Environmental Justice

Environmental Justice, A Bibliography with Abstracts

June 1997

Prepared by
Toxicology and Environmental Health Information Program
Specialized Information Services
National Library of Medicine
National Institutes of Health

Forward

The purpose of this bibliography is to increase public awareness of Environmental Justice, as to current literature and debate, through information published in journals, books and technical reports. Citations are selected and compiled through searching various computerized online bibliographic databases. The strategy included the following terms: environmental justice or equity, minorities, race, class, health, hazard, waste, and pollution, among others.

Suggestions and comments are welcome. Please send to Vera Hudson at: Vera_Hudson@NLM.NIH.GOV

Citations

Environmental Equity Reducing Risk for All Communities. Volume 1. Workgroup Report to the Administrator. Washington, DC: Environmental Protection Agency, Office of Policy, Planning and Evaluation; Report No.:EPA-230-R-92-008A. 140 P. Available From: NTIS, Springfield, VA,;PB95-213146
This report to the Administrator reviews existing data on the distribution of environmental exposures and risks across population groups. It also summarizes the Workgroup's review of EPA programs with respect to racial minority and low-income populations. Based on the findings from these analyses, the Workgroup makes initial recommendations. The report is intended to contribute to the national dialogue on environmental equity and to suggest further steps for EPA. It is an initial step in the Agency's response to environmental equity concerns.

Environmental Equity: Reducing Risk for All Communities. Volume 2. Supporting Document. Washington, DC: Environmental Protection Agency; Report No.:EPA-230-R-92-008A. 140 P. Available From NTIS, Springfield, VA.;PB95-213146
In targeting its protection efforts to reduce the most serious risks, the Agency has begun to examine how the patterns of environmental problems converge on different places, how the people who live in those places are affected, and how environmental programs should be refined to address identified differences. A community surrounded by Multiple sources of air pollution, ringed by waste treatment facilities and landfills, and whose residences contain lead-based paint clearly faces higher than average potential environmental risks. It is in this context that concerns have been raised about the relative risk burden borne by low-income and racial minority communities. Examination of these differences in risk burden and how government agencies respond is known as environmental equity. Although there are many types of equity, this report focuses on racial and socioeconomic equity. See also PB91-155234 and Volume 1, PB95-182556.

Environmental Justice Initiatives 1993. Washington, DC: Environmental Protection Agency; Report No.:EPA-200-R-93-001. 24 P. Available From: NTIS, Springfield, VA.;PB95-182416
The report describes EPA's efforts and initiatives to provide environmental protection for all Americans regardless of race, ethnic background, or income status.

Strategic elements for environmental justice. Environ Health Perspect 1995;103(9):796-800.

Anderson YB, Coulberson SL, Phelps J. **Overview of the EPA/NIEHS/ATSDR workshop--equity in environmental health: research issues and needs**. Toxicol Ind Health 1993;9(5):679-83.

Anderton DL, Anderson AB, Oakes JM, Fraser MR. **Environmental equity: the demographics of dumping**. Demography 1994;31(2):229-48.
Research addressing environmental equity and environmental racism claims that facilities for treatment, storage, and disposal of hazardous wastes (TSDFs) are located disproportionately in minority areas. In the first comprehensive study of TSDFs to use census tract-level data, we find no nationally consistent and statistically significant differences between the racial or ethnic composition of tracts which contain commercial TSDFs and those which do not. TSDFs are more likely to be found in tracts with Hispanic groups, primarily in regions with the greatest percentage of Hispanics. Different geographic units of analysis elaborate on, but are consistent with, these results.

Bollini P, Siem H. **No real progress towards equity: health of migrants and ethnic minorities on the eve of the year 2000**. Soc Sci Med 1995;41(6):819-28.
The paper reviews the available evidence on access to health care and two health outcomes, perinatal Tmortality and accident/disability, for migrant and ethnic minorities in selected receiving industrialized countries. The health of these communities is analyzed using the entitlement approach, which considers health as the product of both the individual's private endowments and the social environment he or she faces. Migrants, especially first and second generations, and ethnic minorities often have reduced entitlements in receiving societies. Not only are they exposed to poor working and living conditions, which are per se determinants of poor health, but they also have reduced access to health care for a number of political, administrative and cultural reasons which are not necessarily present for the native population. The paper argues that the higher rates of perinatal mortality and accidents/disability observed in many migrant groups compared to the native population are linked to their lower entitlements in the receiving societies. Policies aimed at reducing such health gaps need to be accompanied by a more general effort to reduce inequalities and to promote full participation of these groups in the mainstream of society.

Brown P. **Race, class, and environmental health: a review and systematization of the literature**. Environ Res 1995;69(1):15-30.
This paper analyzes and systematizes the race and class differentials in exposure to toxic hazards and actual health outcomes. Research is categorized into the following: Proximity to known hazards includes (1) presence of hazardous waste sites and facilities (landfills, incinerators, Superfund sites), (2) exposure to air pollution, (3) exposure to various environmental hazards, e.g., toxic releases and hazards in pesticides and foods; Regulation, amelioration and cleanup includes (4) record of decisions (RODs) and cleanups at NPL sites, (5) regulatory action, as measured by assessed fines for environmental pollution; Health effects includes (6) specific health outcomes which are related to environmental burden (e.g., blood lead levels). Proximity to prospective hazards includes (7) sitting decisions for incinerators, hazardous waste sites, and nuclear storage sites. The overwhelming bulk of evidence supports the environmental justice belief that environmental hazards are inequitably distributed by class, and especially race.

Bullard RD, Wright BH. **Environmental justice for all: community perspectives on health and research needs**. Toxicol Ind Health 1993;9(5):821-41.
Some individuals, groups, and communities are at special risk from environmental threats. This is especially the case for low income persons, the working class, and people of color whose health may be imperiled by lead in their houses, pollution in their neighborhoods, and hazards in their workplace. Moreover, many of their children face potential health threats in the parks where they play. The environmental justice perspective unmasks the

ethical and political questions of who gets what, why, and in what amounts. An environmental and public health strategy is needed to ensure that all Americans are protected.

