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INTRODUCTION

Despite the fact that women are particularly vulnerable to environmental hazards,[1] governmental regulations provide women with little protection.[2] Although federal environmental regulators use risk assessments as a tool to protect vulnerable populations, their

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1. Samara Swanston, *Race, Gender, Age, and Disproportionate Impact: What Can We Do About the Failure to Protect the Most Vulnerable?*, 21 FORDHAM URB. L.J. 577, 600 (1994) [hereinafter Swanston, *Race, Gender and Age*] ("According to an unpublished study by the National Institute of Environmental Health Sciences (NIEHS), women are more likely to develop or experience serious health effects as a result of environmental exposures."). *See also* Lynn R. Goldman, Environmental Initiatives to Protect Women's Health, Speech Before the Society for the Advancement of Women's Health Research (Sept. 10, 1998) (recognizing that chemicals that disrupt endocrine systems seem to result in high rates of breast cancer and endometriosis in women), *available at* http://www.epa.gov/opptsfrs/home/hhsbcfi.htm (last visited Feb. 6, 2001); U.S. ENVTL. PROTECTION AGENCY, SOCIODEMOGRAPHIC DATA USED FOR IDENTIFYING POTENTIALLY HIGHLY EXPOSED POPULATIONS 1-7, 1-8 (1999) [hereinafter SOCIODEMOGRAPHIC DATA] (identifying women as a group disproportionately impacted by environmental pollution).

2. *See* discussion *infra* Part II.

value is questionable when it comes to protecting women's unique susceptibilities to environmental pollution.[3]

Risk assessments often fail to take into account differences related to sex and gender because they fail to consider the social and physical differences between men and women and result in different health impacts from environmental pollution.[4] Moreover, risk assessments are filled with value-laden judgments that often neglect concerns, values, and perceptions unique to women.[5] Finally, instances where risk assessments do take sex and gender-related differences into account are almost always limited to the protection of fetuses, infants or children; rarely are sex and gender-related differences taken into account to protect women themselves.[6]

This article examines the apparent flaws in risk assessments that lead to inadequate environmental health protection for women. It also encourages agency officials, legislators, and other policy makers to examine the public health implications of risk assessments that fail to consider women. Part I of this article describes the numerous ways and reasons that women are more heavily impacted by environmental pollution than men. Part II argues that risk assessments must take sex and gender related differences into account in order to effectively assess the risks that environmental threats pose to women. Part II also argues that definitions of risks need to consider differing perceptions, values and concerns between men and women. Part III critiques a current trend in environmental policy: equating the protection of pregnancies, infants and children with the protection of women. Finally, Part IV provides an illustration of the deficiencies found in risk assessments by examining and critiquing the human health risk assessments for fish consumption.

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3. *See* discussion *infra* Part II.A.
4. *See* discussion *infra* Part II.C.
5. *See* discussion *infra* Part II.B.
6. *See* discussion *infra* Part III.

I. DEFINING THE PROBLEM: WOMEN ARE IMPACTED BY ENVIRONMENTAL POLLUTION DIFFERENTLY THAN MEN, CREATING DIFFERENT HEALTH CONCERNS

A. Women Have Different Bodies than Men, Creating Variations in Susceptibility

Women's bodies are physiologically different from men's bodies.[7] These physiological differences often put women at greater risk from environmental hazards.[8] The same exact exposure to an environmental hazard is likely to impact women differently and more disproportionately than it impacts men.[9]

Perhaps the most obvious physiological difference between men and women that results in this disproportionate impact is physical size; women on average, are smaller than men.[10] In addition, women, on average, have higher percentages of body fat than men. This, in turn, creates a greater risk for women because many environmental pollutants accumulate more heavily in fatty tissue.[11] Moreover, pregnant women face an even greater risk from environmental pollutants because they may experience greater exposure to pollutants present in food and water because of their increased food consumption.[12]

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7. *See* Samara Swanston, *Inequity in the Environmental Health Protection of Women*, 16 WOMEN'S RTS. L. REP. 36, 38-40 (1994) [hereinafter Swanston, *Inequity*] (describing some of the physiological events in women's lives).

8. *See id.* at 39.

9. *Id.* at 38.

10. INSTITUTE OF MEDICINE, GENDER DIFFERENCES IN SUSCEPTIBILITY TO ENVIRONMENTAL FACTORS: A PRIORITY ASSESSMENT 42 (1998) [hereinafter GENDER DIFFERENCES IN SUSCEPTIBILITY].

11. *See* Robert R.M. Verchick, *In a Greener Voice: Feminist Theory and Environmental Justice*, 19 HARV. WOMEN'S L.J. 23, 64 (1996) (stating that women may be more susceptible to dangerous chemicals that accumulate in fatty tissue).

12. *Id*; *see also* SOCIODEMOGRAPHIC DATA, *supra* note 1, at 1-7 (stating that as women increase their food intake during pregnancy, they may be exposing themselves to greater amounts of chemicals and toxics); Jennifer Brown, *Pediatric Environmental Health Hazards and the Role of Government in Adopting Standards to Protect Children*, 16 PACE ENVTL. L. REV. 189, 194 (1998) (noting that children's higher caloric intake increases their exposure to environmental pollutants).

Women's dieting behavior often results in similar cycles of fat gain and loss.[13] These cycles of fat gain and loss may pose a risk since toxicants stored in adipose tissue are released upon weight loss.[14] PCBs, dioxins, and organochlorine pesticides are just a few of the pollutants that accumulate more heavily in fatty tissue.[15] Repeated and high exposure to these toxins have been linked to certain cancers.[16] Not only do these toxins have harmful effects on women, they also have harmful effects on pregnancies and nursing infants.[17]

Hormones and hormonal changes that are unique to women also result in different impacts on women's health from environmental pollution. Hormonal changes during menstruation have been shown to affect women's susceptibility to environmental threats.[18] For example, fluctuations of progesterone levels caused by the menstrual cycle are believed to make women more susceptible to ozone exposure.[19] In addition, hormonal changes during pregnancy and

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13. GENDER DIFFERENCES IN SUSCEPTIBILITY, *supra* note 10, at 42.

14. *Id.* at 43 (suggesting that this may explain the epidemiological data that shows an association between weight loss and mortality).

15. Verchick, *supra* note 11, at 64.

16. *See, e.g.*, Cindy Skrzycki & Joby Warrick, *EPA Links Dioxin to Cancer*, WASH. POST, May 17, 2000, at A1 (reporting that the Environmental Protection Agency ("EPA") recently concluded for the first time that dioxin is a human carcinogen). The EPA's draft assessment of dioxin characterizes dioxin as one of the most potent chemical toxins known to science. *Id.* at A11. Studies have correlated organochlorines with increased risk of breast cancer and decreased chance of survival from breast cancer. *See also* Annette Pernille Høyer et al., *Organochlorine Exposure and Breast Cancer Survival*, 53 J. CLINICAL EPIDEMIOLOGY 323, 325 (2000) (stating that "findings suggest that past exposure to estrogenic organochlorines such as dieldrin may not only affect the risk of developing breast cancer but also survival").

17. Marsha Lillie-Blanton et al., *Latina and African American Women: Continuing Disparities in Health*, *in* WOMEN'S HEALTH, POLITICS, AND POWER 31, 49 (Elizabeth Fee & Nancy Krieger eds., 1994). Repeated exposures to PCBs may pass to a child through breast milk and can cause liver and nervous system damage. *Id.*; *see also* Skrzycki & Warrick, *supra* note 16, at A11 (reporting that low grade exposure to dioxin is linked to developmental defects in babies and children).

