

Title: Environmental Contaminants and Reproductive Bodies: Provider Perspectives on Risk,
Gender, and Responsibility*

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Environmental Contaminants and Reproductive Bodies: Provider Perspectives on Risk, Gender, and Responsibility

ABSTRACT

Increasingly, leading health organizations recommend that women who are pregnant or considering pregnancy avoid certain toxic chemicals found in our products, homes, and communities in order to protect fetuses from developmental and future harm. In the contemporary United States, women's maternal bodies have been treated as sites of exceptional risk and individual responsibility. Many studies have examined this phenomenon through the lens of lifestyle behaviors like smoking, drinking, and exercise. However, we know little about how environmental hazards fit into the dominant framework of gendered, individual responsibility for risk regulation. I draw on in-depth interviews with 19 reproductive health care providers in the United States to explore how they think about their patients' exposure to environmental contaminants and sometimes subvert this gendered, individualized responsibility and adopt more collective frames for understanding risk.

Research in the past decade suggests exposure to certain toxic chemicals found in our products, homes, and communities can disrupt the endocrine system and cause long-term reproductive health consequences (Caserta et al. 2011). Although findings vary, some environmental contaminants have been linked to low birth weight, preterm delivery, infertility, and developmental impairments to the fetus that can manifest during childhood and later in life (ACOG, ASRM, and PRHE 2013; Caserta et al. 2011; Grandjean et al. 2007). The National Health and Nutritional Examination Survey, which contains nationally representative biomonitoring data, shows that chemicals banned nearly forty years ago in the United States are still detectable in the blood and urine of the majority of women of childbearing age (Axelrad, Goodman, and Woodruff 2009). In light of worrisome findings, the National Cancer Institute vividly warned that babies are "being born pre-polluted" (Reuben 2010:vii) and an increasing number of health organizations encourage women who are pregnant or considering pregnancy to take extra precautions against environmental contaminants.

In addition to advocating for broader reforms, like heightened governmental regulation of industrial pollution, leading reproductive health organizations call for health care providers to improve counseling of reproductive-age patients on reducing exposure to environmental contaminants, like pesticides, lead, mercury, and bisphenol A (BPA) (ACOG et al. 2013; Di Renzo et al. 2015). Members of University of California – San Francisco's Program on Reproductive Health and the Environment suggest that "obstetricians and gynecologists are poised uniquely to intervene in critical stages of human development (i.e., preconception and during pregnancy) to prevent harm" (Sutton et al. 2012:168). They recommend that, in addition to standard counseling about alcohol and smoking, "clinicians should provide anticipatory guidance to all patients with information about how to avoid toxic exposures at home, in the

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community, and at work" (Sutton et al. 2012:168). A publication in the *American Journal of Obstetrics and Gynecology* provides resources on how to counsel preconception and prenatal patients about environmental exposures and highlights the role reproductive health professionals play in "empower[ing] their patients to make positive decisions to reduce exposure and to prevent adverse health impacts to both mother and fetus" (Sathyanarayana et al. 2012:463). The American College of Obstetricians and Gynecologists urges clinicians to take a patient's "environmental history" during preconception visits to assess potential sources of exposure during fetal development and provide guidance to patients on reducing body burdens and avoiding further contamination (ACOG et al. 2013).

Specific recommendations clinicians can give patients include choosing fresh and organic instead of processed and conventional foods, monitoring fish consumption to avoid high levels of mercury, selecting safe containers for food and beverage storage, using non-toxic household and beauty products, testing one's home for lead, refraining from pesticide use in one's home and yard, and learning about exposures and protective measures at work (ACOG et al. 2013; ARHP 2010; Sathyanarayana et al. 2012). These professional guidelines position exposure before and during pregnancy as significant hazards that can be addressed by patients and health care providers. Although some guidelines address men's reproductive health, recommendations are directed primarily towards women. Clinical counseling is designed for preconception and prenatal visits, which are attended predominantly by female patients.

Environmental health social movements have long pressed for medical and scientific communities to acknowledge how environmental pollution impacts health (Brown et al. 2006). Professional reproductive health organizations reflect this call, communicating that structural actions are necessary in addition to individual measures. Recently, the International Federation

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of Obstetrics and Gynecology called on health care providers around the world to advocate stronger policies to prevent toxic exposure and create healthier food systems (Di Renzo et al. 2015). The authors of an article published in *Fertility and Sterility* advocate better regulation at local, state, and national levels, more scientific research to inform policy, and community activism around environmental and reproductive justice. They note that women can take some individual preventative actions, but "placing the responsibility on women to avoid everyday toxins [...] is not an effective strategy for protecting reproductive health" (Woodruff et al. 2008:e14). Similarly, a report by three leading reproductive health organizations states, "Because individuals alone can do little about exposure to toxic environmental agents, the authoritative voice of health care professionals in policy arenas is critical to translating emerging scientific findings into prevention-oriented action on a large-scale" (ACOG et al. 2013:1).

These recommendations are optimistic about providers' and patients' ability to enact meaningful harm reduction, but explicit that these individual behaviors are only effective in the context of large-scale action to reduce the levels of toxic agents in the environment. In the absence of larger reforms, it is unclear the extent to which individual protective behaviors can effectively protect reproductive health and fetal development. As Brown and Kelley (1996) note, when we look to medical providers to intervene in environmental disease, we implicitly ask them to step beyond the traditional boundaries of medical practice and into the realm of public health. Organizations like the American College of Obstetricians and Gynecologists and others ask medical providers to do just that when they emphasize the limits of individual action (ACOG et al. 2013). Other advocacy organizations like Physicians for Social Responsibility have long campaigned for doctors to take a more active role in environmental health and illness, both through direct provision of care and through broader actions to change environmental policy

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(Brown and Kelley 1996; PSR 2015).