Burg JR, Gist GL. **The National Exposure Registry: procedures for establishing a registry of persons environmentally exposed to hazardous substances**. Toxicol Ind Health 1995;11(2):231-48.
The Agency for Toxic Substances and Disease Registry has, as mandated in Superfund legislation, established the National Exposure Registry (NER). The purpose of the NER is to assess and evaluate the potential relationship between adverse health effects and environmental exposure for an exposed population, particularly the relationship between chronic health effects and long-term, low-level chemical exposures. The NER's primary goal is to facilitate epidemiology research by establishing multiple data bases (subregistries) that contain demographic, environmental, and health information on large populations exposed to selected chemicals. The Registry data mainly serve the purpose of being hypothesis-generating rather than hypothesis-testing. The NER is currently composed of subregistries of: (1) persons exposed to volatile organic compounds (VOCs)--a subset of registrants in whom trichloroethylene (TCE) is the primary VOC exposure, but others are present (N = 4,832), a subset in whom benzene is the primary VOC exposure (N = 1,142), and a subset in whom trichloroethane (TCA) and TCE are the highest VOC exposures (N = 3,666); and (2) persons with dioxin exposure (N = 250). Chromium and radioactive substances subregistries are planned.

Calderon RL, Johnson CC Jr, Craun GF, Dufour AP, Karlin RJ, Sinks T, Valentine JL. **Health risks from contaminated water: do class and race matter?** Toxicol Ind Health 1993;9(5):879-900.
The impact of contaminants in water on minorities and economically disadvantaged persons was reviewed. Environmental legislation governing water was summarized as background information against which relevant studies were evaluated. The majority of the available information was anecdotal or case study and did not lend itself to making quantitative comparisons or analyses. However, the data did present certain trends that led to the conclusion that inequities concerning exposure to contaminants in water may exist. The following recommendations were made: current data bases should be analyzed and new data bases created to facilitate assessments of exposure to waterborne contaminants to all populations; an analysis of populations not covered by the Safe Drinking Water Act should be undertaken; a survey should be conducted of the drinking water infrastructure and the results evaluated to identify any impacts to minorities and economically disadvantaged persons; the social, cultural and economic characteristics that influence human exposure to waterborne contaminants need to be identified; and better educational and community outreach programs need to be developed and implemented.

Capek SM. **Environmental justice, regulation, and the local community**. Int J Health Serv 1992;22(4):729-46.
This article examines the sociological significance of the concept of environmental justice for grassroots groups responding to toxic contamination in their local communities. Taking into account nationwide mobilization patterns in such communities, the author documents a precedent-setting episode in the city of Jacksonville, Arkansas, where citizen protests and support from national environmental groups led the Environmental Protection Agency to withdraw three Technical Assistance Grants inappropriately awarded to a group with links to a polluting industry, and subsequently to rewrite the rules for participation in such grants. As the first such challenge nationally, the Jacksonville scenario is an important test case and permits a theoretical and practical evaluation of the relationship between social groups, technology, and the governmental regulatory process. More particularly, it gives insight into the Technical Assistance Grants program, which was set up to enable citizens living close to contaminated sites to interpret and evaluate technical information relating to such sites, but which has been undercut by a weak EPA and cooptation efforts by industries. The article concludes with an exploration of the concept of community in relation to the new construction of environmental justice engaged in by grassroots groups fighting contamination locally and nationally.

Carpenter DO. **Communicating with the public on issues of scientific and public health**. Environ Health Perspect 1995;103(Suppl 6):127-30.
BIOSIS COPYRIGHT: BIOL ABS. RRM JOURNAL ARTICLE HUMAN ENVIRONMENTAL POLLUTION TOXICOLOGY TRUST RESPECT EMPOWERMENT EQUITY LIFESTYLE CHANGES.

Dunbar JB. **Cancer and birth defects surveillance system for communities around the Savannah River Site**. Annual progress report. Washington, DC: Department of Energy; Report No.:DOE-SR-18217-2. Contract

No. FE09-91SR-18217. 157 P. Available From: NTIS, Springfield, VA.;DE93015421
This technical report presents the age-adjusted total, and race and sex specific geographic patterns of cancer mortality for South Carolina (SC) counties utilizing the 1953--1987 average annual age-adjusted mortality rates (AAMRs). The mortality information was obtained from the State Cancer Control Map and Data Program produced by the National Cancer Institute , Centers for Disease Control and the American Cancer Society. The AAMRs for selected primary sites are classified as significantly different or not significantly different from the corresponding United States and SC mortality rates. Categories for classification of the rates are determined using 95% confidence intervals. Geographic patterns of significantly high county AAMRs are identified and discussed. Individual county rates are not emphasized. The terminology, mortality rates used throughout this report pertains to the 1953--1987 AAMRS. Sponsored by Department of Energy, Washington, DC.

George DB, Wells MJ, Clark YR, Riemer JW, Mookherjee HN, Rollins SL, Gilbert AH. **Wastewater environmental justice in small communities**. 212th American Chemical Society National Meeting, Orlando, Florida, Usa, August 25-29, 1996. Abstracts Of Papers American Chemical Society; 212 (1-2). 1996. Envr 125. BIOSIS COPYRIGHT: BIOL ABS. RRM MEETING ABSTRACT WASTEWATER TREATMENT.

Gochfeld M, Campbell V, Landsbergis PA. **Demography of the hazardous waste industry**. Occup Med 1990;5 (1):9-23.
This article attempts to characterize the workforce of the hazardous waste industry. The growth of the industry is discussed, including its deployment into various activity categories, and its size is estimated. Finally, demographics of the workforce are presented.

