 8

UCSF Program on Reproductive Health and the Environment



Engaging clinicians

43

Chemicals found in Virtually Every
Pregnant Woman in the US



Attitudes and Knowledge

“It is hard to open up a discussion if you do not have good information to give back - it is a disservice to the patient and a [waste] of [precious] time.”

“I can’t even figure out how to buy [chemical free products] for myself much less to recommend to [my] patients.”

What UCSF is doing

CLINICAL OPINION

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OBSTETRICS

Toxic environmental chemicals: the role of reproductive health professionals in preventing harmful exposures

Q to Patrice Sutton, MPH, Tracey J. Woodruff, PhD, MPH, Joanne Perron, MD, Naomi Stotland, MD, and Joanne A. Conry, MD, PhD, Mark D. Miller, MD, MPH, Linda C. Giudice, MD, PhD

Among the US population, current indicators of reproductive adversity include a decline in the age of the onset of puberty,¹ declines in fertility and fecundity,^{2,3} increased rates of poor birth outcomes (such as babies born prematurely^{4,5}), increased rates of small for gestational age infants,⁶ increased rates of certain birth defects,⁷ and increased rates of childhood diseases (such as autism,⁸ certain types of cancer,⁹ and obesity¹⁰), and declines in life expectancy (some communities have life expectancies already well behind those of the best-performing nations¹¹). Because these and other barometers of reproductive health and capacity have changed at a relatively rapid pace, they are unlikely to be explained by changes in genetic makeup.¹² Thus, we need to turn our attention to other factors that include the environment as possible contributors to these trends.

From the Program on Reproductive Health and the Environment (Drs Woodruff and Perron) and Ms Sutton), the Department of Obstetrics, Gynecology and Reproductive Sciences (Drs Stotland and Giudice), the Pediatric Environmental Health Specialty Unit (Dr Miller), University of California, San Francisco, CA, and the Department of Obstetrics and Gynecology, North Valley Kaiser Permanente, Ukiahville, CA (Dr Conry).

Received June 30, 2011; revised Jan. 24, 2012; accepted Jan. 24, 2012.

Supported by New York Community Trust, the National Institute for Environmental Health Sciences (NIH; ES018136), and the Environmental Protection Agency (EPA STAR; RC53457801).

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0002-0316/12/00

© 2012 Published by Mosby, Inc. doi: 10.1016/j.ajog.2012.01.034

Every pregnant woman in the United States is exposed to many and varied environmental chemicals. Rapidly accumulating scientific evidence documents that widespread exposure to environmental chemicals at levels that are encountered in daily life can impact reproductive and developmental health adversely. Preconception and prenatal exposure to environmental chemicals are of particular importance because they may have a profound and lasting impact on health across the life course. Thus, prevention of developmental exposures to environmental chemicals would benefit greatly from the active participation of reproductive health professionals in clinical and policy arenas.

Key words: environmental chemical, reproductive environmental health, toxic chemical

The environmental contributors to reproductive health begin *in utero* and include the social, physical, and nutritional environment and physical and chemical agents. Each of these factors interacts with the others and with intrinsic biologic factors (such as age, sex, and genes) to influence individual and population health outcomes.^{13,14} For example, environmental pollution interacts with stress to the detriment of long-term health¹⁵⁻¹⁷; the effects of exposure to toxic chemicals can be exacerbated or mitigated by nutritional status,¹⁸⁻²⁰ and exposure to toxic chemicals and good nutrition is influenced by social and other environmental factors such as injustice, poverty, neighborhood, and housing.^{19,21}

Disparities in these environmental contributors are of major health consequence.²²⁻²⁸ Many communities with the highest exposures also lack access to medical care, good educational opportunities, good nutrition, employment, and other factors that may help to mitigate related impacts. Thus, the effect of a low-dose exposure to an environmental chemical may be quite different, depending on the population's degree of exposure to other environmental contaminants and underlying health status (Figure 1).²⁹

Within the field of obstetrics and gynecology, preconception and prenatal exposure to environmental chemicals (which is defined in this article as includ-

ing synthetic chemicals and metals) is a key area of inquiry because (1) exposure to many and varied toxic chemicals among pregnant women in the United States is now the norm (Figure 2),³⁰ (2) developmental exposure to certain environmental chemicals is linked to a myriad of health consequences that can manifest across the lifetime of individuals and potentially be transmitted to the next generation (Table),³¹ and (3) exposure to environmental chemicals can be mitigated and prevented. This article provides a brief overview of this new science that is relevant to practicing obstetricians, gynecologists, and other reproductive health professionals and outlines opportunities for the prevention of harm and associated costs in clinical and policy venues.