A significant body of research documents that health care providers generally believe environmental hazards impact health, but few report feeling competent to address environmental health issues (see Massaquoi and Edwards 2015 for a review). Two studies focusing on prenatal care echo these results, finding that providers are uncertain about counseling pregnant patients on environmental exposures and desire more training (Sharma, Hodgson, and Nisker 2014; Stotland et al. 2014). One survey of obstetricians found the majority believed that their counseling could help reduce patients' exposures to environmental health hazards, but fewer than 10 percent had any formal training on the topic (Stotland et al. 2014). However, studies have not yet analyzed how providers think about contaminants as a threat to maternal bodies more generally or how providers treat these issues when they do arise in clinical interactions.

We know that women's behaviors are subject to intense scrutiny during pregnancy. However, environmental contaminants are difficult to pinpoint and avoid in everyday life. Professional guidelines ask health care providers to counsel their pregnant and preconception patients on reducing the risk of contamination, but also characterize avoidance as impossible without structural changes to decrease contamination in the wider environment. Moreover, in rare instances where scientific research has considered *men's* contributions to reproduction, it focuses on environmental contaminants encountered at work or in warfare, and frames these exposures as involuntary (Daniels 2006). In this research, I consider the multiple, sometimes conflicting messages about environmental contamination and reproduction and ask: Do health care providers frame environmental risks as an individual responsibility, similar to smoking, drinking, and nutrition? If so, does this responsibility fall on women alone or include men as well? Or do providers see structural causes and collective solutions to environmental threats to

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reproductive health?

BACKGROUND

Environmental Hazards and Individual Reproductive Responsibility

Most environmental threats to health are inherently collective. Intensified production and consumption have resulted in the proliferation of synthetic chemicals that are present in air, water, and soil and move through bodies and across borders (Murphy 2008). Though the majority of contaminants enter the environment through industrial and commercial sources (NOAA 2014), science, medicine, media, and public discourses often focus on individual-level protective actions to shield oneself and one's family from environmental hazards (MacKendrick 2010; Szasz 2007). These typically emphasize personal health through lifestyle changes and "precautionary consumption" – the selection of safe, non-toxic foods and products (MacKendrick 2010).

Framing lifestyle modifications and precautionary consumption as the solutions to environmental health hazards is part of a larger trend in medicine. The dominant medical paradigm in Western, neoliberal societies treats health as an individual problem and responsibility (Cranshaw 2012; Petersen and Lupton 1996; Rose 2007). Health promotion focuses predominantly on the modification of personal "lifestyle behaviors" (Minkler 1999). Environmental scientists have recently extended their focus from the impacts of government regulatory action to include risks that stem from individual bodies (Shostak 2010; 2013). Molecular biomarker technologies, which can detect levels of individual exposure and genetic susceptibility to toxic substances, enable an ethos of individual moral responsibility to maximize personal health and avoid exposures (Shostak 2010; see also Altman et al. 2008). This focus can also obscure the social, economic, and political factors that shape environmental health (Shostak

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2013). Simultaneously, environmental scientists have broadened the definition of "environment" beyond involuntary exposure to include lifestyle choices and other "voluntary" factors like diet, physical activity, and use of addictive substances (Shostak 2013). Although environmental exposure is often beyond personal control, we increasingly imagine that its effects can be combated on an individual level (MacKendrick and Stevens 2016).

Emerging advice about avoiding environmental exposure before and during pregnancy concerns more than the individual – it also concerns potential fetuses, offspring, and future generations. Maternal-fetal relationships, where the woman's body is seen as the barrier between the fetus and the larger environment, complicate and magnify the individualization of health (Kukla 2010; Mansfield 2012; Markens, Browner, and Press 1997). Unlike male bodies, which are envisioned as unified and seamless, women's bodies carry cultural meanings as having the power to both protect and corrupt future life and the womb is believed to have "little resistance against outside forces and eminently crossable boundaries" (Kukla 2005:6). Because of their perceived vulnerability, women's behaviors undergo intense scrutiny when they are pregnant (Kukla 2005; Lupton 2012) and parenting (MacKendrick 2014; Wolf 2007). The failure to avoid risks completely is viewed as a personal shortcoming and indication of poor parenting (Armstrong 2003; Keenan and Stapleton 2010).

Scientific research increasingly focuses on maternal-fetal epigenetics, which centers exposures in the "fetal environment" as important predictors of health later in life and in future generations. Social science examinations of this burgeoning field highlight how epigenetics positions maternal bodies as the primary vector to transmit harm over generations. Therefore, maternal bodies become primary targets of intervention (Mansfield and Guthman 2015; Richardson 2015). As reproductive health experts expand their focus to include the importance

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of "preconception health," women's actions before pregnancy are increasingly scrutinized as well (Waggoner 2013). About half of pregnancies in the United States are unintended (Finer and Zolna 2014), making a specific preconception period difficult to define in many cases. Therefore, the U.S. Centers for Disease Control and Prevention recommends that all women of reproductive age, even if they do not plan to get pregnant, take folic acid, avoid tobacco, drugs, and excessive amounts of alcohol, and avoid toxic chemicals in the workplace and at home to protect reproductive health and be prepared for a possible future pregnancy (CDC 2015). These recommendations extend maternal responsibilities to all women, regardless of whether they will become mothers or not.