Gold DR, Rotnitzky A, Damokosh AI, Ware JH, Speizer FE, Ferris BG Jr, Dockery DW. **Race and gender differences in respiratory illness prevalence and their relationship to environmental exposures in children 7 to 14 years of age**. Am Rev Respir Dis 1993;148(1):10-8.
Race and gender differences in respiratory illness prevalence rates were assessed in a cohort of 8,322 white children and 1,056 black children 7 to 14 yr of age from four U.S. cities. Boys had higher rates of wheeze, asthma, cough, phlegm, and bronchitis than girls. Black children had higher rates of persistent wheeze, shortness of breath with wheeze, asthma, chronic cough, and chronic phlegm than white children. We examined whether the racial disparity in respiratory illness prevalence could be accounted for by environmental exposures and socioeconomic factors. The proportion of families without a parent who had graduated from high school was higher for blacks than for whites, as was the proportion of single-parent households. Black children took up smoking less frequently; their mothers smoked fewer cigarettes. Personal and maternal smoking predicted higher rates of persistent wheeze, chronic cough, chronic phlegm, and chest illness. The relative odds for persistent wheeze were 1.34 (1.07, 1.69) for smoking children compared with nonsmoking children. The relative odds for persistent wheeze were 1.35 (1.13, 1.60) for children whose mother smoked > 30 cigarettes per day versus children with no maternal smoke exposure. Other predictors of respiratory illnesses included parental respiratory illness, parental education, only-child status, single-parent household, air conditioner use, and body mass index. Nevertheless, adjustment for socioeconomic factors, environmental exposures, and body habitus did not significantly reduce the excess respiratory illness prevalence observed among black children. The adjusted relative odds were 1.47 (1.25, 1.74) for persistent wheeze and 1.57 (1.17, 2.10) for asthma for black children versus white children.(ABSTRACT TRUNCATED AT 250 WORDS).

Goldberg MS, Al-Homsi N, Goulet L, Riberdy H. **Incidence of cancer among persons living near a municipal solid waste landfill site in Montreal, Quebec**. Arch Environ Health 1995;50(6):416-24.
The Miron Quarry municipal solid waste landfill site in Montreal, Quebec, generates copious quantities of methane and other gases, including a rich mixture of volatile organic compounds, some of which are recognized or suspected human carcinogens. The site is the third largest in North America and is located in the center of a densely populated area. Using data from the Quebec Tumour Registry, we conducted Poisson regression analyses to evaluate whether cancer incidence among persons who lived near the site was higher than expected. Potential exposure to ambient air pollutants from the site was defined in terms of a set of geographic exposure zones proximal to the site. A set of reference areas distal from the site was selected to be similar to these exposure zones with respect to several key sociodemographic factors. Risk ratios (RRs) were adjusted for age and calendar year. Among men living in the exposure zone closest to the site, elevated risks were observed for

cancers of the stomach (RR = 1.3, 95% confidence interval [95% CI] = 1.0-1.5); liver and intrahepatic bile ducts (RR = 1.3, 95% CI = 0.9-1.8); and trachea, bronchus, and lung (RR = 1.1, 95% CI = 1.0-1.2). Among women, rates of stomach cancer (RR = 1.2; 95% CI = 0.9-1.5) and cervix uteri cancer were elevated (RR = 1.2, 95% CI = 1.0-1.5), but breast cancer incidence was less than expected (RR = 0.9, 95% CI = 0.9-1.0). Prostate cancer was also elevated in one of the proximal exposure subzones (RR = 1.2, 95% CI = 1.0-1.4). Further studies at this and at other landfill sites are needed to confirm or refute these observations.

Granado L. **Environmental equity. The impact of environmental issues on people of color [interview by Mary Szczepanski]**. Beginnings 1994;14(3):2-3.

Hackbarth DP, Silvestri B, Cosper W. **Tobacco and alcohol billboards in 50 Chicago neighborhoods: market segmentation to sell dangerous products to the poor**. J Public Health Policy 1995;16(2):213-30.
This paper describes a study of billboard advertising of tobacco and alcohol products in the city of Chicago. All billboards were counted and their advertising themes noted. These data were matched with information on population and race from the 1990 census in order to document which geographic areas of the city, if any, had excess tobacco or alcohol billboards. The data revealed that minority wards were burdened with three times as many tobacco billboards and five times as many alcohol billboards when compared to white wards. The findings are congruent with studies conducted in other urban areas, which demonstrate a consistent pattern of tobacco and alcohol advertisers targeting poor and minority neighborhoods for outdoor advertising of their dangerous products. Chicago legislative initiatives based on the billboard study are described.

Heitgerd JL, Burg J Ar, Strickland HG. **A geographic information systems approach to estimating and assessing national priorities list site demographics: racial and Hispanic origin composition**. International J Occupat Med Toxicol 1995;4(3):343-63.
BIOSIS COPYRIGHT: BIOL ABS. Demographic studies used to investigate whether minorities are more likely to live near hazardous waste sites have resulted in varying conclusions. Some reasons for these inconsistencies may be due to the design of studies used to collect and compare demographic information. In the research reported here, a Geographic Information Systems (GIS) approach to characterizing total population, by race and Hispanic origin, for areas within a mile of 1,200 National Priorities List (NPL) sites across the United States, was used. An intra county statistical comparison was made between racial and Hispanic origin subpopulations living within one mile of a site and the subpopulations living in the same county, but more than one mile from the site. These results show that the percentage of the population reporting in a minority category is higher in areas nearer the NPL sites.

Hu H, Kotha S, Brennan T. **The role of nutrition in mitigating environmental insults policy and ethical issues**. Environ Health Perspec 1995;103(Suppl. 6):185-90.
BIOSIS COPYRIGHT: BIOL ABS. RRM JOURNAL ARTICLE HUMAN MALNUTRITION PREVENTION ENVIRONMENTAL EQUITY ENVIRONMENTAL RIGHTS.

Huss K, Rand CS, Butz AM, Eggleston PA, Murigande C, Thompson LC, Schneider S, Weeks K, Malveaux FJ. **Home environmental risk factors in urban minority asthmatic children**. Ann Allergy 1994;72(2):173-7.
Urban minority families with children with asthma often live in homes with allergen and irritant exposures harmful to these children. We enrolled 392 African-American asthmatic children, male and female, aged 5 to 12, from 42 schools in Washington, DC and Baltimore, MD. The project is designed to test the effectiveness of school-based asthma education interventions, community-based asthma health workers' programs, and the combination on these children. Baseline telephone interviews were carried out with the primary home care-givers for demographic data and for environmental home exposures that exacerbated asthma. Exposures stated to cause wheezing in the children were cigarette smoke in 72%, dust in 53%, cats in 34%, dogs in 27%, and roach exposure in 15%. Fifty-six percent of children live with cigarette smoke exposure, 73% of which is from mothers. This was a highly symptomatic group with 44% reporting two or more days per week of restricted activity and 62% reporting two or more episodes of night symptoms per week. Those with mattress covers on beds had significantly fewer emergency department visits in the past 6 months than those without covers. Over one-third of parents reported children taking two bronchodilators without anti-inflammatory agents. Less than 20% were reported using anti-inflammatory medications. Decreasing asthma severity in this population entails the prevention and control of known risk factors in the home environment. Emphasis must be placed on cigarette

smoking cessation programs, covering mattresses, and dust and animal dander control. Primary care physicians require education on the role of anti-inflammatory medications.