Exposure to environmental chemicals among pregnant women

In the past 70 years, there has been a dramatic increase in human exposure to both natural and synthetic chemicals. Over this period, US chemical production and use has increased over 16-fold.³² Today, >80,000 chemical substances are listed by the US Environmental Protection Agency (EPA) as manufactured or processed in the United States or imported into the country,^{33,34} but this is probably an overestimate of the number of chemicals currently in commercial use. Approximately 3000-

BRIDGING CLINICAL & ENVIRONMENTAL HEALTH

By Tracey J. Woodruff, Patrice Sutton, and The Navigation Guide Work Group

An Evidence-Based Medicine Methodology To Bridge The Gap Between Clinical And Environmental Health Sciences

ABSTRACT Physicians and other clinicians could help educate patients about hazardous environmental exposures, especially to substances that could affect their reproductive health. But the relevant scientific evidence is voluminous, of variable quality, and largely unfamiliar to health professionals caring for people of childbearing age. To bridge this gap between clinical and environmental health, we created a methodology to help evaluate the quality of evidence and to support evidence-based decision making by clinicians and patients. The methodology can also support professional societies, health care organizations, government agencies, and others in developing prevention-oriented guidelines for use in clinical and policy settings.

DOI: 10.1377/hlthaff.2010.1219
HEALTH AFFAIRS 30,
NO. 5 (2011): 931-937
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The People-to-People Health Foundation, Inc.

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The Navigation Guide Work Group is recognized in an acknowledgment at the end of the article.

Widespread exposure to environmental chemicals at levels encountered in daily life can affect reproductive and developmental health adversely.³⁵ Studies have demonstrated that the levels of chemicals to which an average person is exposed can prevent genes from functioning normally and interfere with the hormonal regulation critical to healthy reproduction.³⁴

For example, environmental chemicals such as polybrominated diphenyl ethers (PBDEs) from flame retardants in furniture and computers,³⁶ and persistent organochlorine pesticides such as DDT³⁷ share the ability to alter the endocrine, neurological, and other biological systems. Virtually everyone in the United States is constantly exposed to these and many other toxic chemicals found in homes, communities, and workplaces.³⁴