18. Swanston, *Inequity*, *supra* note 7, at 39.

19. *Id.* (citing Susan D. Fox et al., *Enhanced Response to Ozone Exposure During the Follicular Phase of the Menstrual Cycle*, 101 ENVTL.

menopause have also been correlated with an increased susceptibility to environmental threats.[20] Pregnancy causes a number of physiological changes that predispose women to disease when they are exposed to certain substances.[21] Similarly, osteoporosis, which mostly affects women after menopause, is triggered or intensified by environmental factors.[22]

There may be other physiological factors that affect the ways in which women's bodies respond to environmental pollutants. However, sex and gender-related differences and their impact on environmental health have not been investigated intensely.[23] Therefore, in order to adequately protect the environmental health of women, lawmakers and environmental regulators must fully explore and take into account, physiological differences.

HEALTH PERSP. 242, 242-44 (1993)); *Cf.* Tarun K. Das, *Effects of the Menstrual Cycle on Timing and Depth of Breathing at Rest,* 42 INDIAN J. PHYSIOLOGICAL PHARMACOLOGY 498, 500-01 (1998) (concluding that progesterone levels may play a role in stimulating respiration and increasing ventilation and inspiratory flow).

20. Swanston, *Inequity*, *supra* note 7, at 39.

21. SOCIODEMOGRAPHIC DATA, *supra* note 1, at 1-8. For example, pregnant women are more susceptible to the toxic effects of such chemicals as beryllium, lead, manganese, organochlorine compounds and organophosphate insecticides, which increase a woman's susceptibility to respiratory disease. *Id.*

22. *See* Marika Berglund et al., *Metal-bone Interactions*, 112-113 TOXICOLOGY LETTERS 219, 219-25 (2000) (stating that recent studies indicate that both lead and cadmium may exert direct and indirect actions on bone turnover and may be negatively associated with bone mass). *See also* Lars Järup et al., *Cadmium May Be a Risk Factor for Osteoporosis*, 55 OCCUPATIONAL ENVTL. MED. 435, 438 (1998) (concluding that there is a relationship between cadmium and osteoporosis); Kohei Uriu et al., *Uncoupling Between Bone Formation and Resorption in Ovariectomized Rats with Chronic Cadmium Exposure*, 164 TOXICOLOGY APPLIED PHARMACOLOGY 264, 271 (2000) (stating that chronic cadmium exposure "resulted in osteopenia, structural changes of the bone and decreased mechanic strength").

23. *Cf.* SOCIODEMOGRAPHIC DATA, *supra* note 1, at 8 (stating that there has been little investigation into sex-linked differences in sensitivity to toxic chemicals).

B. Women's Exposures to Environmental Pollutants are Different

Socio-economic factors also create risks that may be unique to women. The fact that the social and economic dimensions of women's roles impact their health is no surprise.[24] Female lifestyles result in different exposures to different chemicals[25] and environmental pollutants than men.

When it comes to investigating how socio-economic factors impact the environmental health of women, it is important to consider the exposures that women incur in the workplace. For example, when evaluating occupational exposures, the impact of domestic labor must be considered in order to fully assess threats to women's environmental health.[26] This is especially true of women who work in private households. Unfortunately, little attention has been paid to the work of women in the home and the hazards associated with this work.[27] Since the majority of epidemiological studies involve only white males working in industry, the impact of domestic labor has not been adequately considered.[28]

One of the few studies that investigated hazards associated with domestic work has identified exposure to toxic and carcinogenic

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24. *See generally* WOMEN'S HEALTH, POLITICS, AND POWER (Elizabeth Fee & Nancy Krieger eds., 1994).

25. *See* 3 NATIONAL INSTITUTES OF HEALTH, AGENDA FOR RESEARCH ON WOMEN'S HEALTH FOR THE 21ST CENTURY 89 (1997) (finding that various products such as cosmetics, shampoos, conditioners, lipsticks, bath gels, tampons and deodorants that women utilize, may expose them to harmful chemicals) [hereinafter NATIONAL INSTITUTES OF HEALTH].

26. *See* GENDER DIFFERENCES IN SUSCEPTIBILITY, *supra* note 10, at 7; *Cf.* SOCIODEMOGRAPHIC DATA, *supra* note 1, at 7B-3 (stating that in private households, 96.3% of child-care workers, housecleaners, and servants are women).

27. Lesley Doyal, *A Case Study of the Women's Health Movement in Britain*, *in* WOMEN'S HEALTH, POLITICS, AND POWER 61, 70 (Elizabeth Fee & Nancy Krieger eds., 1994).

28. Swanston, *Race, Gender, and Age*, *supra* note 1, at 596 n.131 ("Carcinogenic potency for group A carcinogens and the direct evidence of non-cancer health effects is derived by the EPA from . . . studies involving white males."). *See also* GENDER DIFFERENCES IN SUSCEPTIBILITY *supra* note 10, at 46 (noting that, because of the differences in exposure between men and women, estimates of the risk of benzene exposure should not only be based on male cohort studies).

chemicals in the home as a serious health threat.[29] These exposures may explain why certain types of illnesses, including cancer, have been linked to women who spend more time engaged in domestic work.[30] These exposures disproportionately affect women since women are more frequently in positions in which they are exposed to these hazards; for example, women comprise more than 90% of workers in the cleaning industry in the United States.[31]

The living conditions of women are also important factors which impact environmental health and therefore, must be explored. The government has recognized that minority and low-income populations are subject to disproportionate exposure from air pollution and hazardous waste sites.[32] Since a greater number of women than men live in poverty,[33] women bear this burden in greater numbers. The impact of poverty is perhaps the greatest threat to women's environmental health. As discussed, women are disproportionately impacted by environmental pollution due to physiological differences; therefore, poor women are likely the most vulnerable to environmental pollution.[34]

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29. *See* Doyal, *supra* note 27, at 70 (discussing a study which sampled British workers).

30. *Cf.* Ruth E. Zambrana & Marsha Hurst, *The Interactive Effect of Health Status on Work Patterns Among Urban Puerto Rican Women*, *in* WOMEN'S HEALTH, POLITICS, AND POWER 141, 149 (Elizabeth Fee & Nancy Krieger eds., 1994) (reporting that in a 15-year retrospective study of housewives in one urban area, excessive mortality rates for certain types of cancer were found).

31. SOCIODEMOGRAPHIC DATA, *supra* note 1, at 1-8. *See also supra* note 26.

32. NATIONAL RESEARCH COUNCIL, ENVTL. EPIDEMIOLOGY: PUBLIC HEALTH AND HAZARDOUS WASTES 68 (1991) (recognizing that women of childbearing age, young children and elderly are at risk).

33. U.S. CENSUS BUREAU, U.S. DEPT. OF COMMERCE, POVERTY IN THE UNITED STATES, Table 2 (1999); *see also* Martha E. Gimenez, *The Feminization of Poverty: Myth or Reality?*, *in* WOMEN'S HEALTH, POLITICS, AND POWER 287, 287 (Elizabeth Fee & Nancy Krieger eds., 1994) (stating that in the United States the fastest growing type of family structure is the female-headed household and that almost half of all those living in poverty in the United States are part of families headed by women); SOCIODEMOGRAPHIC DATA, *supra* note 1, at 1-8 (reporting that more women have lived in poverty than men from 1966-1994).

34. *See* Swanston, *Race, Gender and Age*, *supra* note 1, at 592-93 (discussing how the combination of being both female and poor, two

Women activists have long argued that women's social and economic roles must be considered in order to fully identify environmental threats to their health.[35] Working conditions, living conditions, and other conditions generally shared by women should be investigated. Places where women work and live cannot be presumed identical to where men work and live, nor can they be overlooked as important factors when determining environmental threats. Therefore, it is essential that these factors be considered when assessing health threats from environmental pollution.