Kearns G. **Class and environment in fatal years**. Bull Hist Med 1994;68(1):113-23.

Lanphear BP, Weitzman M, Eberly S. **Racial differences in urban children's environmental exposures to lead**. Am J Public Health 1996;86(10):1460-3.
OBJECTIVES: This study explored whether differences in environmental lead exposures explain the racial disparity in children's blood lead levels. METHODS: Environmental sources of lead were identified for a random sample of 172 urban children. RESULTS: Blood lead levels were significantly higher among Black children. Lead-contamination of dust was higher in Black children's homes, and the condition of floors and interior paint was generally poorer. White children were more likely to put soil in their mouths and to suck their fingers, whereas Black children were more likely to put their mouths on window sills and to use a bottle. Major contributors to blood lead were interior lead exposures for Black children and exterior lead exposures for White children. CONCLUSIONS: Differences in housing conditions and exposures to lead-contaminated house dust contribute strongly to the racial disparity in urban children's blood lead levels.

Liu F. **Urban ozone plumes and population distribution by income and race: a case study of New York and Philadelphia**. J Air Waste Manag Assoc 1996;46(3):207-15.
Who lives in the downwind areas of urban ozone plumes? Location theory suggests that the poor should disaproportionately populate the downwind area, while the rich are most likely to live outside urban ozone plumes. Dynamically, we would expect that the downwind area would become poorer over time because the rich would vote with their feet under the serious impacts of urban ozone plumes. However, the importance of urban ozone pollution could be discounted due to the public's risk perception. According to risk and air quality perception literature, one would expect that the public would likely perceive ozone air pollution as a relatively low risk, compared with other environmental risks and social concerns. Therefore, actual population distribution might not follow what location theory suggests. Who actually does live in the downwind areas of urban ozone plumes? The results from a case study of New York and Philadelphia show that the ozone downwind areas are currently populated by a considerably larger proportion of upper income households and whites than the source areas. Furthermore, the population dynamics data do not provide any evidence for the vote with their feet hypothesis. While these findings deviate from the hypotheses prescribed by location theory, they are consistent with what we could expect from theories of risk perception.

Metzger R, Delgado JL, Herrell R. **Environmental health and Hispanic children**. Environ Health Perspect 1995;103(Suppl 6):25-32.
There are numerous indicators that Hispanics face a disproportionate risk of exposure to environmental hazards. Ambient air pollution, worker exposure to chemicals, indoor air pollution, and drinking water quality are among the top four threats to human health and are all areas in which indicators point to elevated risk for Hispanic populations. These data, juxtaposed with data on the health status of Hispanics, tell us that the environmental health status of Hispanics and their children is poor. At the same time, significant inadequacies in the collection of data on Hispanics make it difficult to make improving Hispanic environmental health status a priority. These inadequacies include the failure to use Hispanic identifiers in data collection and failure to collect sample sizes large enough to allow for breakouts of data by Hispanic subgroup. In addressing environmental justice issues, the U. S. Environmental Protection Agency (U.S. EPA) and the Department of Health and Human Services (DHHS) should prioritize improving the quantifiability of environmental exposures and risk based on race or ethnicity. However, improving data should not be the prerequisite to significant, affirmative steps by DHHS and U.S. EPA to address environmental and environmental health problems facing Hispanic communities. In particular, a health-based approach to environmental justice should be the priority.

Montgomery LE, Carter-Pokras O. **Health status by social class and/or minority status: implications for environmental equity research**. Toxicol Ind Health 1993;9(5):729-73.
Much of the epidemiologic research in the United States has been based only on the categories of age, sex and race; thus, race has often been used in health statistics as a surrogate for social and economic disadvantage. Few multivariate analyses distinguish effects of components of social class (such as economic level) from the

relative, joint, and independent effects of sociocultural identifiers such as race or ethnicity. This paper reviews studies of social class and minority status differentials in health, with a particular emphasis on health status outcomes which are known or suspected to be related to environmental quality and conditions which increase susceptibility to environmental pollutants. Sociodemographic data are presented for the U.S. population, including blacks, Asian American/Pacific Islanders, American Indian/Alaska Natives, and Hispanics. Four areas of health status data are addressed: mortality, health of women of reproductive age, infant and child health, and adult morbidity. Conceptual and methodological issues surrounding various measures of position in the system of social strata are discussed, including the multidimensionality of social class, in the context of the importance of these issues to public health research. Whenever possible, multivariate studies that consider the role of socioeconomic status in explaining racial/ethnic disparities are discussed.

Moses M, Johnson ES, Anger WK, Burse VW, Horstman SW, Jackson RJ, Lewis RG, Maddy KT, Mcconnell R, Meggs WJ, et al. **Environmental equity and pesticide exposure**. Toxicol Ind Health 1993;9(5):913-59.
Although people of color and low-income groups bear a disproportionate share of the health risks from exposure to pesticides, research attention has been meager, and data on acute and chronic health effects related to their toxic exposures are generally lacking. Increased resources are needed both to study this issue and to mitigate problems already identified. People of color should be a major research focus, with priority on long-term effects, particularly cancer, neurodevelopmental and neurobehavioral effects, long-term neurological dysfunction, and reproductive outcome. Suitable populations at high risk that have not been studied include noncertified pesticide applicators and seasonal and migrant farm workers, including children.

Nieves AL, Nieves LA. **Race, ethnicity, and noxious facilities: Environmental racism re-examined**. Washington, DC: Department of Energy; Report No.:ANL-EAIS-PP-77719. Contract NO.:W-31109-ENG-38. 35 P. Available From: NTIS, Springfield, VA.;DE94008116
The charge has been made that hazardous facilities tend to be located in proximity to minority populations. This study uses a facility density measure for three categories of noxious facilities to examine the relationship between facilities and minority population concentrations. County-level data are used in a correlation analysis for African Americans, Hispanics, and Asians in the four major regions of the US. Even controlling for income and housing value, and limiting the data set to urban areas, consistent patterns of moderate to strong association of facility densities with minority population percentages are found. Sponsored by Department of Energy, Washington, DC.

