PUBLIC HEALTH GIS NEWS AND INFORMATION

June 1997 (No. 16)

Dedicated to CDC/ATSDR scientific excellence and advancement in disease control and prevention using GIS

I. Public Health GIS (and related) Events

☞ The 8th International Conference on Quantitative Methods for the Environmental Sciences, International Environmetrics Society, Innsbruck, Austria, August 4-8; For further information, contact A. El-Shaarawi, National Water Research Institute, Burlington, Ontario at e-mail <abdel.el-shaarwi@cciw.ca>.

☛ 1997 Joint Statistical Meetings of the American Statistical Association, "Shaping Statistics for Success in the 21st Century", Anaheim, CA, August 10-14; For further information, call (703) 684-1221 or e-mail <meetings@ amstat.org>.

☞ GEOMED '97, International Workshop on Geomedical Systems, Foundations, Systems, and Applications, Rostock, Germany, September 4-6; For further information, contact Prof. Gierl, Medizinische Informatik und Biometrie, Medizinische Fakult=E4t, Universit=E4t Rostock, D-18055 Rostock, Germany.

☛ The fourth SPRUCE (Statistics for Public Resources, Utilities and in Care for the Environment) International Conference, Statistical Aspects of Health and the Environment, September 7-12, Enschede, The Netherlands; Organized by the ITC International Institute for Aerospace Survey and Remote Sensing, in association with the RIVM, TNO, the Wageningen Agricultural University and the International Statistical Institute. For further information, see http://www.itc.nl/spruce/spruce.html.

☞ Annual Conference and Symposium on Conjunctive Use of Water Resources: Aquifer Storage and Recovery, American Water Resources Association, Long Beach, CA, October 19-23; For further information, contact Donald Kendall at e-mail <awrahq@aol.com.

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[Update- 1998 "GIS IN PUBLIC HEALTH" Conference: The first planning meeting of this ATSDR initiative was held at NCHS on May 27, with Steering Committee representatives from CDC/ATSDR, Bureau of the Census, EPA and USGS. Conference location (a West Coast university) and date (Fall '98) will be announced this summer]

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II. News from GIS USERS

(Please communicate directly with colleagues on any issues)

A. General News

1. **Dynamic GIS**: There's no better way to capture the attention of a large GIS audience then to have the governor of the state begin his plenary talk with GIS dynamic mapping. The Honorable Parris Glendening, Governor of Maryland, used an eight-minute USGS video that demonstrated population growth -by decade- between the cities of Baltimore and Washington, D.C. The visualization of urban growth and eventual sprawl for over a 100-year period, through the use of contour mapping, was impressive. The Governor admitted his own excitement for the technology and stated "GIS is a tool a manager must have!" With that, the 10th annual Towson State University Geographic Information Systems Conference, May 28-29, was underway and off to another resounding success. Towson GIS is a major regional conference drawing participation from many other states. A GIS Professional Certification program is also under development at Towson. Congratulations are extended to Jay Morgan, conference organizer and Professor, Department of Geography and Environmental Planning, who received well-deserved

recognition for the evolution of Towson's GIS regional program. **Editor**

2. From **Gerry Rushton**, U. Of Iowa: Announcing two (repeating), three-day, workshops offered by the University of Iowa on GIS and Public Health, July 28-30 and July 31- August 2, 1997, Iowa City, Iowa. The purpose of these workshops is to provide participants with the ability to measure the geographic rates of disease incidences and other health-related indicators for small areas, to assess the relationships between geographic patterns of disease and socio-economic conditions of populations, to evaluate the geographic accessibility of defined populations to health resources, and to determine appropriate locations for health resources.These workshops are intended for public health teachers and health professionals who have responsibilities for disease surveillance and who wish to learn more about how geographic information systems (GIS) are used in public health. Participants will learn how to use GIS to perform a detailed analysis of health data and will learn how to: acquire digital road maps of local areas from public domain sources or enhanced products from private vendors, acquire software to match addresses stored in health files to the digital map, compute and map the geographic patterns of disease incidence and to determine the spatial relationship between rates of disease incidence and socio-economic data from sources such as the U.S. Census, make tests of statistical significance for geographical patterns of diseases, evaluate the geographical pattern of health facilities in relation to need, and evaluate alternative locations for appropriate health services development.The workshops have limited enrollment and emphasize hands-on experience using a variety of GIS software and some public domain software available on a CD-ROM that all participants will receive. Instructors are Gerard Rushton, PhD and Marc Armstrong PhD, Professors in the Department of Geography; assisted by Charles Lynch, MD, PhD and James Rohrer PhD, Professors in the Department of Preventive Medicine. To obtain detailed course information, fees, and registration information request "GIS and Public Health Information" from beverly-prostine@uiowa.edu or ph: 319-335-3220 or FAX: 319-335-3533.

3. From **Lee DeCola**, USGS: The 14th Annual Historically Black Colleges and Universities (HBCU) Summer Faculty GIS Workshop will be held at Howard University, Silver Spring, MD, July 27-August 2. Faculty members at HBCU are invited to participate. Cosponsors for the 1997 program include ATSDR, USGS, BLM, NIMA (National Imagery and Mapping Agency) and FWS. Training includes an introduction to ArcView, applications of GPS, GIS and the Internet, and other federal (NIMA, HUD, EPA, and FWS) GIS demonstrations. For more information, contact coordinators Cynthia Warrick, The Urban Environment Institute, Howard University at 301-585-2295 or Lee DeCola at 703-648-4178 or e-mail ldecola@usgs.gov.

4. From **Marilyn Ruiz**, Florida State University: The GIS/LIS 1997 Annual Conference and Exposition will be held this year in Cincinnati, Ohio, from October 28-30, 1997. Of special interest this year, the conference topics include the area of GIS and Health. Presentations are being solicited in the areas of: Environmental health, epidemiology, risk assessment, and protection of public health. National Priority List sites, brown fields, and environmental reporting. Identification of stressors and receptors. Health care delivery, accessibility, and rural health care. The abstract deadline is May 8, 1997. For a copy of the call for Presentations and Panels, contact the Association of American Geographers, 202-234-1450.

5. From **Danika Holms**, GeoFields, Inc.: GeoFields, Inc. is a GIS consulting company located in Atlanta. In addition to specializing in public health-related GIS applications and methodologies, GeoFields offers expertise in demographics, hazardous waste management, disease incidence analyses, and geostatistics. As an authorized ESRI Reseller, GeoFields can also resell ESRI GIS software at discount prices and provide both technical expertise and advice when designing a GIS project. GeoFields offers monthly "Introduction to ArcView 3.0a GIS"

training classes for public health professionals who are interested in learning about GIS and how to apply it to their areas of research. The class is taught by GIS professionals who are ESRI-authorized instructors and who have extensive experience in public health applications. Added value to the class includes overviews of several ArcView Extensions including Spatial Analyst, Network Analyst, Dialog Designer, and other sample Extensions. GeoFields' instructors are also available to teach on-site. [Editor: Danika also notes that 1997 Annual SERUG (Southeastern Region Arc/Info User's Group) Conference will be held in Atlanta, October 20 - 24] For more information about either of these items, contact Danika at (404-875-2550) or e-mail dholm@geofields.com.