C. Women are Impacted by Different Diseases than Men

The interplay between women's unique physiology and their exposure to different environmental pollutants results in different health threats to women: certain diseases are sex specific, or affect women more than men.[36] In order to protect women, risk assessors must not neglect these diseases. Obviously, women's unique role in reproduction creates a whole range of health problems that men do not face. Environmental pollution can affect the functioning of women's reproductive organs and can impact the health of a fetus.[37] Impacts on women's reproductive health from environmental pollution range from infertility to miscarriages to birth defects.[38] For example, ozone may be damaging to women's reproductive systems.[39]

Another major environmental health concern for women is cancer. "Nearly one third of all cancer deaths in women are sex-specific, resulting from cancers of the breast, cervix, uterus or uterine endometrium."[40] These cancers have all been linked to

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vulnerable subgroups, creates a subpopulation that suffers the greatest risk).

35. Doyal, *supra* note 27, at 70.

36. *See infra* notes 44-53 and accompanying text.

37. Environmental threats also impact the reproductive health of males. There is strong evidence that some forms of exposure to pollutants may damage a man's reproductive capacities. *See* Doyal, *supra* note 27, at 72 (suggesting that although exposure to lead and radiation has been found to affect male reproductive health, women's reproductive capacities are potentially affected more).

38. Doyal, *supra* note 27, at 72.

39. *See* Verchick, *supra* note 11, at 64.

40. Swanston, *Inequity*, *supra* note 7, at 38.

environmental factors. For example, cervical cancer may be related to certain pesticides.[41] Numerous studies have also linked environmental estrogens[42] residing near hazardous waste sites[43] to an increased risk of breast cancer.

In addition to sex and gender-specific diseases, women suffer from health problems affecting both men and women, but which, on average, disproportionately affect women. One example is osteoporosis. About twenty-eight million Americans suffer from osteoporosis; 80% of those afflicted are women.[44] Estrogens and heavy metal toxicity may trigger osteoporosis by influencing bone density.[45] Lupus, fibroid tumors, rheumatoid arthritis, autoimmune thyroid diseases and multiple sclerosis are other diseases that disproportionately impact women and may be linked to environmental pollution.[46] These types of autoimmune diseases are

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41. *Id.* at 39 (reporting that epidemiological studies have shown a correlation between female farm workers exposed to pesticides, such as atrazine, and cervical cancer).

42. *See* Høyer et al., *supra* note 16, at 323 ("Findings suggest that past exposure to estrogenic organochlorines such as dieldrin may not only affect risk of developing breast cancer but also survival."). Other epidemiological studies have found that women with breast cancer have higher levels of pesticides and PCB residues in their breast tissue than women not suffering from breast cancer. *See, e.g.*, Kristan J. Aronson et al., *Breast Adipose Tissue Concentrations of Polychlorinated Biphenyls and Other Organochlorines and Breast Cancer Risk,* 9 CANCER EPIDEMIOLOGY BIOMARKERS PREVENTION 55 (2000); *but see* Francine Laden & David J. Hunter, *Environmental Risk Factors and Female Breast Cancer*, 19 ANNUAL REV. PUBLIC HEALTH 101, 117 (1998) (concluding that "with the exception of ionizing radiation, no environmental exposures can be confidently labeled as a cause of breast cancer"). *See also* Mary S. Wolff & Ainsley Weston, *Breast Cancer Risk and Environmental Exposures*, 105 ENVTL. HEALTH PERSP. 891, 891 (Supp. 4 1997) (reporting that 150,000 women are afflicted with breast cancer each year).

43. Swanston, *Inequity*, *supra* note 7, at 39.

44. NATIONAL OSTEOPOROSIS FOUNDATION, *Osteoporosis Fast Facts*, *available at* http://www.nof.org/osteoporosis/stats.htm (last visited Apr. 5, 2001). In addition, it is possible that osteoporosis itself may put women at a greater risk to toxic exposures since potential toxicants that are stored in the bones are released upon bone loss and fractures. GENDER DIFFERENCES IN SUSCEPTIBILITY, *supra* note 10, at 43.

45. *See supra* note 22.

46. *See* Hakon Heimer, *Outer Causes of Inner Conflicts: Environment and Autoimmunity*, 107 ENVTL. HEALTH PERSP. A504, A504-06 (1999). Two-thirds to three-quarters of all multiple sclerosis patients are

some of the most misunderstood illnesses in medicine today, and most of the sufferers in the United States are women.[47]

Other illnesses also impact women disproportionately. Recently, it has been recognized by the National Institutes of Health that American women are suffering from asthma and multiple chemical sensitivity ("MCS")[48] at higher rates than men.[49] According to the Center for Disease Control and Prevention, asthma-related morbidity and mortality have increased in the last fifteen years.[50] For women the increase was 59%, while for men the increase was 34%.[51] Furthermore, MCS is emerging as an important environmental health issue for women according to the National Institutes of Health.[52]

There is also evidence that women suffer from different health impacts even when they are exposed to the same contamination. Women who live near contaminated sites may suffer disproportionately from certain diseases than men.[53] One study

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women. GENDER DIFFERENCES IN SUSCEPTIBILITY, *supra* note 10, at 51. In addition, the incidence of multiple sclerosis appears to be rising, especially among women. *Id. at* 49.

47. *See* Heimer, *supra* note 46, at A504. For example, the ratio of women to men afflicted with these diseases is 3:1 for rheumatoid arthritis, 9:1 for lupus, and 25:1 for autoimmune thyroiditis. *Id.*

48. NATIONAL INSTITUTES OF HEALTH, *supra* note 25, at 96. MCS often involves an initial toxic exposure after a pesticide application, new carpet installation, or other similar exposures. Following this initial exposure, clusters of symptoms will be triggered upon a later exposure to substances including pesticide, perfumes, auto and diesel exhaust, air fresheners, deodorizers and hair spray. Those who cannot move themselves from such exposures find that their health declines rapidly. *Id.*

49. *Id.* at 96. In addition, government studies indicate that individuals reporting MCS are on the rise, with women outnumbering men. *Id.*

50. Alison Kelly & Richard J. Jackson, *Public Health Principles and Women's Environmental Health: No More Lost Opportunities*, 7 J. WOMEN'S HEALTH 15, 16 (1998).

51. *Id.*

52. *See* Carol M. Baldwin & Iris R. Bell, *Increased Cardiopulmonary Disease Risk in a Community-Based Sample with Chemical Odor Intolerance: Implications for Women's Health and Health-Care Utilization*, 53 ARCH. ENVTL. HEALTH 347, 349 (1998) (identifying women as being more intolerant to various chemicals).

53. *Incidence of Certain Cancers Higher Among Women Near Landfills Report Says*, 29 Env't Rep. (BNA) No. 18, at 897 (Aug. 28,

indicates that the risk of bladder cancer and leukemia is four times higher for women than men. These unique health threats that women face further illustrates the importance of taking sex and gender into account in order to adequately protect women.

D. Women's Concerns Include the Health of their Infants and Fetuses

In addition to unique concerns about their own health, women are often concerned about the risks to their fetuses, infants, and children from environmental pollution.[54] This may be due to the social role that puts women in a position where the health of their families becomes a primary issue since they are often the primary caregivers to children and infants.[55]

Of particular concern to women are the effects of toxic exposures on their pregnancies, fertility,[56] and breast milk. Toxic exposures may affect fertility and are believed to cause birth defects and spontaneous abortions. Evidence suggests that a broad range of pollutants have the potential to interfere with the human endocrine systems, increasing the incidence of infertility; for example, dioxin exposure has been associated with infertility in about 10% of reproductive-age women.[57]

Women are also concerned about the potential of passing pollutants to their infants through breast-feeding. Breast milk can "be a pathway of maternal excretion of toxic elements" including

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1999) (finding that men did not face a statistically greater risk from living near landfills).