Nieves LA, Wernette DR. **Assessment of relative exposure of minority and low-income groups to outdoor air pollution**. Washington, DC: Department of Energy; Report No.:ANL-DIS-TM-31. Contract No.:W-31109-ENG-38. 67 P. Available From: NTIS, Springfield, VA.;DE96014467
A diverse research effort, conducted by both federal agencies and scholars in academia, has addressed the issue of environmental justice. Recent environmental justice studies have generally focused on the demographics of areas close to hazardous waste facilities; landfills; Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) sites; and Superfund sites. Recent efforts at the federal and state levels to determine risk-related priorities in allocating resources for research and remediation have found that hazardous wastes present much lower health effect risks than air pollution does. Past research findings, funded in part by the U.S. Department of Energy (DOE), showed disproportionately high levels of substandard air quality exposure for minority and low-income populations. This study is a continuation of that earlier research. Sponsored by Department of Energy, Washington, DC.

Nieves LA, Wernette DR. **Assessment of relative exposure of minority and low-income groups to outdoor air pollution**. Washington, DC: Department of Energy, Argonne National Laboratory, IL; Report No.: ANL-DIS-TM-31. Contract No.:W-31109-ENG-38. 67 P. Available From: NTIS, Springfield, VA.;DE96014467
A diverse research effort, conducted by both federal agencies and scholars in academia, has addressed the issue of environmental justice. Recent environmental justice studies have generally focused on the demographics of areas close to hazardous waste facilities; landfills; Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) sites; and Superfund sites. Recent efforts at the federal and state levels to determine risk-related priorities in allocating resources for research and remediation have found that hazardous wastes present much lower health effect risks than air pollution does. Past research findings, funded in part by the U.S. Department of Energy (DOE), showed disproportionately high levels of substandard air quality

exposure for minority and low-income populations. This study is a continuation of that earlier research. Sponsored by Department of Energy, Washington, DC.

Perlin SA, Setzer RW, Creason J, Sexton K. **Distribution of industrial air emissions by income and race in the United States: an approach using the Toxic Release Inventory**. Environ Sci Technol 1995;29(1):69-80.
BIOSIS COPYRIGHT: BIOL ABS. There currently is a scarcity of scientific information to guide public policy decisions about issues of environmental justice; broadly defined as the goal of achieving adequate protection from the harmful effects of environmental agents for everyone, regardless of age, culture, ethnicity, gender, race, or socioeconomic status. This paper highlights several key methodological issues that need to be addressed as part of ongoing efforts to strengthen the scientific foundation for informed decision-making regarding environmental justice. Specifically, careful thought must be given to the selection of appropriate (1) statistical tests, (2) geographic unit(s) of analysis, (3) exposure estimators, and (4) comparison (reference) populations. These methodological issues are examined in the context of a nationwide study looking at the differences by ethnicity/race and household income in county-level air emissions of industrial chemicals. National and regional comparisons are made for 1990 using emission estimates from the Toxic Release Inventory, demographic data from the Census, and income data from the Donnelley Marketing Information Services.

Pittenger DB. **Letter report: Population estimates by age, sex and race for 10-county study area**. Hanford Environmental Dose Reconstruction Project. Washington, DC: Department of Energy; Report No.:PNL-7931-HEDR. Contract No.:AC06-76RL01830. 301 P. Available From: NTIS, Springfield, VA.; DE92007914
The Hanford Environmental Dose Reconstruction (HEDR) Project was established to estimate radiation doses that people could have received from nuclear operations at the Hanford Site since 1944. To identify groups that may have received doses, population estimates containing age, race, and sex detail for ten counties in Washington and Oregon for the years 1940 to 1980 were prepared by the Demographics Laboratory under a subcontract with the Pacific Northwest Laboratory (PNL). A data base of population information was developed from census reports and published and unpublished collections from the Washington State Office of Financial Management and Center for Population Research. Three estimation methods were then explored: the cohort-component model, cohort interpolation, and age-group interpolation. The estimates generated through cohort and age-group interpolation are considered adequate for initial use in the HEDR Project. Results are presented in two forms: (1) county populations by sex and single year of age and (2) county populations by sex and race for age groupings. These results are made available to the HEDR Project for further refinement into population estimates by county census divisions. Sponsored by Department of Energy, Washington, DC.

Rabe BG. **Legislative incapacity: the congressional role in environmental policy-making and the case of Superfund**. J Health Polit Policy Law 1990;15(3):571-89.
Congress plays a central role in national environmental policy formation but appears ill equipped to set policy priorities and devise integrative legislation. Fragmentation of authority among a multiplicity of committees and subcommittees, especially in the House, contributes to these problems. This pattern is evident in the evolution of Superfund, the national program to clean up abandoned hazardous waste sites. The prolonged process of reauthorization in the 1980s contributed to serious program delay and failed to resolve a number of fundamental questions concerning the national cleanup effort. Institutional reforms could contribute to a more effective congressional role in future environmental policy deliberations.

Reams MA, Templet PH. **Political and environmental equity issues related to municipal waste incineration siting**. J Hazard Materials 1996;47(1-3):313-23.
BIOSIS COPYRIGHT: BIOL ABS. This analysis presents an overview of recent research concerning factors influencing community responses to municipal incinerators. These factors range from those about which experts and lay people may readily agree, such as the years of service remaining in an existing landfill, to issues that are more likely to engender disagreement, such as community perceptions of environmental risks, 'environmental equity', and other economic and political concerns. The implications of these factors as well as recommendations for decision makers facing municipal solid waste disposal issues are presented.

Reif JS, Tsongas TA, Anger WK, Mitchell J, Metzger L, Keefe TJ, Tessari JD, Amler R. **Two-stage evaluation of exposure to mercury and biomarkers of neurotoxicity at a hazardous waste site**. J Toxicol Environ Health 1993;40(2-3):413-22.