Social scientists have examined the intense regulation of women's smoking (Oaks 2000), drinking (Armstrong 2003), drug use (Harris and Paltrow 2003; Roberts 1997), exercise (Nash 2011), and nutrition (Keenan and Stapleton 2010; Markens et al. 1997) before and during pregnancy. Many point out how public health recommendations and media representations draw heavily on moralized notions of femininity and "good motherhood" (Bell, McNaughton, and Salmon 2009). One result of this intense regulation is the arrest and incarceration of women for their behaviors during pregnancy. Most cases involve prosecution of pregnant women who use illegal drugs, but women have also been arrested for using alcohol, failing to obtain prenatal care, having a "suspicious" pregnancy loss, and withholding consent for medical interventions (Paltrow and Flavin 2013). The criminalization of pregnancy disproportionately impacts marginalized women: nearly three-quarters of women involved are poor and over half are women of color (Paltrow and Flavin 2013; see also Roberts 1997). These punitive responses demonstrate that the expectation of risk-avoidance during pregnancy is more than a cultural norm; it is a standard that can be enforced with legal action.

We know little about whether environmental contaminants are treated like other lifestyle behaviors during pregnancy, ie. as a risk to be managed by individual women. A small group of studies analyzing public health campaigns around environmental hazards during pregnancy suggest that contaminants fit easily into the framework of maternal risk avoidance. While mercury accumulates in seafood as a result of industrial pollution, Mansfield illustrates how public health campaigns position "pregnant women as the threshold – the narrow margin – between the contaminated environment and the fetus" and by making "safe choices," women ensure health both for their child and for the general population (2012:971). Similarly, Kukla shows how reproductive risk warnings in California, posted by businesses to notify pregnant women of the presence of chemicals on site that could cause reproductive harm, "locate responsibility for foetal risk management in pregnant 'consumers'...rather than on those responsible for creating safe public spaces" (2010:323). In both examples, pregnant women are singled out with the responsibility to protect future children from toxins that compound in the broader environment.

In biological and social sciences, an overwhelming amount of research on reproduction focuses on women (Daniels 2006, 1997; Inhorn et al. 2009; van Kammen and Oudshoorn 2002). Scientific research and popular discourse draws direct links between women's health and behaviors and reproductive outcomes, especially fetal health. Researchers have paid scant attention to men, partly because of cultural ideas about gender and reproduction. Daniels formulates the term "reproductive masculinity" to describe how men are treated as: 1) secondary in biological reproduction; 2) less vulnerable to reproductive harm; 3) virile; and 4) distant from the health problems of the children they father (2006:6-7). Although male-factor infertility has received some attention, researchers are hesitant to draw links between men's health and the

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quality of their offspring's health. Instead, men's reproduction tends to be positioned as all-or-nothing: if harm occurs, men can be rendered infertile; otherwise, they will contribute healthy sperm to a pregnancy (Daniels 2006). Moreover, research linking paternal exposures before conception to fetal health emphasizes uncertainty and inconclusiveness of studies as a way to avoid stigmatizing and condemning the behaviors of men (Daniels 1997). In contrast, although studies linking light or moderate alcohol use to prenatal outcomes are uncertain at best, health campaigns warn pregnant women that even one alcoholic drink poses a risk to their gestating fetus (Armstrong 2003).

The Case for Understanding Exposure as Involuntary

Daniels notes rare instances where scientific research considers men's contributions in reproduction. Unlike much of the research on women's smoking, alcohol use, nutrition, and other lifestyle behaviors, this research focuses on involuntary exposures, especially environmental contaminants encountered at hazardous workplaces or in chemical warfare (Daniels 2006). As environmental contamination comes into the frame of reproductive health, particularly *women's* reproductive health, it is important to ask: are these exposures still couched as involuntary? Above, I offer evidence suggesting that the framework of gendered, individualized responsibility should extend to environmental contaminants. However, there are reasons to believe this might not be the case.

First, multiple factors make environmental contamination difficult for individuals and health care providers to address. Contaminants are ubiquitous: they are present in air, water, soil, dust, food, and other consumer products (Murphy 2008). Though pervasive, contaminants are invisible in daily life and only made legible through technologies like biomonitoring (Sexton, Needham, and Pirkle 2004). Researchers increasingly question that there are "safe doses" of

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certain chemicals and argue that even low-levels of exposure during critical windows of susceptibility, like gestation and infancy, are harmful (ARHP 2010; Grandjean et al. 2007). Moreover, people are exposed to mixtures of multiple contaminants, making it difficult to pinpoint sources of adverse health impacts (Schwarzman 2008). Identifying, measuring, and intervening in environmental contamination on the individual level is highly uncertain.

Second, although studies have examined the perspectives of health care providers on hazards around reproduction, those that exist are mixed on the extent to which providers internalize and reflect dominant messages about risk, individualization, and maternal bodies. Providers are an important meso-level link between formal knowledge and everyday practice (Markens 2013). One study of perceptions of smoking during pregnancy found that views of health professionals mirrored those of lay non-smokers, believing that "every woman should assume responsibility for the health of her baby-to-be" and those who fail to abstain from smoking are "unhealthy" and "irresponsible" (Oaks 2000:71). Other studies highlight more nuance and resistance in providers' perspectives (Armstrong 2003; Waggoner 2011). Armstrong (2003) found considerable variation in how doctors understand the potential dangers of alcohol consumption during pregnancy: while many moralized the behaviors of mothers who "caused" fetal alcohol syndrome, others were more hesitant to assign blame or pointed to significant structural barriers, like poverty and inadequate nutrition, which exacerbated the effects of the condition. In sum, health care providers sometimes modify or resist dominant ideologies based on their on-the-ground experience interacting with patients.