54. The names of organizations such as "Mothers of East Los Angeles" and "Mother's Air Watch," illustrate this fact. *See* Verchick, *supra* note 11, at 27 (discussing the fact that women are the dominant force in most grassroots environmental justice organizations).

55. *Cf.* Suzanne E. England et al., *Community Care Policies and Gender Justice*, *in* WOMEN'S HEALTH, POLITICS, AND POWER 97, 102 (Elizabeth Fee & Nancy Krieger eds., 1994) (stating that areas of family care-giving are gender-segregated, and that women often provide personal and health-related care for the elderly in their family).

56. *Dioxin and Endometriosis*, 101 ENVTL. HEALTH PERSP. 571, 572 (1993). A recent report connects dioxin with severe endometriosis in rhesus monkeys. *Id.* at 571.

57. *Id.* at 572 ("Endometriosis may be more an immunologic disorder with reproduction consequences rather than the other way around.").

lead, which can have severe impacts on a developing newborn.[58] It is estimated that five percent of babies in America are exposed to significant levels of PCBs[59] in breast milk, which may cause neurological damage. These health issues also have a direct impact on women because toxic pollutants, such as PCBs[60] that impact pregnancies and nursing infants also have an effect on women themselves.

II. ENVIRONMENTAL RISK ASSESSMENTS FAIL TO ACCOUNT FOR SEX AND GENDER DIFFERENCES

As discussed in Part I, women's bodies are different, resulting in different impacts from environmental pollution. In addition, women's perspectives and concerns about environmental threats may also be different in certain respects. In order to protect women adequately, these differences must be recognized and addressed. Unfortunately, environmental regulators often neglect these differences. Thus, risk assessment, the tool that is supposed to protect sensitive or highly exposed populations, often fails to incorporate differences related to sex and gender.

A. Environmental Regulations Based Upon Risk Assessments that are Value-Laden and Derived from Artificial Assumptions

In the 1970's, regulatory agencies used risk assessments to "carry out their missions."[61] Risk assessments play an essential role in this scheme because they are used to determine how threatening a pollutant is to human health and the environment.[62] The risk

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58. Brian L. Gulson et al., *Relationships of Lead in Breast Milk to Lead in Blood, Urine, and Diet of Infant and Mother*, 106 ENVTL. HEALTH PERSP. 667, 667 (1998).

59. Swanston, *Inequity*, *supra* note 7, at 38; *see also* Theo Colborn et al., *Developmental Effects of Endocrine-Disrupting Chemicals in Wildlife and Humans*, 101 ENVTL. HEALTH PERSP. 378, 381 (1993).

60. Aronson et al., *supra* note 42, at 58 (stating that high rates of PCBs that affect breast milk have also been correlated with breast cancer).

61. John D. Graham, *The Risk Not Reduced*, 3 N.Y.U. ENVTL. L.J. 382, 386 (1994) (referring specifically to the Nuclear Regulatory Commission ("NRC"), the Food and Drug Administration ("FDA") and the EPA).

62. The EPA has been using quantitative risk assessment since 1976. *See* Robert W. Collin, *Review of the Legal Literature on*

assessment process involves identifying the hazard, assessing the exposure and dose at which risk occurs, and characterizing the risk.[63] Federal agencies use risk assessments to determine acceptable levels of toxins and pollution when setting standards.[64] Risk assessments are used to determine acceptable levels of solid waste, pesticides and water pollution.[65] Thus, risk assessments often determine the priorities and legislative agendas of regulatory bodies in environmental law.

Risk assessments are viewed by many as an objective method for establishing environmental standards because they are based upon scientific processes and statistical measures.[66] However, at all stages of this process, value-laden judgments and biases are injected into risk assessments, in choosing the chemicals to regulate and the diseases to focus on, and in assessing and communicating the risk.[67] The basis for decisions in many cases turns upon the interpretation of facts and data that require one to make assumptions that are characterized by subjectivity.[68] Thus, the tool of risk assessment

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Environmental Racism, Environmental Equity, and Environmental Justice, 9 J. ENVTL. & LIT. 121, 158 (1994). Although the term 'risk assessment' does not appear in most environmental statutes, most environmental laws require an analysis of human health effects. *See, e.g.*, Federal Insecticide, Fungicide and Rodenticide Act, 7 U.S.C. §§ 136-136y, 136bb & 136(a)(c) (1994 & Supp. V 1999) (regulating the risk to humans posed by pesticides)); *see also* Toxic Substances Act, 15 U.S.C. §§ 2601-2692 (1994); Water Pollution Prevention and Control Act, 33 U.S.C. §§ 1251-1387 (1994 & Supp. IV 1998); Safe Drinking Water Act, 42 U.S.C. §§ 300(f) to 300(j)-26 (1994 & Supp. IV 1998); Solid Waste Disposal Act, 42 U.S.C. §§ 6901-6992k (1994 & Supp. IV 1998); Clean Air Act, 42 U.S.C. §§ 7401-767lq (1994 & Supp. IV 1998); Comprehensive Environmental Response, Compensation, and Liability Act, 42 U.S.C. §§ 9601-9675 (1994 & Supp. IV 1998). The recently amended Food Quality Protection Act specifically calls for risk assessment. *See* 21 U.S.C. §§ 301-397 (Supp. IV 1998). For a brief history of risk assessments, see Graham, *supra* note 61, at 386-88.

63. Verchick, *supra* note 11, at 62.

64. *See id.*

65. *Id.*

66. *Id.* at 75.

67. *Id.* at 79 (suggesting that risk assessors, who are often white men, may be protecting the environment based on their own biases).

68. *See id.* at 77 (detailing how feminist theory can be used as a tool to deconstruct risk assessments); *see also* Hans Bohnenblust & Paul Slovic, *Integrating Technical Analysis and Public Values in Risk-Based*

tends to inject values and subjectivity leading to bias against different groups including women.

B. Risk Assessments Fail to Take Into Account Risks Perceived by Women

The first step of the risk assessment process involves defining the problem, i.e. identifying the hazard. Since risk is a perception, based upon subjective assumptions, subjectivity and value-laden judgments are inevitably inserted at this point. Researchers have found that perceptions of risk differ along the lines of gender.[69] Dozens of studies have shown that perceptions about health risks from environmental pollution differ between men and women.[70] These studies indicate that there are gender differences in the level of concern for the same risk, and that there are gender differences with regard to what is considered a risk.[71]

Women, according to one study, perceive a greater risk than men, from most hazards.[72] This study identified twenty-five environmental health risks and asked over 1,500 respondents to rank the risks from "almost no health risk" to "high health risk."[73] The researchers then created a hazard index to generate data according to race, sex and gender.[74] According to the study, white males were always less likely to rank a hazard as "high risk."[75] The authors concluded that sociopolitical factors such as power, status, and sex and gender

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Decision Making, 59 RELIABILITY ENGINEERING AND SYSTEM SAFETY 151, 151 (1998) (discussing how subjectivity is part of any formal safety analysis); *see generally* Paul Slovic, *Trust, Emotion, Sex, Politics, and Science: Surveying the Risk Assessment Battlefield*, 1997 U. CHI. LEGAL F. 59, 60 (1997) [hereinafter *Trust, Emotion, Sex*].

69. *Trust, Emotion, Sex, supra* note 68, at 68 (asserting that there are several dozen studies documenting that there is a gender difference in perceived risks). Throughout history, women have approached environmental concerns with different perceptions and assumptions than men. *Id.*

70. *See* Swanston, *Inequity*, *supra* note 7, at 36.

71. *Id.*

72. Verchick, *supra* note 11, at 79.

73. Swanston, *Inequity*, *supra* note 7, at 36 (citing James Flynn et al., *Gender, Race, and Perception of Environmental Health Risks*, DECISION RESEARCH, Feb. 1994, at 2).