Communities surrounding the Rocky Mountain Arsenal (RMA), a Superfund site in Colorado, were studied in order to determine whether exposures to mercury were greater among persons who resided there than among residents of a comparison area 12-15 miles distant. From a census-based stratified random sample, 469 persons were interviewed and urine samples were obtained for biomonitoring. Mercury was detected in urine from 32 (6.8%) of the 469 persons sample at a detection limit of 5 ppb. Trace levels of mercury (detectable, but nonquantifiable) were found in 80 (17.1%) of the persons sampled. Neither the frequency of detection, the arithmetic mean, nor the geometric mean value for urine mercury was found to be statistically different when persons living near the site were compared to persons from the more distant comparison area. The risk of mercury exposure associated with demographic variables, residence, occupation, hobbies, dietary habits, water supply, housing, and activity patterns was evaluated. In the second stage of the evaluation, the Neurobehavioral Core Test Battery (NCTB) is being used to assess individual functional deficits and nervous system disorders associated with exposure to mercury and other neurotoxic chemicals.

Rios R, Poje GV, Detels R. **Susceptibility to environmental pollutants among minorities**. Toxicol Ind Health 1993;9(5):797-820.
BIOSIS COPYRIGHT: BIOL ABS. Susceptibility to environmental pollutants involves both biological and nonbiological factors. Individuals belonging to minority groups are much more likely to be subject to a number of these factors. This paper examines biological susceptibility of minorities to environmental pollutants and provides specific examples of susceptibility resulting from: genetic makeup, occupation; other factors such as compromised health status, exposure to mixtures of pollutants, substance abuse, and unemployment; and social inequality of access to health care, education, and communication skills. Recommendations are made for specific actions and for additional studies.

Sachs A. **Upholding human rights and environmental justice**. In: Brown LR, Editor. State Of The World, 1996. New York: WW Norton and Company; 1996. P. 133-51.
BIOSIS COPYRIGHT: BIOL ABS. RRM BOOK CHAPTER HUMAN IMPACT ENVIRONMENTAL DESTRUCTION HAZARDOUS WASTE DISPOSAL POLLUTION SUSTAINABLE DEVELOPMENT CIVIL LIBERTIES.

Sarpong SB, Hamilton RG, Eggleston PA, Adkinson NF Jr. **Socioeconomic status and race as risk factors for cockroach allergen exposure and sensitization in children with asthma**. J Allergy Clin Immunol 1996;97 (6):1393-401.
BACKGROUND: The domestic cockroach has been identified as an important source of indoor aeroallergens worldwide in both temperate and tropical climates. Because cockroach populations are highest in crowded urban areas, some have suggested that the increased asthma morbidity and mortality rates in inner cities could be related in part to cockroach allergen exposure. We have examined cockroach allergen exposure in the homes of children with asthma in both urban and suburban locations and have related the rates of exposure and sensitization to socioeconomic, racial, and demographic factors. OBJECTIVE: The study was designed to determine the independent contribution of race, socioeconomic status, and place of residence to the risk of cockroach allergen exposure and sensitization in children with asthma. METHODS: Eighty-seven children with moderate to severe allergic asthma, aged 5 to 17 years, participating in a prospective trial of immunotherapy, were evaluated. Extracted dust samples from three home locations were analyzed by using two-site monoclonal immunoassays for major cockroach allergens (Bla g 1 and Bla g 2). A puncture skin test with a mixed cockroach allergen extract was performed in 81 of the 87 subjects. RESULTS: In the 87 homes evaluated, 26% of the bedroom dust samples had detectable levels of cockroach allergen. In homes with detectable bedroom cockroach allergen levels, mean Bla g 1 and Bla g 2 concentrations in urban and suburban homes were similar. Over 80% of children with bedroom Bla g 1 or Bla g 2 of 1 U/gm or greater demonstrated skin sensitivity to cockroach allergen. The rate of cockroach sensitization was directly related to the level of bedroom exposure. African-American race was the only factor that was independently associated with cockroach allergen exposure ($p = 0.05$). Lower socioeconomic status, age greater than 11 years, cockroach exposure, and African-American race were all independently associated with cockroach allergen sensitization on the basis of stepwise multiple linear regression analysis. CONCLUSIONS: African-American race and low socioeconomic status were both independent, significant risk factors for cockroach allergen sensitization in children with atopic asthma. Cockroach allergen is detectable throughout the house, including the critical bedroom environment.

Schiffman SS, Miller EA, Suggs MS, Graham BG. **The effect of environmental odors emanating from commercial swine operations on the mood of nearby residents**. Brain Res Bull 1995;37(4):369-75.
The effect of environmental odors emanating from large-scale hog operations on the mood of nearby residents was determined using the POMS (Profile of Mood States). The scores for six POMS factors and the TMD (total mood disturbance score) for 44 experimental subjects were compared to those of 44 control subjects who were matched according to gender, race, age, and years of education. The results indicated a significant difference between control and experimental subjects for all six POMS factors and the TMD. Persons living near the intensive swine operations who experienced the odors reported significantly more tension, more depression, more anger, less vigor, more fatigue, and more confusion than control subjects as measured by the POMS. Persons exposed to the odors also had more total mood disturbance than controls as determined by their ratings on the POMS. Both innate physiological responses and learned responses may play a role in the impairment of mood found here.

Sexton K, Gong H Jr, Bailar JC 3d , Ford JG, Gold DR, Lambert WE, Utell MJ. **Air pollution health risks: do class and race matter?** Toxicol Ind Health 1993;9(5):843-78.
BIOSIS COPYRIGHT: BIOL ABS. Air pollution is not spread evenly across demographic groups. Exposures and associated health risks appear to fall disproportionately on populations that are poor and nonwhite. Although scientific evidence documenting disparities in air pollution exposures, doses, and health effects is scant, the available data strongly support the contention that disadvantaged groups, many of whom are ethnic and racial minorities, routinely encounter levels of air pollution that are higher than average. The extent to which exposure differentials contribute to observed differences in health status by class and race is unknown, but worthy of further investigation. We recommend several steps, all of them feasible and most of them relatively inexpensive, to improve our understanding and ability to address environmental health disparities.