Finally, environmental justice advocates work to frame contamination as a collective problem that is not only difficult for individuals to avoid, but unequally distributed throughout society. Certain populations, particularly poor communities of color, bear a disproportionate

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share of the negative health and environmental consequences of pollution (Brulle and Pellow 2006). This stems from both the unequal distribution of environmental disadvantages, like the placement of toxic sites in poor, minority neighborhoods (Sze 2007), and the unequal distribution of environmental privileges, like access to healthy food, parks, and green spaces (Pellow and Brehm 2013). Professional medical organizations, like the American College of Obstetricians and Gynecologists, have adopted the language of environmental justice to frame appeals for regulations and reform. One committee opinion, for example, argues underserved women are particularly vulnerable because of the "complex interactions of race, place, and the environment" that lead to more exposure to pollution and environmental disaster and less access to resources to protect their health (ACOG et al. 2013:6). Another relates disparities in access to healthy foods to "food system-related environmental justice" (Sutton et al. 2011:892). Centering environmental justice rebuffs the idea that women can take individual-level protective actions to ensure health and instead highlights how race and class inequalities create significant disparities.

In the next section, I detail the methods for the study. I then turn to my results to demonstrate that while some providers frame avoidance of environmental risks as the responsibility of individual pregnant women, most treat contamination as a broader, involuntary threat that is not easily amenable to individual action. I document the specific ways, like identifying hazardous workplaces or the ubiquity of chemicals in consumer products, that providers broaden the scope of contamination beyond lifestyle behaviors. I also closely compare providers' discussions of men's versus women's exposures to examine how environmental health risks remain gendered.

DATA AND METHODS

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Data come from a broader interview study I conducted with reproductive health care providers (N=19) about their experiences in the clinic, with a focus on how they counsel patients about contraception and reproductive planning (see Stevens 2015). Here, I center on data about if and how providers counsel reproductive-age patients about environmental contaminants. Sampling targeted respondents who worked across practices that accepted 1) private insurance only, 2) Medicaid and private insurance, and 3) uninsured patients, Medicaid, and private insurance.¹ I began recruiting respondents through personal and professional contacts and then used references to gather additional participants. I also recruited at a national conference for nurse practitioners and through an online forum for nurse practitioners in Women's Health. I conducted all interviews in 2013. About half of the interviews were conducted in-person and half by telephone. All except one agreed to have interviews recorded and transcribed.

Respondents included Nurse Practitioners (NPs, DNPs, and PhDs in Nursing), Certified Nurse Midwives (CNMs), and Doctors of Medicine (MDs). I limit my sample to primary care providers who could practice independently and had multiple years of work experience in reproductive health care. The respondents worked across a range of settings, including hospitals, private practices, non-profit and federally-funded clinics, university health centers, and workplace wellness centers. Many simultaneously held positions at academic institutions. As Table 1 shows, providers were mostly white, female, and Nurse Practitioners. Eighteen respondents lived and worked in the northeastern, mid-western, southern, or western United States. One lived abroad, but her most recent clinical experience was domestic.

[Table 1 about here]

Interviews were semi-structured, open-ended, and covered a range of topics, including

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birth control, abortion, preconception care, pregnancy, and infertility. I introduced conversations about environmental health hazards in the context of if and how providers counsel patients on preconception care. I asked: "Do you ever talk to patients who are thinking about planning a pregnancy about exposure to environmental contaminants like lead, mercury, or plastic?" I followed this question with probes about whether patients ever initiated these discussions and what types of advice providers gave. Although I brought up this topic under the subject of preconception care, providers frequently talked about how they counsel patients who are *already* pregnant. (For instance, at my mention of mercury, some described their recommendations for pregnant women to limit fish consumption). Therefore, I combine these two categories – preconception and prenatal counseling– in this paper. For this analysis, women planning a pregnancy and those already pregnant are theoretically similar in their roles as "potential" or "future" mothers (Waggoner 2013).

I transcribed interviews and coded them using QSR NVivo computer software. I used "thematic analysis" to guide this research (Braun and Clarke 2006). I began analyzing interviews with environmental contaminants as one of the sensitizing concepts to explore. The themes of gendered, individualized risk versus collective responsibility arose through this inductive approach to data analysis.

RESULTS

My analysis begins with the minority of providers who fit environmental risks seamlessly into existing frameworks for thinking about the maternal body. They either view the responsibility to avoid contaminants as similar to the responsibility to avoid other risks during pregnancy or view lifestyle behaviors like smoking and drinking *as* the primary environmental hazards. In contrast, discussions of men's exposure to environmental contaminants typically

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adopt the lens of involuntary exposure, which could cause infertility, rather than fetal damage (see Daniels 2006). I was not expecting providers to discuss men to the extent they did, because their patients are predominantly female and because larger discourses about risk in reproduction focus on women. Providers' introduction of men into conversations about environmental contaminants indicates they are thinking, at least to some extent, about male contributions to reproduction. It also lends analytic leverage to parse out if and how discourses about reproductive risk are gendered.