74. *See id.*

75. *Id.*

defined perceptions and acceptance of environmental health risks.[76] The authors suggested that white men might see the world as less risky because they create, manage, control and benefit the most, whereas women may view the world as more risky since they benefit less from technologies and institutions.[77]

Arguably, risk assessors, politicians, and bureaucrats may be acting on values and judgments about risk that women do not share,[78] or may be neglecting concerns that are particular to women. "White men still control the major political and business institutions in this country. They also dominate the sciences and make up the vast majority of management staff at environmental agencies."[79] If perceptions of those defining risk are not diverse, it is likely that the values and judgments of women are not being reflected. Women activists complain that officials and experts often dismiss their concerns as being "over-emotional" or that they themselves are dismissed as "hysterical housewives."[80] This is reflected by the experiences of women who often encounter such reactions in the health field.[81]

It is essential that risk assessments take into account the different values, perspectives, perceptions and concerns of women because it is the policy makers' subjective values and perceptions about risk that determines the protection that is afforded to different populations. The concerns and values of women must be made visible, and risk assessors and policy makers must listen to these differences. The manners in which risks are perceived and defined affect the chemicals and diseases that are studied.[82] For example, "classical risk assessments of air pollution have generally focused on

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76. *Id.*

77. *Id.* at 36-37.

78. Verchick, *supra* note 11, at 79.

79. *Id.* at 82.

80. *Id.* at 41.

81. The failure to hear women's voices is often present in health-care. Doctors have been criticized for discounting the health complaints of women whom they often regard as hysterical or over-reacting. *See Dressed for Diagnosis*, N.Y. TIMES, June 22, 1997, at 3 (Women's Health Special Section).

82. *Cf.* Swanston, *Race, Gender and Age*, *supra* note 1, at 595-96 (describing regulators' discretion when identifying risks).

cancer risks but not risks specific to vulnerable populations."[83] One reason why classical risk assessments have focused on cancer is based on the assumption that if individuals are protected from cancer, they will be protected from any other adverse effects.[84] By focusing on cancer risks, other health impacts that disproportionately impact women have been neglected. It is also possible that cancers specific to women have been overlooked. Since one third of all cancer deaths in women are sex specific, resulting from breast, cervix, uterus and uterine endometrium cancers,[85] it is equally as important to understand for what type of cancer risk a pollutant has been tested.

There are non-cancer effects of pollution that predominantly affect vulnerable populations. For example, in the case of air pollution, women are at risk from asthma, allergies and respiratory infections.[86] Risk assessments that focus on cancer neglect these threats and other non-cancerous threats. In particular, subjective policy considerations concerning environmental risks that focus on cancer risks can result in the risks of birth defects or miscarriages being overlooked.[87] For example, until recently, "concern about endocrine-disrupting substances has focused primarily on cancer, [although] it will be

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83. *Id.* at 596; *see also* Lynn R. Goldman, Two Decades of Progress in the Evaluation of Environmental Risks to Male Reproductive Health, Speech at Hazardous Substances and Male Reproductive Health International Conference (May 14, 1998) (stating that environmental policies have often targeted carcinogenic risks due to the way that risk assessments are conducted), *available at* http://www.epa.gov/opptsfrs/home/malerepf.htm (last visited Apr. 5, 2001) [hereinafter Goldman, *Two Decades of Progress*].

84. Goldman, *Two Decades of Progress*, *supra* note 83.

85. *See supra* note 41 and accompanying text.

86. *See* Lennart Möller et al., *Future Research Needs Associated with the Assessment of Potential Human Health Risks from Exposure to Toxic Ambient Air Pollutants*, 102 ENVTL. HEALTH PERSP. 193, 200 (Supp. 4 1994).

87. *Cf.* Robert R. Kuehn, *The Environmental Justice Implications of Quantitative Risk Assessment*, 1996 U. ILL. L. REV. 103, 127 (noting that non-cancer health effects including birth defects are overlooked in risk characterization). "Over reliance on resource-intensive cancer risk assessments leaves many other serious environmental hazards unaddressed . . . ." *Id.*

equally important to study these substances in relationship to infertility, endometriosis and birth defects."[88]

In order to protect women, risk assessments must include the fears, perceptions and values that are unique to women.[89] Only by accepting the diversity that exists in the perception or valuing of risks, is the advancement of women's environmental health possible.[90] In addition, including values, perspectives, and concerns of women in risk assessment will not only protect women, but protection of the entire human population may be expanded. Scientific experts and government workers are often far removed from places of environmental pollution and contamination, making some problems likely to go unnoticed.[91] However, individuals close

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88. Kelly & Jackson, *supra* note 50, at 17. There has been some progress made in this area. In 1998, the EPA announced that it would begin addressing women's health issues from endocrine disruptors. However, screening and testing programs would not have been initiated without pressure from groups such as the Long Island Breast Cancer Coalition, National Breast Cancer Coalition and the Endometriosis Association and Resolve. *See* Lynn R. Goldman, Partnership to Strengthen Efforts to Prevent Breast Cancer, Speech at Partnering to Improve Outcomes: Opportunities for Collaboration in Government Breast Cancer Programs, (Sept. 28, 1999), *available at* http://www.epa.gov/opptsfrs/home/hhsbcfi.htm (last visited Apr. 5, 2001) [hereinafter Goldman, *Partnership*].

89. There has been some recognition of different perceptions concerning risks. For example, the EPA has adopted a new approach for screening and testing chemicals that are endocrine disruptors. In October of 1996, the EPA established the Endocrine Disruptor Screening and Testing Advisory Committee ("EDSTAC"). This Committee is unique in that it is a collaborative effort, bringing together many differing interests. This committee recommends and sets priorities for chemicals that need to be screened and studied. However, recognizing that research is often focused on chemicals that we know pose a risk, the committee also ranks chemicals for which little is known. In addition, they allow the public to nominate chemicals that are specific concern to them but may seem insignificant on a national basis. *See* Goldman, *Partnership*, *supra* note 88. This type of approach differs from the traditional method of ranking priorities and defining risks, as it allows for many different interests to be heard.

90. For example, for years children received little protection under environmental laws. However, federal agencies have recently been required to take into account special risks and disproportionate impacts that environmental threats pose to children. *See* Exec. Order No. 13,045, 62 Fed. Reg. 19,885 (Apr. 21, 1997).

91. Verchick, *supra* note 11, at 47-48.

to environmental contamination may more readily notice environmental threats and more accurately perceive their seriousness.[92] For example, women activists, based on observations in their homes, have been the first to point out many environmental risks, such as contaminated soil, and water, and problems caused by lead poisoning.[93]

C. Risk Assessments Fail to Take into Account Physiological Differences of Women

The Environmental Protection Agency ("EPA") acknowledges that because the risk of exposure to environmental threats varies among members of populations, it is necessary to divide those populations into subgroups according to age, sex, race, and ethnicity in order to protect them adequately.[94] Although regulators use risk assessments to protect sensitive subgroups, their value in protecting these groups is questionable due to their failure to consider differences in vulnerability of these groups to environmental threats.[95]

Risk assessments involve many arbitrary assumptions, some of which overrate and underrate the risks to the human population.[96]

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92. *Id.* at 48 (pointing out that residents of polluted communities are often the first to notice the environmental threats).

93. *See, e.g., id.* (discussing how one activist was the first in her rural community to suspect that the water was contaminated based upon her observations of black stains on items of laundered clothing and from dizzy spells suffered by family members).

94. *See* SOCIODEMOGRAPHIC DATA, *supra* note 1, at 1-5.

95. *See generally* Kuehn, *supra* note 87 (examining the use of quantitative risk assessment and the implications on minority and low-income populations).