Sexton K, Olden K, Johnson BL. **Environmental justice: the central role of research in establishing a credible scientific foundation for informed decision making**. Toxicol Ind Health 1993;9(5):685-727.
Although much of the evidence is anecdotal and circumstantial, there are mounting concerns that environmental health risks are borne disproportionately by members of the population who are poor and nonwhite. We examine the central role of environmental health research in defining the dimensions of the problem, understanding its causes, and identifying solutions. Environmental health sciences, including epidemiology, exposure analysis. pharmacokinetics, toxicology, and surveillance monitoring, must be employed to determine the extent to which society has achieved equity and justice in safeguarding the health and safety of its citizens. By improving our ability to identify, evaluate, prevent, and/or reduce risks for all members of society, environmental health research can contribute directly to fair and equitable protection for everyone, regardless of age, ethnicity, gender, race, or socioeconomic status.

Shrader-Frechette K. **Equity and nuclear waste disposal**. J Agriculture Environ Ethics 1994;7(2):133-56.
BIOSIS COPYRIGHT: BIOL ABS. RRM LITERATURE REVIEW PUBLIC SAFETY URANIUM REGULATION.

Soliman MR, Derosa CT, Mielke HW, Bota K. **Hazardous wastes, hazardous materials and environmental health inequity**. Toxicol Ind Health 1993;9(5):901-12.
This paper reviews issues associated with the equity of locating hazardous waste sites and hazardous materials. Reports and case studies indicate that hazardous waste sites and the locations of hazardous materials are disproportionately situated near minority communities, especially African-American communities. This inequitable placement of hazardous waste sites is of concern, since exposure to toxic waste can adversely affect human health. Proximity to these sites may place these minority communities at higher risk of developing cancers and respiratory, cardiovascular, and neurological diseases, and of incurring increased levels of individual and family stress. The health of persons in minority communities near hazardous waste sites is further compromised by their lack of access to adequate health care. The potential health risks borne by racial and ethnic minorities and by low income communities as a consequence of exposure to toxic waste constitutes environmental inequity. In order to decrease the burden of these risks, we recommend developing environmental policies that address environmental inequity; conducting detailed demographic and health studies that assess the impact of exposure to toxic waste on minority populations; and devising educational programs to sensitize professional service providers and prevent exposure by community residents. This paper identifies research needs and opportunities.

Taboas AL. **Editorial principles of environmental protection strategy**. Environ Intl 1996;22(4):385-8. BIOSIS COPYRIGHT: BIOL ABS. RRM EDITORIAL HUMAN HEALTH PROTECTION ENVIRONMENTAL MANAGEMENT ENVIRONMENTAL PROTECTION US GOVERNMENT ETHICS ENVIRONMENTAL JUSTICE REMEDIATION USA.

Upfal M, Burtan R. **Challenges in medical surveillance for hazardous waste workers**. Appl Occupat Environ Hyg 1992;7(5):303-9.
Issues involved with the design and implementation of medical surveillance studies for hazardous waste workers were evaluated. Two primary factors considered in such studies were the demographics of the workforce and the hazards inherent in the work (physical demands and chemical and biological exposures). The importance of identifying the objectives of a surveillance program was discussed. Objectives included: determination of baselines and fitness for work, assessment of exposure, detection of toxic effects, epidemiologic research, employee education, compliance with government regulations, or defense against possible litigation. The major types of health examinations for hazardous workers were preplacement, periodic, post incident, and termination examinations. The medical procedures used in such surveillance programs varied according to the objectives, job duties, and potential and actual exposures. Problems associated with data collection and interpretation were examined. The author suggests that a national hazardous waste database be formed to follow workers throughout the country. Specific examples of problems in data interpretation were presented.

Wagener DK, Williams DR, Wilson PM. **Equity in environmental health: data collection and interpretation issues**. Toxicol Ind Health 1993;9(5)775-95.
In order to assess the issue of inequity in exposure to environmental hazards, researchers must identify subgroups whose exposure is disproportionately greater than the average exposure experienced by the remainder of the population. The general population is a complex mixture of subgroups, each consisting of individuals who experience a wide range of exposures and whose ability to cope with the consequences of those exposures is equally varied. Therefore, large efforts are needed to collect data that will enable researchers to determine comprehensively which subgroups are highly exposed and which subgroups have disproportionately greater health effects as a result of exposures to environmental hazards. The interpretation of findings is more of an art than a science, especially when two population subgroups are being contrasted. Addressing environmental equity requires explicit comparisons between groups, and racial and ethnic contrasts will be prominent. It is often difficult to identify the underlying mechanisms that produce particular patterns of results. However, researchers and policy makers must understand the dynamics that may have produced a particular pattern of results so they can separate those factors that are amenable to change from those that are not.

Wartenberg D. **Screening for lead exposure using a geographic information system**. Environ Res 1992;59 (2):310-7.
Screening programs for lead overexposure typically target high-risk populations by identifying regions with common risk markers (older housing, poverty, etc) While more useful than untargeted screening programs, targeted programs are limited by the geographic resolution of the risk-factor information. A geographic information system can make screening programs more effective and more cost-efficient by mapping cases of overexposure, identifying high-incidence neighborhood warranting screening, and validating risk-based prediction rules.

Wernette DR, Nieves LA. **Minorities and substandard air quality**. Washington, DC: Department of Energy; Report No.:ANL-EAIS-PP-75526. Contract No.:W-31109-ENG-38. 6 P. Available From: NTIS, Springfield, VA.; DE94011483
Scientists at Argonne National Laboratory have been studying the relative potential for exposure of minority population groups to substandard outdoor air quality. The US Environmental Protection Agency (EPA) has identified areas that have excess levels of ozone, carbon monoxide, sulfur dioxide, nitrogen dioxide, lead, or particulate matter. These areas generally consist of counties covering many square miles, and the degree to which their residents are exposed to air pollution certainly varies. However, the differences in population groups living in these areas can imply differences in potential exposure to pollutants and may suggest directions for research and remedial action. So far, the scientists have examined these differences for African-Americans, Hispanics, and Whites (non-Hispanic). Sponsored by Department of Energy, Washington, DC.