Yet, I found that most frame environmental contamination as mostly or wholly involuntary. First, providers highlighted female-dominated, but hazardous jobs where, like dangerous, male-dominated occupations, exposure is difficult to avoid. Second, although providers infrequently address class directly, a number identify barriers, like the inability to leave one's job or move to less-toxic neighborhoods, that echo the broader critiques of environmental justice advocates. Finally, some providers conceptualize contamination as coming from ubiquitous sources that are simply not subject to individual intervention. When providers frame environmental exposure as involuntary, gendered hazards may remain salient (ie. maternal bodies are vulnerable and in need of protection), but the gendered *responsibility* to avoid those hazards disappears.

Environmental Risk Avoidance as Gendered and Individualized

Some providers fit environmental contaminants into traditionally gendered and individualized frameworks, where women are personally responsible for exposures, while men's exposures are largely involuntary.

This provider places responsibility for fetal health squarely on mothers, saying:

The very first thing I learned in my maternal-child nursing course is, 'No one's gonna ever like hearing this, but the woman's body is a house for the baby and

requires a lifetime of work to have a good house.' And [the teacher] was absolutely, a hundred percent correct. We have women in society who are just piss-poor gestational carriers and they should not have children. (Nurse Midwife 1)

When I ask specifically about environmental exposures, she responds:

R [Respondent]: Yeah...my patients are more exposed to drugs.

I [Interviewer]: *Oh, okay [...]so those kinds of contaminants.*

R: We don't live on the seashore where we have a lot of people who are fishing and eating fish. I mean, this is an urban population [...] [so] there's city water [...], but the REAL environmental exposures are what the woman does with her everyday life, which is bad nutrition and exposure to drugs. Either alcohol, IV drugs of any type, cocaine, heroin, marijuana [...] (Nurse Midwife 1)

This provider focuses on whether women have prepared their bodies to be "good houses" to babies. Such a perspective leaves little room to consider collective threats to maternal health and when broader threats exist, they are limited to specific at-risk groups, like seaside and rural populations. According to this provider, the "real" exposures are the things that women do to themselves in their day-to-day lives. Cigarettes, drugs, and alcohol constitute a handful among many sources of chemical exposure, but this provider attributes the entire scope of contamination to these substances. Those who fail to implement healthy lifestyle behaviors are "piss-poor gestational carriers" – their bodies become hazardous containers that threaten fetal health – and for this reason, the provider believes these women "should not have children."

In contrast, providers tend to discuss men in the context of widespread, involuntary exposures. This provider mentions workplaces as important sites of toxic exposures:

If they had exposure to these toxic chemicals, first of all, you don't see that today. [...] Today you have OSHA [the U.S. Department of Labor's Occupational Health and Safety Administration] that comes in and if there's any toxic exposure - you see more men exposed to toxic chemicals than you see women exposed to toxic chemicals. In the environment, you've got exposure from fumes from gasoline and that kind of stuff or if you're living in a city with high pollution, like Los Angeles. (Nurse Practitioner 2)

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She writes off workplace exposure as insignificant, because she believes 1) it affects men more than women and 2) regulatory organizations like OSHA effectively manage workplace hazards.² However, she does mention one pervasive source of exposure - air pollution in cities. When I ask what types of advice she gives to her mostly female patients, she responds:

Oh, well one thing that I failed to mention, first thing is to avoid smoke. I do smoking cessation counseling and give them resources for that. Number two, avoid smoke if you work in an environment where there's smokers - you need to not even go outside with them while they're having their cigarette. Avoid those areas where the smokers are. Find a different door to go in. (Nurse Practitioner 2)

In this provider's framing, toxic chemical exposures affect men at work, although she believes this threat is significantly reduced by government regulation. Alternatively, the top priority for women is to avoid smoke, a traditional arena of women's gendered responsibility during pregnancy. Women can achieve this both by quitting smoking and by carefully maneuvering themselves in public spaces to avoid secondhand smoke.

We see a similar juxtaposition of women's and men's contributions to reproduction in the following example. This provider, who specializes in infertility services, talks at length about how some women have trouble getting pregnant because they delay childbearing and have false hopes about conceiving in their forties without an egg donor. She then shifts to hypothesizing about male-factor infertility, which she suspects is impacted by hormones in the water supply and other environmental factors:

R: Male infertility? There are a lot of theories about that. I think a lot of it's environmental. There's even a theory that so many women are on hormone pills, that the estrogen is in the urine and when they urinate, it goes into the septic system and water-treatment plants and they feel that might actually be affecting males. [...] So, I kinda think it's an age-factor in prolonging things for career, but I also think there's a lot of environmental factors and probably things that we don't even KNOW of. I mean, obviously, all the pesticides and all of those things that are meant to alter the reproduction of the bugs! *[laughs]* So that they don't reproduce!

I: It might be affecting our endocrine systems...

R: So, you're not washing your vegetables and you're not washing all this stuff and you're consuming this over a period of time...well, then is that not going to affect you in some way? [...] I mean, environmental pollutants, obviously, are everywhere. (Nurse Practitioner 4)

Here, reasons for male infertility are largely involuntary – some individual behaviors, like washing produce, could be modified, but otherwise contaminants are “everywhere,” traveling through water supplies and food systems.

A pattern emerges in these two examples where providers consider both women’s and men’s contributions to reproduction. Hazards to men are mostly involuntary and stem from larger systems, like industry and food and water supplies. Women’s reproduction is largely within their locus of personal control, impacted by personal behaviors like avoiding smoke and planning pregnancies early enough to avoid infertility. They also allude to notions of “reproductive masculinity” (Daniels 2006): that men’s reproduction is not harmed at all or the harm manifests as infertility.