96. *See generally* Lisa Heinzerling, *The Rights of Statistical People*, 24 HARV. ENVTL. L. REV. 189 (2000). These assumptions are arbitrary and often made in the absence of conclusive proof. Risk assessment requires many assumptions concerning the potency of the hazard, the magnitude of exposures, and the susceptibility of the population at risk. For example, risk assessments require that the effects of a particular substance on an animal population be used to predict the effects in humans, thus assuming similarities between the animal populations studied, usually mice, rats, and humans. *Id.* at 199-200. Another example is the assumption by the Occupational Safety and Health Administration, that workers are exposed to pollutants for their entire working lives. *See id.*

Risk assessments often assume that the population targeted by the regulation has the same susceptibility to the harm as the population studied in the risk assessment.[97] As a result, some of the assumptions on which risk assessments are based underrate the actual risk borne by women, since the population studied is white men.[98] Consequently, the scientific analysis of determining a safe level of exposure does not adequately protect women because the population that is often studied does not include women.

Environmental risk assessments assume that the average weight is 70 kg. (154 lb.), the weight of the average man.[99] However, since most women weigh less than the average male, their exposure to pollutants is proportionately greater than men's exposure.[100] In

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97. *See id.* (stating that many assumptions used in risk assessments underrate the actual risk).

98. *See* Kuehn, *supra* note 87, at 123 n.100 (stating that only 2% of cancer epidemiological studies any analysis on nonwhite men and only 7% addressed the effects of nonwhite men); Joy E. Carlson & Katie Sokoloff, *Preventing Child Exposures to Environmental Hazards: Research and Policy Issues*, 103 ENVTL. HEALTH PERSP. 3 (Supp. 6 1995) (commenting that "children are not routinely included in risk assessment processes and most environmental regulations are based on exposure data of adult males"); *see also* Swanston, *Inequity*, *supra* note 7, at 38 (criticizing the assumption of the white male as the norm). However, this is slowly beginning to change in some areas. The EPA has begun a collaboration with NCI and NEIHS in a study of. 90,000 pesticide applicators and their families and their increased risk of developing diseases including breast cancer. *See* Goldman, *Partnership*, *supra* note 88. In addition, in 1996, the Food Quality Protection Act was passed requiring that children be taken into account in setting pesticide standards. *See* U.S. ENVTL. PROTECTION AGENCY, ENVIRONMENTAL THREATS TO CHILDREN (Sept. 1996), *available at* http://www.epa.gov/epadocs/child.htm (last visited Apr. 5, 2001). *See also* Swanston, *Inequity*, *supra* note 7, at 40 ("It is well known that most epidemiological studies used by environmental regulatory agencies have involved white males working in industry.").

99. *Id. See, e.g.*, ENVTL. PROTECTION AGENCY, 3 HUMAN HEALTH RISK ASSESSMENT PROTOCOL FOR HAZARDOUS WASTE COMBUSTION FACILITIES, VOL. 1, 6-16 (peer review draft 1998). For the determination of inhalation cancer risk for individual chemicals, this report stated that the EPA recommends using default values of 70 kg for adults. These default values are consistent with U.S. EPA 1990e. *Id.*

100. *See* Swanston, *Race, Gender and Age*, *supra* note 1, at 597 (arguing that the body weight used to calculate exposure levels should reflect the average weight of the general population). Since women on

addition, differences in female hormones and percentages of body fat may also create differences between men and women exposed to the same toxins.[101]

The EPA also assumes that the correct averaging time for the exposure to some pollutants is the human life span because the effects of certain carcinogens have long latency periods, in some instances approaching the human lifespan. However, the EPA uses seventy years as the default averaging time, the average life span of white males, even though women on average live seven years longer than men.[102] Therefore, risk assessments protect those individuals that weigh at least as much as the average male, and those that live at least as long as the average male.

Women are at a disadvantage due to these assumptions and as a result are under-protected. Women also face another disadvantage that adds to their under-protection: a general lack of knowledge concerning women's health. Although women account for over one-half of this country's population, they have been largely excluded from biomedical and clinical trials.[103] Women have been traditionally under-represented or excluded from clinical research on the basis of their sex and gender.[104] Moreover, women have even been excluded from studies on diseases that predominately affect women. For example, studies on breast cancer in the past excluded women, using samples of only men.[105] In addition, most epidemiological studies are

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average weigh less than the average male, they are not being considered in most assessments. *Id.*

101. *See* discussion *supra* Part I.A.

102. *See* Deborah. L. Wingard, *The Sex Differential in Morbidity, Mortality, and Lifestyle*, 5 ANNUAL REVIEW OF PUBLIC HEALTH 433, 434 (1984) (concluding that the average life expectancy rate of men and women differs by seven years).

103. Swanston, *Inequity*, *supra* note 7, at 37. The understanding that biomedical research focuses more on the health of men is one reason why the Food & Drug Administration and National Institutes of Health have created special guidelines to include women in research. In the last few years, NIH and FDA have vastly improved their policies concerning women's health. Karen L. Baird, *The New NIH and FDA Medical Research Policies: Targeting Gender, Promoting Justice*, 24 J. HEALTH POL., POL'Y & L. 531, 537-40 (1999).

104. *See* Baird, *supra* note 103, at 531-32.

105. Elaine S. Zwelling, *Women: First, Last, Always*, 3 J. PERINATAL EDUCATION 1, 2 (1994).

skewed because they focus on white males.[106] For example, women and minorities account for 46% and 18% of the U.S. work force respectively. However, a survey of 1,233 published epidemiological studies on occupational cancer found only a few studies that analyzed risks among white women and non-white women, 7% and 1% respectively.[107]

Although Congress passed a law in 1993 requiring that women be included in clinical trials in sufficient numbers, women are still being neglected in research.[108] Recent studies have found that although women are increasingly being included as subjects in clinical research, scientists often fail to analyze their data for sex and gender differences.[109] This exclusion and neglect of women from studies makes it difficult to treat, diagnose, and prevent disease in women.[110] Moreover, the general lack of knowledge about the causes, treatment and prevention of women's diseases adds to biased risk management decisions. Arguably this lack of information has resulted in regulatory agencies not taking women into account in risk assessments. The lack of knowledge about women is itself a strong argument that women's bodies need to be considered in risk assessments.

Physiological differences in women's bodies need to be taken into account in risk assessments. Risk assessments fail to consider the fact that women suffer disproportionately from different exposures to environmental pollution and that women suffer from unique health problems. Furthermore, risk assessments based on the assumption that the male body is representative of the entire population serves to reinforce the lack of information about women.

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106. Baird, *supra* note 103, at 535 (reporting major studies that used thousands of patients, all of whom were male).

107. Sheila Hoar Zahm & Joseph F. Fraumeni, Jr., *Racial, Ethnic, and Gender Variations in Cancer Risk: Considerations for Future Epidemiologic Research*, 103 ENVTL. HEALTH PERSP. 283, 284 (Supp. 8 1995).

108. Robert Pear, *Research Neglects Women; Studies Find,* N.Y. TIMES, Apr. 30, 2000, at 16.

109. *Id.*

110. *See* Swanston, *Inequity*, *supra* note 7, at 37 (discussing how the failure to include women in clinical research is slowly being remedied); *see generally* NATIONAL INSTITUTES OF HEALTH, *supra* note 25; *but see* Pear, *supra* note 108, at 16 (asserting that studies still lack meaningful analysis concerning gender-related health differences).