B. Technical News

6. From **Art Getis**, San Diego State U., via <ai-geostats@gis.psu.edu> : [In GIS spatial analysis], the question of scale continually arises. In my opinion I think that one must recognize variations in the nature of the heterogeneity from subarea to subarea within the study region. Together with Keith Ord, I have been working on a type of statistics called "local statistics" that gets at this problem of scale identification by using each observation (pixel), one at a time, to pinpoint the range of the spatial association. As might be expected, the range oftentimes varies from subarea to subarea. See: JK Ord and A Getis (1995), "Local Spatial Autocorrelation Statistics: Distributional Issues and an Application," Geographical Analysis, 27, 4, 286-306. Also, A Getis and JK Ord (1996), "Local Spatial Statistics: An Overview," in Longley, P. and Batty, M., Spatial Analysis: Modelling in a GIS Environment, Geoinformation International: Cambridge. pp 261-77.

7. From **Allen Hightower**, NCID (personal communication on selected desktop GIS mapping features): Feature for feature, and even weakness for weakness, MapInfo and Atlas GIS have astonishingly similar capabilities. Both allow "charts on maps", raster underlaying, crude buffering, multilayering, ODBC and SQL, zooming, but really little in the way of sophisticated spatial analysis tools. Neither product would be a good choice for a primary data management tool and I don't think that anyone would want to do that for a project of any importance. Both have good import/export tools. Their scripting products extend the usefulness of both products considerably and can be used by either product to create the tools that aren't on the main menu of the other product. Both have been around for a long time and have lots of success stories. Maptitude -a much newer product by a new company- has even fewer spatial analysis tools than MapInfo or Atlas, but is much cheaper and is easier to use since it has a much narrower scope. Epimap can certainly make a strong ease of use claim -and has Epi Info compatibility to boot. In terms of price - if EpiMap will do the job, you're not going to beat the price. Plus, the developers are nice! I use it whenever the application allows. Maptitude is around $400, Atlas GIS is $800, and MapInfo was $1200, last time I checked. ArcView 3 is $1200, with a couple of powerful and pricey spatial analysis add-ons. These are all list prices but everyone runs "specials."

C. Internet News

8. **The Society for Veterinary Epidemiology and Preventive Medicine** (SVEPM) held its annual conference at University College Chester, University of Liverpool, UK, April 9-11, 1997. GIS Users may be interested to know that there were workshops on “Analyzing Clustered Data” and “Dynamic Disease Models” as well as other paper presentation themes similar to human public health. Some of these included the use of multi-level modelling in veterinary epidemiology, meta-analytic review of ELISA tests for the diagnosis of human and porcine trichinellosis, pre-harvest food safety - an epidemiological approach to reducing food-borne public health risks, evaluation of intervention strategies to control Cryptosporidium in drinking water supplies and human and bovine tuberculosis in the HIV era. For further information, see Web site http://epiweb.massey.ac.nz/.

9. **Minority Health**: The University of North Carolina at Chapel Hill's School of Public Health is pleased to

announce the 3rd annual Summer Public Health Research Institute on Minority Health from June 22-27, 1997. This session is designed to improve research methods, decision making, policy development, and planning for minority health. Objectives: The Summer Public Health Research Institute on Minority Health will emphasize issues and solutions related to collecting and analyzing data for racial and ethnic populations, studying the relationship between race and socioeconomic status, identifying and reducing barriers to conducting research in minority communities, and devising surveys to study minority populations and subpopulations. Location: The Institute will be held at the School of Public Health on the campus of UNC-Chapel Hill. For further information, please contact Ms. Shelby Taylor, The University of North Carolina at Chapel Hill, Department of Biostatistics, CB# 7400 McGavran-Greenberg, Chapel Hill, NC 27599-7400 or ph: 919/966-7012 or e-mail: oce@unc.edu. Also be sure to visit The Minority Health Project website: http://www.minority.unc.edu.

10. **Wildlife Health Information Partnership**: 3rd International Interdisciplinary Conference on the Environment, Cambridge/Boston, Massachusetts, USA, June 25-28, 1997. The Wildlife Health Information Partnership (WHIP) is an open collaborative project among federal, state and local governments, professional organizations, universities, zoological parks, conservation groups, and individuals around the world, who are interested in the field of wildlife health. Goals for WHIP are to provide and share information about the status and trends of diseases and health management in free-ranging and captive wildlife, as well as serve as a general forum for news and announcements of interest to the wildlife health community. WHIP encourages contributions of relevant items, to reach these goals. The current headings are: Wildlife mortality reports; Disease outbreaks and die-offs; Information about wildlife diseases; Wildlife health news and newsletters; Publication lists; Wildlife health organizations; Journals and articles on-line; Upcoming meetings and conferences; Employment opportunities; Training opportunities; List of wildlife disease contacts and expertise; Book list, and; Links to other wildlife disease/health related sites. Suggestions for additions, as well as comments, are always welcome. The WHIP web site has been updated and expanded.Your visit is invited at: http://www.emtc.nbs.gov/http_data/whip/whiphmpg.html; Contact: F. Joshua Dein, VMD, MS, ph: (608) 271-4640, National Wildlife Health Center, Biological Resources Division, USGS, 6006 Schroeder Road, Madison, Wisconsin, 53711, or e-mail <fjdein@facstaff.wisc.edu>.

11. The **URISA Annual Conference** will be held July 20-23, 1997 in Toronto, Canada. The conference offers educational sessions, workshops, and exhibits that emphasize information technology integration, spatial information management, and GIS integration and applications. The theme of this year's conference is "Acting Locally, Connecting Globally." For more information, see the URISA Annual Meeting web site at http://www.urisa.org.

12. **GIS at Fish and Wildlife**: You might want to check out another mail-list that is focused on applications of GIS technology to wildlife issues (see above related item). It is called, "The Fish and Wildlife Information Management Discussion List". Here's a list of some topics: geographic information systems and remote sensing; geopositioning satellite receivers; radio-telemetry; database planning, development, and maintenance; licensing and administrative systems; statistical analysis systems; automated data collection; networking and telecommunications; data and software availability, and many more. You can subscribe by sending a message to the following address: listserv@listserv.vt.edu with this message: subscribe FWIM-L your full name.