The next provider quoted challenges reproductive masculinity, framing both men’s and women’s lifestyle behaviors as impacting the *quality* of fetal health. He talks about counseling couples who plan to conceive. With these patients, he covers a list of behaviors, including avoiding certain consumer products that contain chemicals, saying:

Okay, so now, who's trying to get pregnant? Two people [...] You're gonna make a baby. The factory is you, so we gotta get the factory ready [...] Take a prenatal vitamin, don't smoke, don't drink, don't use any drugs, exercise. Drink eight glasses of water a day, make sure your immunizations are up to date, be healthy. Don't get around people that smoke, don't use bleach, Clorox, anything that you think that you can breathe that's gonna stay in there [...] Not only that, it takes two people! So it's not just about you. If your boyfriend is out smoking a blunt and he's drinkin' beer every night, now that's his sperm that he's contributing to your baby. So, you gotta explain that. Don't let him drink. Don't let him do drugs. (Nurse Practitioner 10)

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Here, the "factory" metaphor applies to both women and men: their bodies need to be in good condition to create a good product. The advice to avoid environmental contaminants like bleach and other chemicals that are dangerous to inhale fits with a long list of health and lifestyle admonitions. This provider is emphatic that men play a specific role in fetal health that goes beyond maintaining fertility: their sperm, which is impacted by their behaviors, directly contributes to the "reproductive equation," at least in conception and fetal health (Almeling and Waggoner 2013). Yet, ultimately admonitions to men are framed in terms of female partners not "let[ting] him" drink or do drugs. While men are included, much of the onus of lifestyle changes still seems to fall on women, who should now monitor their own *and* their partners' behaviors.

Individual Responsibility in Perspective

Unlike the previous section, where providers identify women's bodies as potentially toxic environments, the providers I describe below envision contamination occurring on a larger scale – in workplaces, neighborhoods, or simply everywhere. Here, women do not create dangerous environments for their future children. Instead, they are forced by their circumstances to exist in dangerous environments. Chemicals may ultimately move *through* women's bodies, but this refocusing removes much of the blame from women themselves.

Although hazardous workplaces have traditionally been gendered as male, providers mention a number of female-dominated jobs, like salon worker, house cleaner, and health care technician, that pose threats to reproductive health. These jobs, where workers encounter toxic products and radiation, are major sources of involuntary exposure. As respondents describe, women can try to take some precautions, but they are incomplete. This provider reports that patients who work in salons are concerned the chemical products they use might affect

pregnancy. I ask:

I: Now, that's difficult. What do you do when someone's working as a hairdresser and they say they want to get pregnant?

R: Yeah, it's tricky [*laughs*].

I: Would you have advice for them?

R: Well, the advice that...there've been no studies done that show that there's any higher incidence of birth defects in that type of environment. The recommendation is that a person who's pregnant not stay eight hours consistently in that same environment. Open windows, circulating air, go outside to change it up. That's really the best they can do. (Nurse Practitioner 3)

Here, managing threats at work is "tricky" and while pregnant women can take some measures, like maintaining proper ventilation and taking breaks outside, these are not foolproof. Rather, they are merely "the best they can do."

We see a similar response from another provider, who asks during preconception visits whether her patients or their partners encounter hazards at work:

I: If someone is working in a hazardous workplace, what kind of advice can you give them?

R: It's really tough. Let's say they work in a nail salon or they work in a hair salon or whatever and they're exposed to all that stuff. You might wanna wear something to protect your nose and your mouth; you might wanna wear protective clothing. I would look and see what chemicals they use and if that's toxic or not. [...] Because in this day and age, unfortunately, people can't leave their jobs, but there might be ways that you could protect yourself while you're there. (Nurse Practitioner 11)

Again, women might take some steps to protect themselves, but avoiding exposures at work is "really tough," especially when people do not have the economic security to leave jobs that could harm their reproductive health. Moreover, these are mostly low-wage jobs, which can give individuals even less room to demand workplace protections or take temporary leaves of absence.

Providers also express uncertainty about counseling patients when environmental risks seem ubiquitous, invisible, unavoidable, or unknown. This provider puzzles over how to give advice about contaminants, a topic her patients sometimes ask about:

Our world is so contaminated, it's a good question. I think that it's something we probably need to step up in terms of interacting with patients[...] I think environmental contaminants are so potentially overwhelming.

She continues:

All - everything in lotions are chemicals and they're systemically absorbed and we put them all over our bodies! So should we be doing that? [...] Environmental toxins are just so everywhere. What do we do? Tell people not to live their lives? I don't know if we have time enough for these conversations. Their cleaning fluids, their this, their that, their carpets -- I mean everything; deodorant! (Nurse Practitioner 1)

This provider is interested in counseling her patients about avoiding environmental exposures, but overwhelmed by the sheer ubiquity of contaminants. Her repeated use of questions like "Should we be doing that?" and "What do we do?" portrays her uncertainty about what advice to give. Although she might help patients select a lotion without chemicals, she notes that the list of dangerous consumer products is so long that people would not be able to "live their lives" if they tried to avoid every source of contamination. Unlike the Nurse Practitioner 10, quoted above, who finds it unproblematic to ask his patients to engage in a long list of protective behaviors, this provider expresses that it would be too demanding to advise patients to take on the responsibility of avoiding potentially hazardous consumer products.

Another provider offers a critique of the way we treat pregnancy and risk more generally:

R: I'm also a little bit in the camp that, sometimes we can't see the forest through the trees. I think if we're just a healthy person, we'll be fine in our pregnancy, or we'll generally be fine and I think we nitpick about a lot of different things, but also, our environment's a disaster, so we can talk all we want about trying to avoid mercury and lead and heavy metals, it's everywhere.