Wernette D, Nieves L. **Minorities and air quality non-attainment areas: A preliminary geo-demographic analysis**. Washington, DC: Department of Energy; Report No.:ANL-CP-75440. Conf-9206158. Contract No.:W-31109-ENG-38. 22 P. Available From: NTIS, Springfield, VA.;DE92013054
A major section of the Clean Air Act Amendments (CAAA) focuses on reducing air pollution through extending and modifying the provisions for states and localities with US Environmental Protection Agency (EPA)-designated non-attainment areas. Specifically, Title 1 of the CAAA is concerned with non-attainment areas, as defined relative to the National Ambient Air Quality Standards for atmospheric ozone, carbon monoxide, and particulate matter; Title 2 is concerned with mobile sources or air pollution, which produce carbon monoxide, contribute to ozone concentrations, and in the past have been a major source of airborne lead; and Title 4 is concerned with acid deposition, mainly due to sulfur dioxide emissions. This paper has its origin in the question of the potential benefits for minorities--relative to the majority non-Black, non-Hispanic population--of reductions in air pollution that may result from these amendments. It is part of a larger effort to identify and assess the costs and benefits of the CAAA for minorities, relative to the majority population. The focus of this paper centers on comparing Black and Hispanic populations to White, non-Hispanic populations living in EPA-designated non-attainment area counties in the contiguous United States, which excludes Alaska and Hawaii. Subsequent comparisons of majority populations with Native Americans and Asian-Americans will include these two states. Socioeconomic energy research and analysis conference, Baltimore, MD (United States), 27-28 Jun 1992. Sponsored by Department of Energy, Washington, DC.

Westra L. **Environmental integrity, racism and health**. Sci Total Environ 1996;184(1-2):57-66. BIOSIS COPYRIGHT: BIOL ABS. Environmental degradation seriously affects human health. Thus, a close relationship exists between the protection of ecosystem integrity and wilderness on one hand, and human health on the other. However, there is an overarching, holistic perspective in laws and regulations - as well as morality - to maintain a healthy relationship between the two. Problem areas focused on in this paper are: (a) climate change and global warming; (b) food production; and (c) global equity. This paper argues for the principle of integrity, which provides an holistic perspective, suggested as a better approach than that of current regulations to mitigate against associated threats to human health.

White JCe. **Environmental Science Research. Vol. 45. Global climate change linking energy environment economy and equity: Eighth Annual Conference of the Air Resources Information Clearinghouse**; 1991 Dec 5-6; Washington, DC. New York: Plenum Press; 1992. 242 p
BIOSIS COPYRIGHT: BIOL ABS. RRM BOOK MEETING SOCIAL CONCERNS LEGISLATION POLLUTION.

Whiteman DC, Dunne MP, Burnett PC. **Psychological and social correlates of attrition in a longitudinal study of hazardous waste exposure**. Arch Environ Health 1995;50(4):281-6.
The differences between responders and nonresponders (re(fuser)s and movers) in a follow-up survey of self-reported health effects associated with residing near a hazardous waste site were analyzed in this study. Responders and refusers did not differ with respect to demographic variables when comparison was made with measures from the initial survey; however, movers were more likely than refusers to be younger, to rent their homes, and to have lived in the area for the shortest period. In terms of psychological reactions, movers and refusers reported more intense worries, more stress, and more psychological intrusion about the problem than did responders. There were no differences between the groups with respect to self-reported prevalence of death and cancer, diseases, or symptoms of physical illness. The results indicated that the psychological impact of exposure to a hazardous waste site may be greatest in individuals who are lost to follow-up.

Wigley DC, Shrader-Frechette K. **Environmental justice: a Louisiana case study**. J Agricult Environ Ethics 1996;9(1):61-82.
BIOSIS COPYRIGHT: BIOL ABS. RRM LITERATURE REVIEW HUMAN ETHICS INFORMED CONSENT FAIRNESS RADIATION POLLUTION USA.

Wilkinson CH, Brumburgh GP, Edmunds TA, Kay D. **New approach for environmental justice impact assessment**. Washington, DC: Department of Energy; Report No.:UCRL-JC-123630. Conf-960648-4. Contract No.:W-7405-ENG-48. 11 P. Available From: NTIS, Springfield, VA.;DE96008484
President Clinton's Executive Order 12898 calls for examination of disproportionately high and adverse impacts to minority and low-income communities. In addition to demographic mapping, environmental justice analyses

should also include quantitative impact assessment to show presence or absence of disproportionate impacts. This study demonstrates use of a geographic information system (GIS) and a computer model. For this demonstration, a safety analysis report and a computer code were used to develop impact assessment data from a hypothetical facility accident producing a radiological airborne plume. The computer code modeled the plume, plotted dose contours, and provided latitude and longitude coordinates for transfer to the GIS. The GIS integrated and mapped the impact and demographic data toprovide a graphical representation of the plume with respect to the population. Impacts were then analyzed. The GIS was used to estimate the total dose to the exposed population under the plume, the dose to the low-income population under the plume, and the dose to the minority population under the plume. Impacts among the population groups were compared to determine whether a dispropotionate share of the impacts were borne by minority or low-income populations. Annual conference of the National Association of Environmental Professionals: practical environmental directions - a changing agenda (21st), Houston, TX (United States), 2-6 Jun 1996. Sponsored by Department of Energy, Washington, DC.

Wittie PS, Drane W, Aldrich TE. **Classification methods for denominators in small areas**. Stat Med 1996;15 (17-18):1921-6.
Conventional methods fail to provide adequate assignments of individuals into appropriate subgroups for small area analyses, especially when studies cover only a portion of a county or use ecologic, descriptive variables. An unconventional aid to epidemiological investigations, such as a geographic information system (GIS), can aid public health investigators in determining denominators for studies of disease where overlays of environmental exposure and public health data define the geographic extent of the population being studied or where data must be analysed using a map. The basic functions of a GIS--to store, retrieve, transform and display data which have real earth-based co-ordinates--can facilitate this type of ecologic approach. In this paper, each denominator is chosen using the aid of a GIS to allow overlays of environmental elements with residential areas. A variety of methodological issues are associated with such studies, specifically the issue of thin cells (numerically). One solution is to avoid the use of denominators. Another involves careful classification rules for choosing the 'exposed' group. Each of these methods have relevance for environmental equity evaluations associated with environmental hazards.