The GIS and Remote Sensing Working Group of The Wildlife Society (TWS) was formed in February, 1993. This group includes, but is not limited to, GIS users, remote sensing specialists, cartographers and landscape ecologists. The purposes of the group are: 1) a clearinghouse of information and expertise with a database of individuals that can be obtained

from the listserv or the Working Group Secretary. Working Group members have volunteered their time and expertise to help members with their particular software or hardware, 2) advice and recommendations on policy and position as requested by Wildlife Society Councils and members, 3) a focal group that can address issues of concern to the GIS community within the Wildlife Society membership, 5) A telemetry committee for issues in the area of radiotelemetry and 6) a quarterly newsletter of information. **Editor**

13. From <owner-ppgis-scope@igc.org> (**GIS-L Moves to GeoGraph International**): GIS-L, recognized as the world's leading discussion list for geographic information systems has found a new home. Just days before the list was slated to go off the air, URISA Board member Nancy Von Myer found a white knight in GeoGraph International (http://www.geoint.com), home of The Harlow Report-Geographic Information Systems, GeoGraph, and WestSide Automation. The company agreed to take over the support of the list. Managing Director of GeoGraph, Ron Welebny said "We are pleased to provide this valuable service to the GIS community. It is a great way for users, vendors, students, and educators to exchange ideas about GIS. We know there will be some transition problems, so please be patient. Until further notice, you may still join the list by sending a message to listerver@urisa.org. In the body put subscribe gis-l <your name>. Do not put a subject or sig line." The high cost of maintaining the list is one reason URISA decided to discontinue their participation. According to GeoGraph's Chris Harlow (chris@geoint.com), the list will now be supported by sponsorship, similar to public television. There will be four levels of participation: Platinum, Gold, Silver, and Bronze.

A separate web site will be developed to list the sponsors, with links to the sponsors' sites. Sponsors will be encouraged to display a to-be-developed logo with the words "A proud [Platinum]-level sponsor of GIS-L" in their ads, newsletters, and on their stationary. Background: According Nancy Von Myer "GIS-L was started by David Mark at the University of New York in Buffalo a number of years ago. It was started as an educational service to the GIS Community through the NCGIA efforts. When the list became more than David Mark was willing to do as a volunteer effort, the list was nearly shut down. At that time David announced at the UCGIS, an organization of thirty major universities, that the list was shutting down and asked if anyone would take it over and all thirty declined. URISA came forward at that time to try to save the list. "URISA did not maintain the list server, but rather a company (IDI) operated the list on their equipment, and with their personnel. They tell us that there are approximately 15,000 subscribers." GeoGraph International is a GIS services company, with offices in Ft. Myers, Florida, Birmingham, Alabama, and Greenwich, CT.

14. **Global Change Research** (from <owner-fwim-l@LISTSERV.VT.EDU>):The US Global Change Research Information Office (GCRIO) is pleased to announce that Our Changing Planet: The FY 1998 Global Change Research Program is now available in print and online. Our Changing Planet: The FY 1998 Global Change Research Program is a report to Congress supplementing the President's FY98 budget, pursuant to the Global Change Research Act of 1990. The report describes the U.S. Global Change Research Program (USGCRP); reviews progress in global change research over the past decade; presents highlights of recent and current research on key global change environmental science issues; outlines integrative activities and perspectives supported by the USGCRP; discusses new global change research challenges in the coming decade; and provides a detailed view of the FY98 USGCRP budget, including FY98 program components and program highlights by agency. Achieving the goals and objectives of this program will require continued strong support for the scientific research needed in order to improve understanding of how human activities are affecting the global environment, as well as how natural and human-induced change is affecting society.

Our Changing Planet FY 1998 is available online at:http://www.gcrio.org/ocp98/toc.html. Print copies of Our Changing Planet FY 1998, as well as

previous editions and other global change publications, are available free of charge. Copies may be ordered by using the GCRIO Document Request Form at: http://www.gcrio.org/OnLnDoc/docreq-form.html. Copies may also be requested via the address, e-mail, phone and fax numbers below. U.S. Global Change Research Information Office User Services, 2250 Pierce Rd., University Center, MI 48710, PH: 517-797-2730, FX: 517-797-2622, E-mail:help@gcrio.org or http://www. gcrio.org.

15. **GIS Mapping Techniques** (through <fwim-l@listserv.vt.edu>): We invite review of and comments on 2 web sites describing GIS habitat mapping efforts in coastal New Hampshire and Casco Bay, Maine. The Fish and Wildlife Service Gulf of Maine Project has been mapping coastal habitats for fish and wildlife in New Hampshire and Maine to supply information for conservation purposes. Evaluation species were selected using social, economic, and ecological criteria. Maps were based upon known occurrences of the species of interest, and overlays of suitable environmental conditions in the form of spatial models. Habitats for each species were modeled, by life stage, based upon their preferences for vegetation types, food resources, temperature, salinity, substrate and depth. We created gridcell digital maps (using a geographic information system, or GIS) for each of these parameters. On a cell by cell basis we then compared the mapped environmental data to preferences of the species, and computed an aggregate habitat value from the suitabilities for each parameter. The resulting habitat suitability values were mapped and compared with occurrence data to verify or adjust the model. Habitat values for all species were indexed to relative scarcity within the study area, then combined into an aggregate habitat map for these coastal species.

These maps are being used by federal and state agencies and not for regulatory and voluntary conservation efforts. The full report is available at: http://rossby.unh.edu/edims/banner/gbay/gbay.htm. The analysis for Casco Bay included a somewhat different list of species and approach. It can be reached at: http://rossby.unh.edu/edims/banner/ casco/casco.htm. For further information, contact Jeff Waldon, Project Leader, Fish and Wildlife Information Exchange, Dept. of Fisheries and Wildlife Sciences, Virginia Tech, 203 W. Roanoke St., Blacksburg, VA 24061, or ph: (540) 231-7348 or e-mail at fwiexchg@vt.edu or at http://www. fw.vt. edu/fishex.

16. **More New Interactive Mapping** (through fwim-l@listserv.vt.edu): The staff here at Kentucky Fish and Wildlife Information System announces our most recent web application. The new interactive mapping application, "The Kentucky Breeding Bird Atlas", is posted on our web site http://www.kfwis.state.ky.us/. This application displays maps of bird distribution patterns and textual life history information from our database system. This is the second interactive map we have released that uses ESRI's Map Objects and Map Objects Internet Map Server. With this new application, we have added a couple of new features: panning, color ramps, replacement of coverages, and integration with our enterprise database system. As you use the system, we would appreciate hearing your comments. Hope Barrett, Database Coordinator, Kentucky Fish and Wildlife Information System, Kentucky Dept. of Fish and Wildlife Resources, Frankfort, KY 40601 or phone: (502) 564-4406.