I: *Yeah, how do you do it?*

R: We're a mess. That's why we're all -- chronic illnesses and stuff. Our food is a disaster, in my opinion. (Nurse Practitioner 5)

The provider resists the idea that maternal bodies need to be perfectly pure. She is frustrated that medical institutions already "nitpick" pregnant women about particular behaviors instead of encouraging overall health, a critique that echoes the feminist scholars mentioned above (Armstrong 2003; Kukla 2005; Markens et al 1997). For her, introducing yet another arena of caution for women – environmental contaminants – would be especially unwarranted in the context of a disastrous environment and food system. By linking problems like chronic illnesses to the environment, this provider counters the idea that individuals can control and are ultimately responsible for their own health (Petersen and Lupton 1996; Rose 2007).

This provider who serves a low-income population, many of whom are undocumented immigrants, reacts against the idea of reviewing a litany of preconception recommendations with her patients. She finds particularly unrealistic the recommendation that individuals planning a pregnancy should avoid toxic work environments and describes her patients' crisis orientation towards medicine:

You don't take the pill unless you're sick, you don't do it for prevention. If you can't afford it, you don't buy it, even if you're being told and prescribed it. So, if you have to work, you work at whatever job you can get for the money you can get, it doesn't matter as far as exposures to things. So, yeah there's people that make the decisions and then there's people that actually have to [*exasperated laugh*] do them. (Nurse Midwife 2)

This response highlights how the ability to follow health recommendations is fundamentally linked to socioeconomic resources (Link and Phelan 1995). Her patients are rarely able to practice preventative care, including avoiding exposures at work, because the financial consequences are prohibitive.

Another provider reports a number of local hazards that could impact her mostly

rural patients:

R: It depends where they come from. [...] Radon; we have a lot of that down our way. Down in the [local] area, they have the nuclear power plants[...] some down the [other] way, those houses are built over landfills [...]

I: So if you were talking to someone who lived near the nuclear power plant, what kind of advice might you give to them?

R: Move. [*laughs*].

I: Move before they thought about getting pregnant?

R: Yeah, but most cases if they can't, to be aware of what's going on in that area. The citizen-awareness groups that they have in those particular areas become part of that, so they know what to look for. (Nurse Practitioner 6)

For patients who live near a source of contamination, like a landfill or nuclear power plant, this providers' best advice is to "move" before they get pregnant. She says this with a laugh, however, in recognition that for her mostly low and moderate-income patients, moving is not a realistic option. Her suggestion that patients look for citizen-awareness groups points to the need for more collective forms of protection.

These providers emphasize that environmental contaminants are ubiquitous - they are found in workplaces, consumer products, a polluted food system, and toxic neighborhoods. Although some encourage patients to take precautions against contamination, respondents here are unsure that lifestyle changes will result in real protection. They also point to specific barriers, like the inability to leave a hazardous job, that make it difficult to avoid contamination while pregnant. Providers express concern about patients' and their future children's health, but they cannot assign their patients a responsibility to avoid environmental toxicants.

DISCUSSION

In the contemporary United States, pregnant and maternal bodies are treated as sites of

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exceptional risk and regulation. The paradigm of individual risk-management dominates clinical practice: providers are trained to monitor individual behaviors, like smoking, drinking, nutrition, and exercise, in order to prevent harm to patients and their gestating fetuses. Environmental contaminants, which have come into view as a significant threat to reproductive health in the past decade, have the potential to shift conversations away from gendered, individualized responsibility in reproduction. In this research, most providers point to uncertainties, collective sources of contamination, and other barriers that prevent individuals from protecting their maternal bodies from environmental exposures. For the most part, providers treat women's exposure to environmental contaminants the same way that health research has treated men's contributions to fetal harm (Daniels 1997): they highlight uncertainties and thus avoid designating individual responsibility. Because providers are unsure of the sources of harmful exposure, the effects it has, or methods to prevent it, they typically cannot blame women for failing to avoiding it. These findings are surprising and significant given the seemingly relentless pressure on women of reproductive age to engage in exceptionally high standards of risk management and take individual responsibility for their and their children's health.

There may be multiple explanations for this pattern. First, previous research documents how health care providers hold more nuanced views of risk in pregnancy and motherhood than dominant discourses suggest (Armstrong 2003; Waggoner 2011), although this is not always the case (Oaks 2000). Health care facilities are sites where the idealistic demands of risk-avoidance collide with the realities of everyday life. Providers must negotiate public health directives and broader discourses about risk and motherhood with the tangible barriers their patients face. Many of the providers quoted above convey intimate knowledge of the difficult decisions their patients make about the communities they live in, the places they work, the products they use, and the

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medical advice they follow. One contributing factor may be the predominance of nurse practitioners in this study. Compared to doctors, nurse practitioners tend to have higher patient satisfaction, perform longer consultations, and give patients more information (Laurant et al. 2005). Characteristics like these may relate to why many of the providers in this study express an acute understanding of how their patients' lived experiences interact with health.

Although providers do not use the language of "environmental injustice," the examples they give, like patients' difficulty moving out of toxic neighborhoods or leaving dangerous jobs, tap into larger patterns of environmental inequality. Though providers point to abstract structural barriers, none specifically identify faults with government regulation or mention corporate responsibility for chemical pollution. They also do not discuss the importance of leveraging their professional voices to advocate for stronger environmental policies, as medical organizations have suggested. Still, they seem to internalize messages about environmental justice without directly identifying them or explicitly engaging in political efforts.