III. WHERE RISK ASSESSMENTS TAKE WOMEN'S BODIES INTO ACCOUNT, WOMEN'S HEALTH HAS BEEN EQUATED WITH BOTH THE HEALTH OF THEIR PREGNANCIES AND INFANTS

A. Traditionally, Women's Health Protection Has Been Limited to Their Reproductive Health; There is a Similar Trend in Environmental Health Protection

Traditional accounts of women's health problems often focus upon the reproductive potential of women. Within the medical establishment, women's health has often been relegated to obstetrics and gynecology; within public health, women's health needs are seen as being met by maternal and child health programs. "Reproduction was so central to women's biological existence that women's nonreproductive health was rendered virtually invisible."[111] Consequently, "[o]utside the specialized realm of reproduction, all other health research concerned men's bodies and men's diseases."[112] This bias stems from the traditional view that women were wives and mothers, important only for childbirth, childcare, and domestic nutrition.[113] Although women's reproductive health is an important concern, it comprises only a fraction of health issues that women face. Despite the gains of various women's movements, the belief that women's value is in their reproductive potential still persists.[114] Health concerns about women revolve around reproduction. This is especially true in the area of environmental health.

Environmental regulations have slowly begun to include pregnant women and women of childbearing age as sensitive populations due to concerns regarding the adverse affects of chemicals on fetuses.[115] Although this is an improvement for women's health concerns,

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111. Nancy Krieger & Elizabeth Fee, *Man-Made Medicine and Women's Health: The BioPolitics of Sex/Gender and Race/Ethnicity*, MAN-MADE MEDICINE 15, 21 (Kary L. Moss ed., 1996).

112. *See id.*

113. *See, e.g.*, Muller v. Oregon, 208 U.S. 412, 421 (1908) (stating that as "healthy mothers are essential to vigorous offspring, the physical well-being of woman becomes an object of public interest and care in order to preserve the strength and vigor of the race").

114. *See* Tracey E. Spruce, *The Sound of Silence: Women's Voices in Medicine and Law*, 7 COLUM. J. GENDER & L. 239, 252 (1998).

115. *See, e.g., infra* Part IV.

environmental health protection has not been adequately extended far beyond women's health of their reproductive potential.[116]

Looking at the EPA's approach in handling the environmental threat of air pollution, the dichotomy between reproductive women and women in general becomes more apparent. Recently, the EPA has recognized that indoor air pollution in the home poses risks. The EPA and its Science Advisory Board ("SAB") have ranked indoor air pollution as one of the most threatening environmental risks to public health.[117] Studies have concluded that allergens can seriously aggravate the symptoms of asthma, which for women, has been on the rise. Exposure from volatile organic compounds in the home can also threaten health.[118] These chemicals can evaporate from cleaning substances, adhesives, paints and wood preservatives.[119] Exposure to some may aggravate asthma and may be linked to cancer.[120]

Studies have also shown that air pollution can have significant health impacts on pregnancies. "Carbon monoxide has been related to sudden infant deaths and low birth weights."[121] There is currently a growing public education campaign to inform women about these risks during pregnancy.[122]

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116. One exception is that recently the EPA and other federal agencies have recognized the importance of informing women of the threat of breast cancer from environmental exposures. The EPA in 1996 planned to create a website that would enable citizens to locate breast cancer prevention programs and statistics. *See* Goldman, *Partnership*, *supra* note 88. The EPA is also planning more studies to look at the links of environmental risk factors to breast cancer. *See id.* However, this improvement came only with the strong lobbying efforts of women's health organizations. *Id.*

117. OFFICE OF CHILDREN'S HEALTH PROTECTION, U.S. EPA, AIR THEY BREATHE, *available at* http://www.epa.gov/children/air.htm#indoor (last visited Apr. 5, 2001) [hereinafter AIR THEY BREATHE] ("EPA studies of human exposure to air pollutants indicate that indoor air levels of many pollutants may be 2-5 times, and occasionally more than 100 times, higher than outdoor levels.").

118. *Id.*

119. *Id.*

120. *Id.*

121. ERIC MANN, L.A.'S LETHAL AIR 23 (1991) (quoting Kleinman, et al., Effects on Human Health of Pollutants 3.12).

122. *Id.*

However, research concerning the health impacts on women's health in general from air pollution seems to be lacking.[123] Risks to women's health from indoor air pollution has gone completely unrecognized, even though current information on indoor air pollution in the home suggests that it may have a great health impact on women's health.[124] This is especially disconcerting since women are disproportionately affected by pollution in the home being that they are more likely to work in the home.[125]

Household pollution also comes from pesticides,[126] including products to control insects, termites, rodents, fungi, and microbes.[127] Studies have shown that exposure to high levels of cyclodiene pesticides may cause long-term damage to liver and the central nervous system and an increased risk of cancer.[128] The EPA needs to recognize that women bear a disproportional impact from indoor air pollution in the home.

The fact that the EPA has recognized the risk to women's pregnancies and to children, but not women in general, is problematic. In order for women to be adequately protected, progress must be made outside of the area of reproduction. However, most environmental reports and studies that discuss women's environmental health only look at the maternal and reproductive aspect. Consequently, risk assessments tend to equate women's health with the health of their pregnancies and infants.

B. Risk Assessments Equate the Health of Fetuses and Infants with the Health of Women

Risk assessments and advisories have begun to take into account some effects that environmental hazards have on women's bodies.

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123. *Id.* (stating that in 1991, of the 22 major studies on health effects of ozone published in the "Effects on Human Health of Pollutants in the South Coast Air Basin," fourteen were done exclusively on males, three involved both males and females and only one study involved more women than men).

124. AIR THEY BREATHE, *supra* note 117 (identifying pollutants that are present in indoor air, such as volatile organic compounds, allergens and carbon monoxide).

125. *See supra* note 26.

126. AIR THEY BREATHE, *supra* note 117.

127. *Id.*

128. *Id.*

Many times, these risk assessments and advisories are characterized as protecting women, particularly pregnant women and women of child-bearing age. However, in reality, these regulations protect women's pregnancies, infants, and children, not women themselves. The fact that the protection of fetuses, infants and children has been mischaracterized as protecting women only adds to the misperception that women are adequately protected. It is important to investigate this mischaracterization.[129] The way that events are characterized and the words that are used often influence how one sees reality.[130]

By equating women's health with the health of their pregnancies and infants, we dangerously neglect other factors that affect pregnancies and reproduction.[131] Women's health extends far beyond health issues connected with reproduction.[132] Furthermore, the mischaracterization of risk assessments that protect pregnancies and infants as being protective of women may create a false sense of security that women's health needs are being met.

IV. HUMAN HEALTH RISK ASSESSMENTS FOR FISH CONSUMPTION

The human health risk assessments concerning fish consumption in the Hudson River in New York provide an illustration of some of the deficiencies of risk assessments. There is a growing concern that individuals are exposed to dangerously high levels of PCBs, dioxins, and organochlorine pesticides through consumption of fish laced with these pollutants. In the past, the EPA has severely

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129. This mischaracterization is illustrated by classifying pregnant women and women of childbearing age as sensitive subpopulations by the EPA; however, the population that the EPA is actually seeking to protect consists of fetuses, infants, and children.

130. Holly Doremus, *The Rhetoric and Reality of Nature Protection: Toward a New Discourse*, 57 WASH. & LEE L. REV. 11, 12 (2000) ("[S]ometimes the rhetoric we use to describe problems becomes so ingrained as to be almost invisible. Even if we are unaware of it, though, rhetoric has the very real effect of severely constraining our perception of the problem and its potential solutions.").

131. *See, e.g.*, Shanna H. Swan et al., *Have Sperm Densities Declined? A Reanalysis of Global Trend Data*, 105 ENVTL. HEALTH PERSP. 1228-32 (1998) (finding that pollutants, specifically endocrine disruptors, have been linked to lower sperm counts).