17. **Veterans and Agent Orange** from Institute of Medicine, Division of Health Promotion and Disease Prevention (through epidemio-l@ CC.UMontreal.CA): Public Meeting Announcement, June 19, 1997, 9:00-5:00 PM, Room 2004, National Academy of Sciences, 1055 Thomas Jefferson Street, NW, Washington, DC. As called for in Public Law 102-4 and at the request of the Department of Veterans Affairs, the Institute of Medicine (IOM) of the National Academy of Sciences (NAS) will review and evaluate the available scientific evidence regarding statistical associations between diseases and exposure to dioxin and other chemical compounds in herbicides used in Vietnam. For each disease or condition, the NAS will determine, to the extent that available scientific data permit meaningful determinations: --whether a statistical association of disease with

herbicide exposure exists, taking into account the strength of the scientific evidence and the appropriateness of the statistical and epidemiological methods used to detect the association; --the increased risk of the disease in question among those exposed to herbicides during Vietnam service; and --whether there exists a plausible biological mechanism or other evidence of a causal relationship between herbicide exposure and the disease in question. The NAS will not make recommendations regarding specific individual cases. While the report will provide scientific information for the secretary of veterans affairs to consider in making determinations about compensation, these decisions remain the responsibility of the secretary. Thus, presentations and submissions should be focused on interpretations of the existing scientific literature relevant to the statutory charge.

Diseases and adverse effects to be considered include: (1) cancers of the stomach, colon, hepatobiliary tract, respiratory tract, testis, prostate, kidney, and brain, Hodgkin's disease, non-Hodgkin's lymphoma, leukemia, soft tissue sarcoma, nasopharyngeal cancer, and other cancers; (2) metabolic disorders including altered lipid metabolism, porphyria cutanea tarda, and diabetes; (3) autoimmune and other immunological disorders; (4) neurologic and neurobehavioral disorders, including peripheral neuropathy; (5) disorders of the digestive system including gastrointestinal ulcers and hepatotoxic effects; (6) reproductive disorders including spina bifida and other birth defects, miscarriages, and abnormal sperm morphology; (7) chloracne and other skin disorders; (8) circulatory disorders; (9) respiratory disorders; and (10) other health conditions.

The IOM is now assembling the information that will be used in the update to this research which will be published in 1998. This update will consider all of the literature reviewed in two prior reports Veterans and Agent Orange: Health Effects of Herbicides Used in Vietnam and Veterans and Agent Orange: Update 1996 but will focus on studies that have been published since the writing of the last report. This review could lead to revisions in the findings of these reports with respect to conclusions regarding health effects. In order to enable members of the public to provide their views regarding the three statutory considerations, the IOM is conducting this public meeting and inviting interested individuals to offer their views. Both written and oral submissions are welcome. A second public meeting will be held in Irvine, California in October. To register to attend the meeting, please complete the Online Registration Form at "www2.nas.edu/hpdp/22b6.html".

18. **National Research Center on Statistics and the Environment** (NRCSE): Located at the University of Washington, and sponsored by the U.S. Environmental Protection Agency (USEPA), NRCSE has been created to provide a platform for such multi-disciplinary interaction with respect to statistical analysis of environmental concerns. Among the main research topics envisioned for the Center are: Space-time modeling; model assessment; ecological assessment; risk assessment; environmental sampling; and environmental standards. Larry Cox will represent USEPA as the EPA Principal Scientist to the NRCSE.

As a an example of a recent research proposal, “Application of Bayesian and Non-Bayesian methods to Development and Assessment of Environmental Fate and Transport and Toxicodynamic Models” (Alison Cullen, Adrian Raftery and Elaine Faustman), human health risk is expressed as a function of toxicant intake (Ti), toxicokinetics (Tk), and toxicodynamics (Td) submodels: Risk = f(Ti, Tk, Td) where toxicant intake refers to the amount (dose) of the chemical that contacts a person, toxicokinetics describe the amount of chemical that reaches a critical organ or tissue, and toxicodynamics relate the specific organ/tissue dose to the likelihood of toxic effects (i.e. toxic potency). It is the purpose of this project to use Bayesian and non-Bayesian statistical methods to develop and assess environmental fate and transport models (leading to estimates of toxicant intake) and toxicodynamic models, for use in human health risk assessment.

Another example is a project involving risk assessment in hazardous site cleanup. Here deterministic models have traditionally been used to

calculate risks. The issue of model assessment, taking into account the uncertainty in model inputs, in comparing model output to measured quantities in the field, and the uncertainty pertaining to the model itself, is one of considerable importance. Center scientists are developing methodology that will enable such uncertainty assessment in a variety of situations. For further information, visit Web site http://www.stat.washington.edu/NRCSE/.

III. GIS Outreach

(Editor: All solutions are welcome and will appear in the next edition; please note that the use of trade names and commercial sources that may appear in *Public Health GIS News and Information* is for identification only and does not imply endorsement by CDC or ATSDR)

☎ From **Tammie McRae**, ATSDR: Would GIS Users please recommend any GIS/GPS training that they are aware of and forward that to me. I would appreciate any information you can provide. Sincerely, Tammie McRae, Division of Health Assessment and Consultation, Exposure Investigation and Consultation Branch, Consultation Section, (404) 639-0621 or mail to ATSDR, MSE-32, 1600 Clifton Road, Atlanta, GA 30333.

☎ From **Lee Caplan**, NCCDPHP (special request): My paper entitled "A literature review of electromagnetic fields and breast cancer" was selected for presentation in the Interactive Poster Session at the SPRUCE IV International Conference on Statistical Aspects of Health and the Environment. The conference will be held in the Netherlands from September 8-12, with the poster session being on Wednesday, September 10 beginning at 10:50 AM. Unfortunately, neither I nor my co-authors will be able to attend this meeting. I am trying to find someone who is planning on attending the meeting who would be willing to put up my poster and say a few words about it, and remain with it during the poster session. Of course, I will make the whole poster and send it to this person, as well as write up a brief statement about it. If someone would be willing to do me this favor, I would be extremely grateful. I am very disappointed that I will not be able to attend the meeting, so I would at least like to be able to share my research with those who are attending. Thank you very much. Lee Caplan, MD, PhD, LHC9@ccdcpc1. em.cdc.gov, ph: (770) 488-3021.

☎ From **Robb Chapman**, EPO (**Interface between CDC WONDER and GIS public health applications**): This is a software development project at CDC which has two aspects related to GIS applications for public health: (1) warehousing and dissemination of GIS-capable data for CDC/ATSDR and WONDER users, and (2) creating an interface between CDC WONDER (Web version) and leading GIS applications. The first aspect is an outgrowth of efforts to build data "pipelines' between CDC and other organizations; we have a special interest in establishing an easy-to-use link from the Census Bureau so as to provide "one stop shopping" for Census Tiger and demographic data extracts. The Census Bureau is beginning work on a much-improved mechanism to disseminate their data over the Internet; at this point in time not much information is available but the time frame is probably on the order of two to three years. The second aspect is part of our effort to provide better integration of WONDER with commonly used desktop applications including Epi Info, Excel/Lotus, Word Processors, and GIS apps such as Arcview. This is a very new R&D area which may be expected to bear initial fruit within a year. [Editor: please feel free to contact Robb at (404) 639-4860 with any observations you may have; also, see Robb's report below about new changes in CDC WONDER]

IV. Special Reports

(Submissions are open to all)

❖CDC WONDER: News, Plans, Coming Attractions

Source: Robb Chapman, Acting Chief,EPO/DPHSI/PHISB/CDC. Following is a summary of plans and activities affecting the CDC WONDER information system. We send this out this as part of our ongoing effort to keep our user community and interested

parties in the public health arena informed. Please share this information with any who might find it of interest.