Second, my results indicate that female-dominated jobs, like salon work and cleaning, feature prominently in providers' minds when they think about "hazardous" work. Traditionally, we imagine dangerous workplaces as masculine spaces, like chemical plants and industrial factories. Female-dominated spaces like beauty salons force a re-imagining of *who* is exposed to environmental contaminants at work.

Third, many providers I talked with describe environmental contamination as ubiquitous, intangible, or unknown. While sometimes they link contamination to certain products (like bleach or cigarettes), they also perceive contamination as "out there" in air, food, and water. Even when providers can connect contamination to concrete objects, like lotions or hair dyes, they struggle to give their patients useful recommendations for avoidance, especially when

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women use these products at work. These factors – limited knowledge of concrete, practical recommendations and the sense that contaminants are “everywhere” - may lead providers to ruminate on the broader causes of contamination and the forces that make avoidance feel impossible. They may also find it difficult to moralize environmental risk-avoidance behaviors, because unlike smoking or drinking, they cannot say precisely what those behaviors are and whether patients have the power to avoid them.

Finally, in the case of environmental contaminants, the acknowledgment of structural barriers also occurs in official discourse. While leading professional organizations in reproductive health encourage providers to counsel patients about individual actions to guard against environmental exposure, they also explicitly call for large-scale reforms to protect food, air, water, and soil from further pollution (ACOG et al. 2013; ARHP 2010; Sutton, Giudice, and Woodruff 2010). Though these official statements are relatively recent and have not completely disseminated to providers, the results I present here mirror this tension. This study also points to the need to investigate how professional medical organizations decide to adopt environmental health recommendations, especially those aimed at structural reforms, and how recommendations do or do not filter to providers through (continuing) medical education, journals, and other outlets.

Although emphasizing collective responsibility for environmental contamination does not invoke a gendered responsibility for risk avoidance, gender is still entwined in the issue. Appeals for better regulation and environmental protection rely on images of the corruption of pure wombs and babies. For example, one health advocate quoted in report on environmental challenges to reproductive health says, “It's a tremendous irony that we believe that the womb is safe, and that something that is supposed to be so sacred – where life begins – is where the

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problem begins" (PRHE 2008:11). Examples like this, along with the language of "babies being born pre-polluted" (Reuben 2011:vii) appeal to gendered notions of maternal purity and innocence that need protection.

The emphasis on collective, rather than individual, maternal, responsibility for environmental contaminants is not a given. Some health care providers frame environmental contaminants as another item in a long list of things for women to avoid before and during pregnancy. Respondents simultaneously describe men's exposure to environmental contaminants as involuntary or inconsequential. It is possible that as professional guidelines become more familiar and routine, actions like eating organic food, using "natural" personal care products, and buying BPA-free plastics could become new expectations of individual risk-management during pregnancy. Because of gendered ways of thinking about reproduction, these expectations would likely adhere more to women than to men. Because professional medical organizations emphasize both individual protective actions *and* structural interventions, research should continue to monitor how health care providers, the media, and the public treat environmental contaminants as risk to reproduction as these recommendations become more widely disseminated.

Environmental contamination is just one among many potential threats to reproduction. I demonstrate that, in this case, health care providers do not wholly subscribe to the dominant paradigm of individual, gendered responsibility for risk avoidance. In fact, many subvert this paradigm by focusing on structural barriers to personal protection and collective sources of contamination. Future research should be attentive to whether, and how, similar ruptures in discourse occur around how we understand gender, health, and the vulnerability of reproductive bodies.

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NOTES

1. I was not able to collect statistics on patient demographics from each health care organization. Instead, I use the type(s) of insurance accepted at the respondent's most recent practice as an indicator of the patient population it served. Generally, a high proportion of Medicaid patients signified a low-SES patient population, as this federal health insurance program requires that recipients meet a certain percentage of the poverty level to qualify for coverage. Most providers at practices accepting only private insurance described their clientele as predominantly white and high-SES. Those at practices accepting private insurances and Medicaid described clientele that were socioeconomically mixed, but predominantly white. Most at practices accepting uninsured patients described their patient population as predominantly minority and low-SES.
2. Health advocates argue that existing workplace regulations are not sufficient to ensure workers' safety, particularly during pregnancy. They note that many chemicals in use have not been tested for health effects and that legal exposure limits are not appropriate to measure harm to a developing fetus (PRHE 2012). Additionally, advocacy groups like Asian Communities for Reproductive Justice highlight how women, especially poor women of color, are particularly vulnerable to workplace exposures in female-dominated jobs like hair and nail salon work (Rojas-Cheatham et al. 2009).

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BIOSKETCH

Lindsay Stevens is a doctoral student in the Department of Sociology at Rutgers University. Her research explores medical and lay perspectives on health, gender, and reproduction. Her previous work has been published in *Social Science & Medicine* and *Sociological Forum*.

Table 1: Characteristics of Interviewees

	N (19 total)
<i>Gender</i>	
Female	17
Male	2
<i>Race</i>	
White	16
Black or African-American	1
Hispanic	1
Unknown	1
<i>Provider Type</i>	
Nurse Practitioner (NP, DNP, or PhD in Nursing)	15
Certified Nurse Midwife (CNM)	2
Medical Doctor (MD)	2
<i>Type of Insurance(s) Accepted at Most Recent Practice</i>	
Private Insurance Only	6
Private Insurance and Medicaid	7
Private Insurance, Medicaid, and Uninsured	6
<i>Geographic Region</i>	
Northeastern U.S.	14
Southern U.S.	3
Western U.S.	1
Abroad	1