132. *See* discussion *supra* Part I.A.

underestimated the threats to sensitive populations from consuming fish laced with PCBs, dioxin, mercury and pesticides.[133]

As discussed in Part I, pollutants such as PCBs, dioxins, and organochlorine pesticides may disproportionately affect women due to their higher percentages of body fat.[134] High exposure to these chemicals may potentially impact the liver, nervous system, immune system, metabolism of glucose, reproductive hormones, and may cause cancer and birth defects.[135] Exposure to these chemicals may disproportionately affect women since they tend to suffer more from autoimmune disorders[136] and because mercury exposure has been linked to interfering with the immune system.[137] These toxins also have harmful effects on pregnancies and nursing infants.

Some states have issued advisories concerning the safe amount of fish that can be consumed.[138] However, these advisories do not adequately protect women. The advisories are based upon risk assessments that do not consider different impacts on sensitive populations including women because they were based upon the EPA's default assumptions.[139] The chemical exposure from fish consumption was calculated by a default assumption about body weight and the number of years of exposure to these chemicals.[140]

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133. ENVIRONMENTAL DEFENSE FUND, EPA UNDERESTIMATES RISKS OF FISH IN AMERICANS' DIET (1993), *available at* http://www environmentaldefense.org/pubs/EDF-Letter/1993/Mar/c_epaunder.html (last visited Apr. 5, 2001).

134. *See* Verchick, *supra* note 11, at 64. These chemicals build up more heavily in fatty tissue. *Id.*

135. *See* Lillie-Blanton et al., *supra* note 17, at 49 (discussing the risk of cancer, liver damage, and nervous system damage from repeated exposure to PCBs); *see also* N.Y. STATE DEPT. OF HEALTH, HEALTH ADVISORIES: CHEMICALS IN GAME AND SPORTFISH 1999-2000 (describing the consequences of regularly eating contaminated fish).

136. *See supra* notes 46-47 and accompanying text.

137. *See* Jocelyn Kaiser, *Toxicologists Shed New Light on Old Poisons*, 279 SCIENCE 1850, 1850 (1998).

138. *See, e.g.*, N.Y. STATE DEPT. OF HEALTH, HEALTH ADVISORIES: CHEMICALS IN GAME AND SPORTFISH 1999-2000.

139. ENVTL. PROTECTION AGENCY, HUMAN HEALTH RISK ASSESSMENT: UPPER-HUDSON RIVER PCBS REASSESSMENT RI/FS 23 (1999) [hereinafter UPPER-HUDSON RISK ASSESSMENT]; ENVTL. PROTECTION AGENCY, 2F-A HUMAN HEALTH RISK ASSESSMENT: MID-HUDSON RIVER PCBS REASSESSMENT RI/FS 16 (1999) [hereinafter MID-HUDSON RISK ASSESSMENT].

140. UPPER-HUDSON RISK ASSESSMENT, *supra* note 139, at 23.

The body weight of 70kg, the average weight of men, not women, was used for calculating the risk from chemical exposure[141] and inhalation rates for PCBs.[142] Similarly, calculations of the risk of methyl mercury were based upon a body weight of 72kg.[143] To determine the carcinogenic effects throughout a lifetime, seventy years was used as the average life span,[144] even though it is seven years shorter than the average life span of women.[145]

Although the EPA has acknowledged that pregnant women may be more susceptible to pollutants,[146] risk assessments do not seem to consider these hormonal differences. They do not account for pregnant women's vulnerabilities to pollutants due to these hormonal changes. Physiological changes during pregnancy have been shown to make pregnant women more susceptible to pollutants such as beryllium, lead, manganese, and organophosphate insecticides.[147]

Although some states have issued advisories that concern the amount of fish that can be consumed by women, the goal of these advisories is the protection of fetuses, nursing infants, and young children, not women.[148] For example, the EPA's risk assessments for exposures to mercury-contaminated fish now take into account women's pregnancies, nursing infants, and children.[149] Some states

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141. UPPER-HUDSON RISK ASSESSMENT, *supra* note 139, at 23; MID-HUDSON RISK ASSESSMENT, *supra* note 139, at 16.

142. UPPER-HUDSON RISK ASSESSMENT, *supra* note 139, at 31.

143. OFFICE OF WATER, U.S. ENVTL. PROTECTION AGENCY, MERCURY UPDATE, IMPACT ON FISH ADVISORIES, *available at* http://www. epa.gov/ost/fish/mercury.html (last visited Apr. 5, 2001) [hereinafter MERCURY UPDATE].

144. UPPER-HUDSON RISK ASSESSMENT, *supra* note 139, at 23; MID-HUDSON RISK ASSESSMENT, *supra* note 139, at 16.

145. *U.S. Women Live Longer*, USA TODAY, Dec. 7, 1999, at A1 (stating that, in the United States, the average age for women is 80 years, and the average age for men is 73 years).

146. *See id.*

147. *See* SOCIODEMOGRAPHIC DATA, *supra* note 1, at 1-8.

148. *See generally*, U.S. ENVTL. PROTECTION AGENCY, NATIONAL LISTING OF FISH AND WILDLIFE ADVISORIES, *available at* http://www.epa.gov/ost/fish (last visited Apr. 5, 2001).

149. *Id.* It should also be noted that although the EPA has finally begun to recognize the risks to women's pregnancies, there has still been a lack of action at the national level. Them has been little attention paid to targeting and reaching women of childbearing age and pregnant women to alert them to the risks posed by eating mercury contaminated fish. *See* Michael T. Bender & Jane M. Williams, *A Real Plan of Action on*

have issued special consumption advisories for methyl mercury for women who are breast-feeding or pregnant, and for young children.[150]

Even though these advisories are characterized as protecting pregnant women and childbearing women,[151] they do not consider the health impacts to women themselves. The EPA often cites pregnant women and women of childbearing age as sensitive populations that need protection through advisories.[152] However, these advisories only address the impact to the fetus, infant, and child, not to the health of the woman.[153] These advisories need to consider the impact to women's health in order to adequately protect women.

CONCLUSION

Environmental laws and regulations fail to adequately protect women. Risk assessments, which are the basis for many health and safety standards, fail to take into account factors that create different or greater environmental risks for women. Risk assessments fail to acknowledge physiological and socio-economic differences between men and women. In addition, policies implemented to protect the public's safety and health reflect value-laden judgments of risk perception and do not consider the values and experiences of often marginalized groups such as women. The result of risk assessments and policies that do not incorporate these factors is health protection that is tailored to men, and assumed to fit women. This has lead to the inadequate protection of women's environmental health.

Mercury, 114 PUB. HEALTH REP. 416 (1999). Men are more than twice as likely to report being aware of fish advisories. *Id.*

150. *See* MERCURY UPDATE, *supra* note 143. However, it should be noted that these advisories are aimed at protecting the pregnancies of women, not the women themselves. *Cf. id.* (revealing that the EPA suggests that states use a default value of 72 kg to calculate consumption limits for adults, event though the average woman weighs less than this).

151. *See, e.g.*, N.Y. STATE DEPARTMENT OF HEALTH, HEALTH ADVISORIES: CHEMICALS IN SPORTFISH AND GAME 2000-2001 2 (2000).

152. *See id.* (characterizing the advisories as being for women, infants and children).

153. *Id.* (stating that the reasons for the special protection of women is to protect fetuses, young children and breast milk).

In order to address this inequality, we must first acknowledge that women, as a diverse group, are disadvantaged by certain policies and by the absence of specific policies to meet their needs. Risk assessments based upon false assumptions are a prime example. Physiological and socio-economic differences between men and women must be incorporated when conducting risk assessments. The concerns, values and experiences that are often unique to women must also be considered in order to create an inclusive definition of risk. In addition, regulators must acknowledge that women's health extends far beyond women's reproductive potential. Although the protection of fetuses, infants, and children is extremely important, and long awaited, equating it with women's health only further disadvantages women. Armed with the knowledge that sex and gender inequality exists in women's environmental health protection, agency officials, legislators, and other legal decision makers will be encouraged to critically examine the public health implications of risk assessments that currently fail to consider women.