The primary theme for CDC WONDER this year is our continued shift in emphasis from DOS WONDER to the newer World-Wide-Web WONDER system. Last December we proposed, as part of this overall migration, that support for DOS WONDER be discontinued as of January 1, 1998. In response to spirited feedback (both pro and con) from all facets of the public health community we are now modifying this proposal. It is clear that while many organizations are now or soon will be fully Internet-capable, many others will not be by the first of next year, and that DOS WONDER, and in particular the WONDER E-mail feature, provides a vital communications link upon which many programs depend for their day-to-day activities. Therefore, while we will continue to do all we can to facilitate the necessary transition to an Internet-based system, we now plan to continue supporting the DOS WONDER system until most users are able to move off of it.

Though we will support DOS WONDER, we intend to develop it no further; new features and new data sets will not be incorporated into it without demonstrable need. Additional user accounts for the DOS system will be granted only to those who are employed in the field of public health and who can warrant that they have no recourse for Internet access at this time.

Meanwhile, the focus of our energy is on development of the new system. CDC WONDER on the World-Wide-Web has been online for nearly 18 months now (we invite you to visit it at http://wonder.cdc.gov). In that time we have learned a lot about administering a large-scale Web system. In addition, the tools and technology available to us have improved dramatically. Therefore, we are working on changes to the system that will improve its efficiency and usefulness.

Some parts of WWW WONDER are suitable for general public access, while other parts - certain data sets, Info Exchange, the public health E-mail address directory - are appropriate for use by the public health community only. Therefore starting soon, we will grant WONDER accounts to members of the public health community only -- as determined by their employing organization or by credentials, area of research, or by referral. Public access data will remain available to the public, while more sensitive information will be reserved for registered users.

An additional layer of security will continue to be provided by WONDER's "Groups" facility, wherein access to especially sensitive data is restricted to defined groups of users, each under the control of a designated group administrator. And WONDER will comply with the CDC standards now under development for secure and confidential transmission of data over the Internet.

WWW WONDER will provide no E-mail interface. There is no need to, since virtually all Internet service providers and Web Browsers have their own E-mail interface built-in. However, the WONDER E-mail address directory will remain in place, and within any modern graphic-user-interface environment it should be quite simple to "cut and paste" entries from this directory to the address book of any E-mail application in use. Also, WONDER "Groups", including E-mail groups, will persist in the new system. Mailing to an E-mail group will still result in delivery to all members of the group.

To facilitate migration to Internet E-mail, WONDER now supports users with SMTP E-mail addresses and allows users to send in "change of address" requests so that mail delivered to their WONDER address is automatically forwarded. And at the same time, CDC's internal E-mail system will soon support of MIME attachments; this means that the difficulties experience moving E-mail attachment between CDC and many Internet E-mail systems (requiring UUENCODING/DECODING) will become a thing of the past.

Probably the most significant developments, however, are in the area of WONDER access to public health databases. High use data sets, including the MMWR and even huge statistical databases like National Compressed Mortality, are being moved from the CDC mainframe to servers much closer to and more tightly coupled with the WONDER system. This will speed up responses to these data queries by

several orders of magnitude. In addition, we are experimenting with using "Java applets" to facilitate the relatively seamless movement of text and data from WONDER's databases into the desktop applications of your choice. While this is a very new and experimental area, it holds great promise as a means of integrating previously separate applications, automating translations that used to require manual steps and some degree of computer sophistication.

And finally, we are making serious efforts to expand the scope of WONDER's data content, and to make it easier and faster to bring new public health databases "online": On one front, a pilot project experimenting with access to remotely located databases over the Internet is underway. If this succeeds, and if data-sharing agreements can be worked out, it could lead to WONDER access to databases in many different agencies, and to the ability to join or integrate data from multiple sources.

On another front, we are reviving an older project which provides an interface between WONDER and mainframe SAS and SUDAAN jobs. The aim here is to make it much simpler and faster to bring certain mainframe databases online, and also to provide for more meaningful queries to the complex survey data sets.

As always, we invite your feedback and comments with respect to our plans for CDC WONDER. Please E-mail comments to the Info Exchange topic we've set up for this discussion. As should be apparent by now, we do read these comments and take them into consideration. We are particularly interested in hearing your opinions on what additional health databases we should be pursuing. From WONDER E-mail, the address for mailing comments is found by searching for the name "INFO CDC WONDER FUTURE PLANS". If you are on the CDC E-mail system (Microsoft Mail) you can address your comments to CDCWONDER/ WONDER/INFOFUTPLN. From the Internet, send mail to infofutpln@wonder.em.cdc.gov. Thank you for your interest in and support of CDC WONDER.

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❖Basic Review of Geographic Information Systems: A Generic Definition

Source: Kenneth E. Foote, The Geographer's Craft,Department of Geography, University of Texas at Austin. GIS is a special-purpose digital database in which a common spatial coordinate system is the primary means of reference. Comprehensive GIS require a means of:

1.Data input, from maps, aerial photos, satellites, surveys, and other sources

2.Data storage, retrieval, and query

3.Data transformation, analysis, and modeling, including spatial statistics

4.Data reporting, such as maps, reports, and plans

Three observations should be made about this definition: First, GIS are related to other database applications, but with an important difference. All information in a GIS is linked to a spatial reference. Other databases may contain locational information (such as street addresses, or zip codes), but a GIS database uses geo-references as the primary means of storing and accessing information. Second, GIS integrates technology. Whereas other technologies might be used only to analyze aerial photographs and satellite images, to create statistical models, or to draft maps, these capabilities are all offered together within a comprehensive GIS. Third, GIS, with its array of functions, should be viewed as a process rather than as merely software or hardware. GIS are for making decisions. The way in which data is entered, stored, and analyzed within a GIS must mirror the way information will be used for a specific research or decision-making task. To see GIS as merely a software or hardware system is to miss the crucial role it can play in a comprehensive decision-making process.

Other Definitions: Many people offer definitions of GIS. In the range of definitions presented below, different emphases are placed on various aspects of GIS. Some miss the true power of GIS, its ability to integrate information and to help in making decisions, but all include the essential features of spatial references and data analysis.