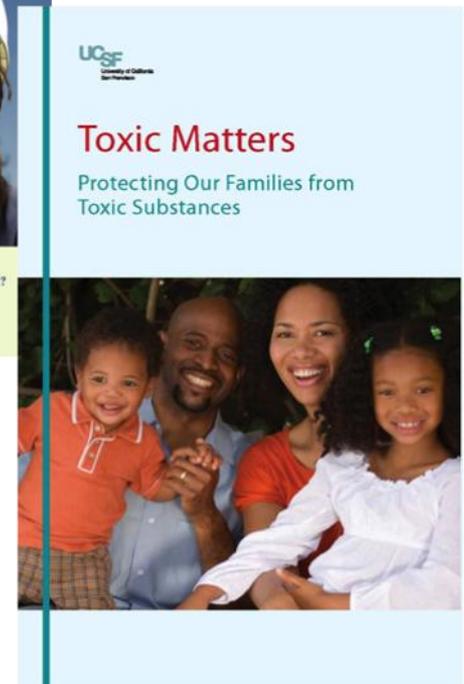
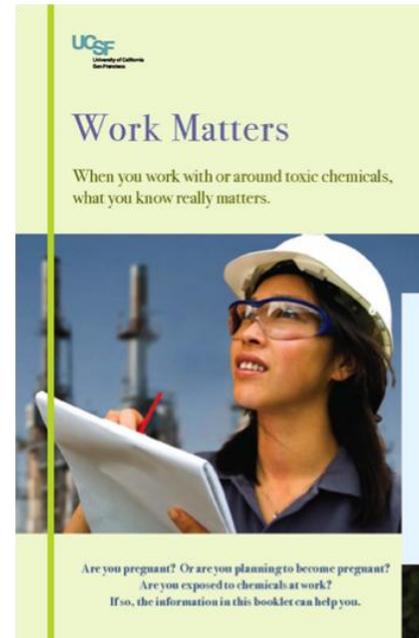
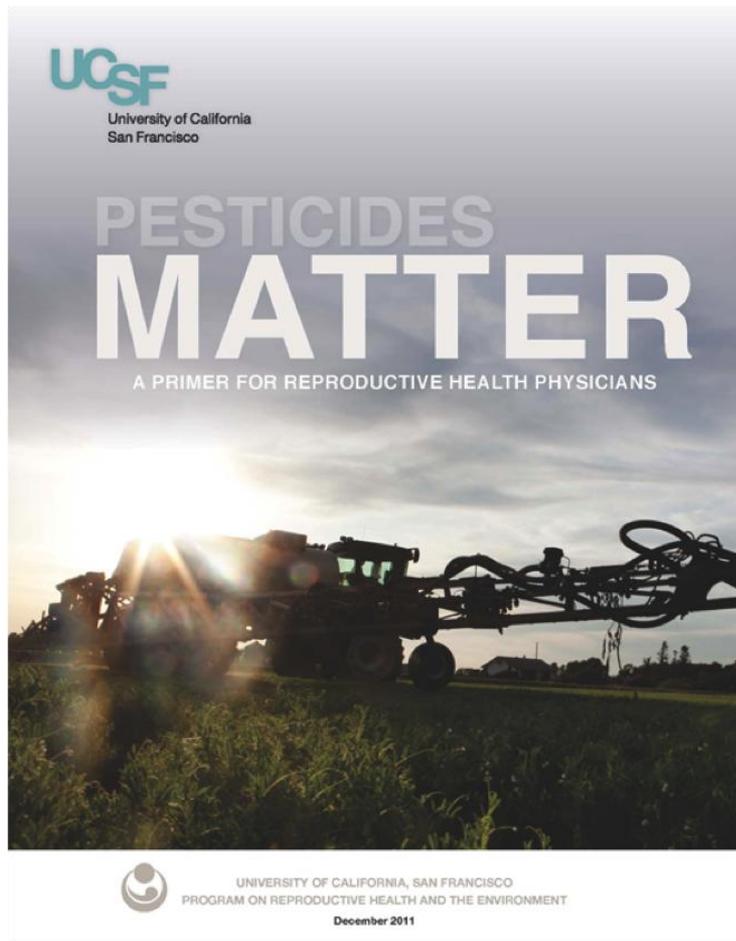
Exposures to ambient levels of environmental chemicals during critical periods of growth and development—in utero and during infancy, childhood, and adolescence—are of particular concern because they can have a profound and lasting effect on health.³⁸⁻⁴⁰ Virtually all pregnant

women in the United States have detectable levels of all of the following environmental chemicals in their bodies: lead, mercury, toluene, perchlorate, bisphenol A (BPA), and some phthalates, pesticides, perfluorochlorinated (PFCS), polychlorinated biphenyls (PCBs), and PBDEs.

Studies have documented that each of these chemicals can be harmful to human reproduction or development, or both. Many of these chemicals in pregnant women are at levels associated with adverse health outcomes in human studies.⁴¹ The reproductive and other potential health impacts of daily and simultaneous exposure to environmental chemicals has not been studied. This shortcoming is recognized by the National Academies to be a gap in current scientific methodologies that inform public policy.⁴²

Based on their expert assessment of the strength of the existing science, leading scientists and reproductive and other health care professionals recommend timely action to prevent harm.^{42,43} The evidence of harm for some chemicals is also strong enough to warrant regulatory action to reduce or prevent exposure, albeit after the chemicals have been allowed to enter the market, the environment, and people.⁴² The

What UCSF is doing



Beyond the clinic

- AMA
- APHA
- Endocrine Society
- CA Medical Association
- ACOG
- American Nurses association
- American Academy of Pediatrics
- American Dietetic Association
- Kaiser Permanente

Questions for Discussion:

- What communities or networks of interests have you identified or worked with?
- How do we identify these communities of interest?
- What are the information needs of these communities of interest? How have you assessed them? What are the similarities and differences?
- How can we design research translation strategies with them?
- Have you adopted strategies that have been successful? What makes a successful strategy?
- How do we contribute to development of cohesive proposals to improve public health within such contexts?
- Are there communities or networks of interest that we should reach out to and engage? Which ones and why?