A definition quoted in William Huxhold's Introduction to Urban Geographic Information Systems. (New York: Oxford University Press, 1991),

page 27, from some GIS/LIS '88 proceedings: ". . . The purpose of a traditional GIS is first and foremost spatial analysis. Therefore, capabilities may have limited data capture and cartographic output. Capabilities of analyses typically support decision making for specific projects and/or limited geographic areas. The map data-base characteristics (accuracy, continuity, completeness, etc) are typically appropriate for small-scale map output. Vector and raster data interfaces may be available. However, topology is usually the sole underlying data structure for spatial analyses."

C. Dana Tomlin's definition, from Geographic Information Systems and Cartographic Modeling (Englewood Cliffs, NJ: Prentice-Hall,1990), page xi: "A geographic information system is a facility for preparing, presenting, and interpreting facts that pertain to the surface of the earth. This is a broad definition . . . a considerably narrower definition, however, is more often employed. In common parlance, a geographic information system or GIS is a configuration of computer hardware and software specifically designed for the acquisition, maintenance, and use of cartographic data."

From Jeffrey Star and John Estes, in Geographic Information Systems: An Introduction (Englewood Cliffs, NJ: Prentice-Hall, 1990), pages 2-3: "A geographic information system (GIS) is an information system that is designed to work with data referenced by spatial or geographic coordinates. In other words, a GIS is both a database system with specific capabilities for spatially-reference data, as well [as] a set of operations for working with data . . . In a sense, a GIS may be thought of as a higher-order map."

And from Understanding GIS: The ARC/INFO Method (Redlands, CA: Environmental System Research Institute, 1990), page 1.2: A GIS is "an organized collection of computer hardware, software, geographic data, and personnel designed to efficiently capture, store, update, manipulate, analyze, and display all forms of geographically referenced information."

Related Terms: Acronyms, Synonyms, and More: One reason why it can be difficult to agree on a single definition for GIS is that various kinds of GIS exist, each made for different purposes and for different types of decision making. A variety of names have been applied to different types of GIS to distinguish their functions and roles. One of the more common specialized systems, for instance, is usually referred to as an AM/FM system. AM/FM is designed specifically for infrastructure management. It is defined further below. In addition, some systems that are similar in both function and name to GIS, nevertheless are not really geographic information systems as defined above. Broadly, these similar systems do not share GIS's ability to perform complex analysis. CAD systems, for example, are sometimes confused with GIS. Not long ago, a major distinction existed between GIS and CAD, but the their differences are beginning to disappear. CAD systems, used mainly for the precise drafting required by engineers and architects, are capable of producing maps though not designed for that purpose. However, CAD originally lacked coordinate systems and did not provide for map projections. Nor were CAD systems linked to data bases, an essential feature of GIS. These features have been added to recent CAD systems, but geographic information systems still offer a richer array of geographic functions. The use of so many acronyms, synonyms, and terms with related meaning can cause some confusion. Consider a few of the most widely used terms:

*AGIS (Automated Geographic Information System)
*AM/FM (Automated Mapping and Facilities Management): Automated mapping by itself allows storage and manipulation of map information. AM/FM systems add the ability to link stores of information about the features mapped. However, AM/FM is not used for spatial analysis, and it lacks the topological data structures of GIS.
*CAD (Computer-Assisted Drafting): These systems were designed for drafting and design. They handle spatial data as graphics rather than as information. While they can produce high-quality maps, generally they are less able to perform complex spatial analyses.
*CAM (Computer-Assisted Mapping, or

Manufacturing)
*Computerized GIS
*Environmental Information System
*GIS (Geographic Information System)
*Geographically Referenced Information System
*Geo-Information System
*Image-Based Information System
*LIS (Land Information System)
*Land Management System
*Land Record System
*Land Resources Information System
*Multipurpose Cadastre: These systems store information about parcels of land. They are used in urban geographic information systems in order to collect and maintain data associated with property. Identifiers assigned to each parcel link information to each plot of land. All information is carefully stored with a geodetic reference frame because a high degree of accuracy is necessary in maintaining information about parcel boundaries and ownership. Because information in multipurpose cadastres is also linked to street addresses, these systems can be used for keeping track of such things as emergency response, crime, delivery of municipal services, and tax assessments. All such information can then be integrated and analyzed together.
*Multipurpose Geographic Data System
*Multipurpose Land Record System
*Natural Resources Inventory System
*Natural Resources Management Information System
*Planning Information System
*Resource Information System
*Spatial Data Handling System
*Spatial Database
*Spatial Information System

In the context of these innovations, geographic information systems have served an important role as an integrating technology. Rather than being completely new, GIS have evolved by linking a number of discrete technologies into a whole that is greater than the sum of its parts. GIS have emerged as very powerful technologies because they allow geographers and others to integrate their data and methods in ways that support traditional forms of geographical analysis, such as map overlay analysis as well as new types of analysis and modeling that are beyond the capability of manual methods. With GIS it is possible to map, model, query, and analyze large quantities of data all held together within a single database.

The importance of GIS as an integrating technology is also evident in its pedigree. The development of GIS has relied on innovations made in many different disciplines: Geography, Cartography, Photogrammetry, Remote Sensing, Surveying, Geodesy, Civil Engineering, Statistics, Computer Science, Operations Research, Artificial Intelligence, Demography, and many other branches of the social sciences, natural sciences, and engineering have all contributed. Indeed, some of the most interesting applications of GIS technology draw upon this interdisciplinary character and heritage. [Note: Dr. Foote's GIS web site is http://www.utexas.edu/depts/grg/gcraft/contents.html]

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❖ Local Government Partnerships Reduce Duplication of Effort and Costs for Census 2000: Local GIS Files Used to Electronically Update the Nation's Tiger Data Base

Source: Jon Sperling, Geography Division, Bureau of the Census. Over the past six months, census geographers and programmers have developed a viable production system that will electronically transfer data from locally maintained geographic information system (GIS) files to the TIGER data base in a timely and cost-efficient manner. Digital maintenance of the Census Bureau's geographic database using local GIS files will reduce clerical, labor-intensive work at the Census Bureau and, through time, lead to significant cost savings at the Census Bureau. At the same time, this process will minimize duplication of efforts within government agencies and enhance the quality of the TIGER Data Base and Master Address File (MAF) for the Census 2000 and beyond.

Using a combination of commercial GIS and internal Census Bureau software and programs, digital files are now being systematically reviewed, edited, and converted to a standard format. These digital exchange files are then run through a process that

transfers base geographic data such as street centerlines, street names, address ranges, and ZIP Codes from the source file to the TIGER data base. Along with a careful review of provided metadata, a series of pre-processing edits of the local digital file and post-processing edits of the updated TIGER file ensure the overall quality of the data transfer process.

Most of the TIGER/MAF development work for Census 2000 is being done, and will continue to be done, by the Census Bureau's 12 regional offices in a necessary, but time and labor intensive, process using predominantly non-digital reference materials. This process of resolving uncoded address cluster files from computer matches between postal and census databases is known as Master Address File Geocoding Office Resolution (MAFGOR). This operation is fundamental for providing linkage between the TIGER data base and the Master Address File, the primary vehicles for supporting the collection, tabulation, and processing of data for Census 2000, ongoing current surveys, and the future American Community Survey. In some cases, local governments have offered to resolve these uncoded clusters in a program called the TIGER Improvement Program (TIP). However, these hard-copy map updates also are entered manually into the TIGER data base with all the attendant concerns of quality and efficiency in large labor-intensive operations.

In-house digital files received from local governments and other sources reveal the potential savings from the existing digital update process. During the past several months, over 30, primarily county-based, GIS files have been converted to a standard digital exchange format for census processing. In addition to cost savings from electronically updating the TIGER data base with local GIS files, there are time and quality benefits derived from using the digital file as a heads-up source for interactively adding new streets and address ranges not currently handled by the automated process. Perhaps even more important from an organizational perspective is the fact that the federal government is not duplicating work already done by local and regional governments. The implications of this evolving process for post census maintenance of a national street centerline file for census and other purposes are profound.

These first files are only the tip of the iceberg of publicly available and continually maintained digital geographic files nationwide. The quantity and quality of these files will inevitably increase and improve over time. Likewise, the programs and processes for exchanging digital spatial data will become increasingly robust. As such, long-term savings could multiply several-fold.

In light of these developments, the Census Bureau has much to gain and little to lose in pursuing ongoing digital exchange with local participants. Encouraging and actively pursuing digital geographic data sharing partnerships will reduce duplication of effort within the public sector, between the public and private sector, and translate into tremendous savings for the Census Bureau and, consequently, the American taxpayer. As such, this digital processing of local geographic files fulfills the basic tenets of Vice-President Gore's Reinventing Government Initiative and works within the spirit of the overall objectives of our emerging National Spatial Data Infrastructure (NSDI). [Note: Jon Sperling will be presenting a paper on Updating TIGER with Non-Census Spatial Databases at the 1997 ESRI User Conference in San Diego, CA]

V. Public Health GIS Literature

(This section may include literature citations, abstracts, syntheses, etc., and submissions are open to all)

Abstracts Preview: 1997 NCHS Joint Meeting of the Public Health Conference on Records and Statistics and the Data Users Conference, July 28-31, Washington, D.C.- Session on "Geographic Information Systems (GIS): An Exploratory Tool for Disease Surveillance and Analysis" (July 29, 3:30-5:00 p.m.).

1. "Pilot Project to Develop a GeographicInformation Systems-Based Sampling Frame for National Surveys of Local Health Departments and Local Boards of Health," Thomas Richards, M.D.,* Medical Officer, Public Health Practice Program Office, CDC.

Abstract: Mapping the boundaries of U.S. local health departments (LHDs) and local boards of health (LBOHs) is a key step in establishing a national sampling frame for surveys monitoring *Healthy People 2000* Objective 8.14. This objective is: "increase to at least 90 percent the proportion of people who are served by a local health department that is effectively carrying out the core functions of public health." A pilot project was developed to map LHD and LBOH boundaries in six states as completely as possible using a desktop geographic information system (GIS) software package. This presentation describes this initial effort and the utility of the boundary files, using data from a 1992-1993 national LHD survey, a 1996 national LBOH survey, and the Bureau of Census. We conclude that a national GIS-based frame is feasible and essential. Such a frame would provide the ability to select representative samples of LHDs and LBOHs to make accurate national estimates about their characteristics and services, obtain timely input from them about critical public health policy issues and trends, link survey results with boundary files for other data sources, and use spatial analysis techniques to gain new insights.

2. "A Geographic Information Systems Approach to Community Epidemiology in a North Carolina Industrial County," Gerald Pyle, Ph.D.*, Professor of Health Promotion, College of Nursing and Health Professions, UNC Charlotte. Abstract: Unique facets of the Southeastern Piedmont textile mill culture have had a dubious influence on community health status. The demographics of Gaston County, North Carolina, typify many of the textile manufacturing areas of the Southeastern U.S. Cultural mores are manifested by a combination of rural values, labor intensive low wage-rate manufacturing employment, high levels of literacy by national standards, a higher incidence of social pathologies, and higher than average age-adjusted mortality rates. This study examines some key aspects of the health status of Gaston County with Geographic Information Systems (GIS) by analyzing the community epidemiology of teen births, hepatitis B and HIV-AIDS. Two retrospective descriptive epidemiological associations are made. One consists of a socioeconomic comparison of teen births in 1994 and 1995 with violence against pregnant teens. The second analysis is an epidemiologic association of reported hepatitis B and HIV-AIDS.

GIS methods are used to identify spatial clusters of teen births by specific neighborhoods as defined by census tract information. These clusters are scrutinized in conjunction with similar information about violence against pregnant teens. Our findings show similar social pathologies within comparable neighborhoods. The GIS-based comparison of hepatitis B and HIV-AIDS results in similar spatial clusters for groups that are demographically different. Using hepatitis B reports from 1978-1994 and AIDS and HIV-positive cases recorded for the period 1987-1994, our findings show that the earlier hepatitis B epidemic was to some extent a spatial precursor to the subsequent HIV-AIDS epidemic in Gaston County. Similar geographical clusters of these two STDs are also in consonance with patterns identified for teen mothers. The methods used here attest to the importance of GIS-based investigations in community epidemiology.

3. "GIS and Breast Cancer Screening: Integrating Cancer Registry, Census, and Mammography Site Data to Monitor Breast Cancer Control," T. Joseph Sheehan, Ph.D.*, Professor, Department of Community Medicine and Health Care, University of Connecticut School of Medicine. Abstract: Since there is no known prevention strategy for breast cancer, secondary prevention through screening and early detection remain the only way to control breast cancer. Mammography screening has been shown to reduce breast cancer mortality 30-40% among women 50 years and older. Since reliable data on breast cancer screening are not yet available, surrogate or proxy measures, such as the proportion of cases with advanced disease at diagnosis, can be used to estimate screening rates. A high proportion of late stage diagnoses would suggest poor screening. As part of the Massachusetts Breast Cancer Control Evaluation Project, these proxy measures of screening have been incorporated into a Geographic Information System (GIS) along with other relevant social and economic

data. Spatial Scan statistics are used to test whether significant excesses of late stage cancers are clustered geographically, based upon data aggregated to the town or census tract level. When significant clusters are found, thematic maps are created to show the racial/ethnic, educational, and economic features of those areas, along with the location of mammography sites and public transportation routes, all of which can help in tailoring intervention programs for the affected regions.

4. "Investigating Breast Cancer and the Environment Using a Geographic Information System," Steven Melly, M.S.*, Staff Scientist, Silent Spring Institute. Abstract (see related article below "Mapping Out a Search for Environmental Causes of Breast Cancer").

*Presenter of coauthored paper

Selected Journal Publications

Pyle, G.F. and Gross, W.A. (1997). " The Diffusion of HIH/AIDS and HIV Infection in an Archetypal Textile County." *Applied Geographic Studies*, Vol. 1, 63-81: This study examines the geographical diffusion of the annual reporting of both newly diagnosed cases of HIV-AIDS and HIV-positive persons [using ArcView GIS] in a textile manufacturing county that typifies the "mill culture" of the American South. Nearest-neighbor analysis helps in identifying clusters of cases over time. As the HIV-AIDS epidemic progresses from the late 1980s into the 1990s, newly identified clusters of cases increasingly converge closer together. We also identify clusters of reported HIV-positive persons with the realization that the information is under-representative of the population not clients of public health facilities. The relative risk to African-Americans is much higher than other groups in spite of lower proportion than found in large metropolitan areas. The risk to females also continues to grow, especially for African-Americans. [**Editor**: This study, including findings on the community epidemiology of teen births and hepatitis B, will be presented at the 1997 NCHS Joint Meeting of the Public Health Conference on Records and Statistics and the Data Users Conference, July 29, Washington, D.C.]

Brody, J.G., Rudel, R., Maxwell, N.I. and Swedis, M.S. (1996). "Mapping Out a Search for Environmental Causes of Breast Cancer," *Public Health Reports*, Vol.111, No.6, pp.494-507: "When the Massachusetts Department of Public Health published town-by-town cancer statistics for 1982-1990, the breast cancer rates for Cape Cod stood out as sharply as the peninsula itself on a state map. Among the state's 351 cities and towns, eight communities had breast cancer rates that were at least 25% higher than the state average and also met the stringent statistical significance criterion of $P<0.001$ (one chance in a thousand that the town breast cancer rate differed from the statewide rate by chance alone). Of these eight towns, seven were on Cape Cod. Using the common statistical significance criterion of $P<0.05$ (one chance in 20), two other Cape Cod towns also were found to have elevated breast cancer rates. When elevated cancer incidence occurs within a confined geographic unit such as Cape Cod, epidemiologists begin to think about whether demographic or environmental features specific to the area may explain the pattern. Could the explanation lie in something about the people or something about the place?" Synopsis: Geographic patterns and time trends for breast cancer suggest there are preventable causes that may include environmental factors. This article describes the development of new methods used in the Cape Cod Breast Cancer and Environmental Study to investigate whether synthetic chemicals in the environment contribute to breast cancer risk. [**Editor**: This study will be presented at the 1997 NCHS Joint Meeting of the Public Health Conference on Records and Statistics and the Data Users Conference, July 29, Washington, D.C.]

Perlin, S.A., Setzer, R.W., Creason, J. And Sexton, K. (1995). "Distribution of Industrial Air Emissions by Income and Race in the United States: An Approach Using the Toxic Release Inventory," *Environmental Science & Technology*, Vol.28, No.1, pp. 69-80. Abstract: 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.

VI. Related Census, DHHS and Other Developments

Excerpts from the November 14-15, 1996 meeting of the NATIONAL COMMITTEE ON VITAL AND HEALTH STATISTICS, Public Health Service, Washington, D.C.

SUBCOMMITTEE/WORK GROUP MEMBERSHIP. Ultimately, motions were passed establishing three Subcommittees: Populations at Risk; Health Data Needs, Standards and Security; and Privacy and Confidentiality. A Planning and Implementation group was ratified as a subcommittee of the Executive Subcommittee. The following points were made in regard to various Subcommittees:

-The Planning and Implementation functions will include identifying linkages with other groups working on overlapping issues, tracking progress on work plans and identifying barriers, and providing liaison between Subcommittees and the Executive Subcommittee.

-The core of the Privacy and Confidentiality proposal is for the Subcommittee to conduct a series of hearings by the end of February. The issues regarding information as a public trust will probably be taken up by the Subcommittee after the first round of legislation.

-The charge and function of the Work Group on Data Standards (established at the last meeting) were put into the broader context of a subcommittee that deals more generally with data needs and data quality. The Subcommittee will determine how to implement its charge and whether to have a separate work group on standards.

-Members acknowledged a shared responsibility for concern about populations at special risk. The Subcommittee on Populations at Risk will serve as a resource to the other Subcommittees and a reference point for outside constituencies. It will function somewhat like the Planning and Implementation group in "scanning" the work of the other groups.

-Community- and state-level data issues will be addressed under the Health Data Needs rubric.

-The structure and function of all subcommittees will be evaluated in a year.

Executive Subcommittee: Detmer, Coltin, Frawley, Leatherman, Lumpkin

Planning and Implementation: Coltin, Amaro, Cohn

Populations at Risk: LaVeist, Amaro, Arce, Iezzoni, Mor, Ward

Health Data Needs, Standards and Security: Starfield, Cohn, Coltin, Frawley, Iezzoni, LaVeist, Lumpkin, McDonald, Mor, Van Amburg,

Privacy and Confidentiality: Gellman, Cohn, Frawley, Leatherman, Ward

PRIVACY COMPONENT. John Fanning then reported on the Department's work on confidentiality and privacy, as stimulated by the Health Insurance Portability and Accountability Act (AKA P.L.104-191, HIPAA, and Kassebaum/Kennedy) which directs the Secretary to present to the Congress recommendations for medical record confidentiality legislation by August 1997. Those responsible are consulting every part of the Department and other departments with an

interest in records, and they hope this Committee will contribute to the process. The Department plans to take part in Congress's review of pending confidentiality legislation, which is likely to take place in the near future. HHS has already analyzed the proposed legislation, and policy development will build on that analysis.

DATA STANDARDS COMPONENT. Bill Braithwaite explained that in enacting the bill, Congress was responding to a private sector request for national uniform standards for electronic data interchange (EDI), with potential savings estimated at $5.49 billion a year. The main purpose, therefore, was to decrease the cost of health care. A secondary concern was securing the computerized health information and making it private.

The Secretary is required to adopt standards for electronic exchange of administrative data within 18 months of enactment, and those who choose to exchange information electronically then have 24 months to comply with the standards. The recommended standard must have been developed by an ANSI-accredited standards development organization (SDO), unless the Secretary can demonstrate that it will substantially reduce administrative costs and that it was promulgated under negotiated rule-making. If there is no ANSI standard, NCVHS can recommend a standard to the Secretary.

The timeline for the work is very short: Because the approval process can take up to a year, the Department really has only six months from enactment to do the work, three of which are past. Congress has until August 1999 to enact general privacy legislation, and if they have done nothing by February 2000, the Secretary can issue privacy regulations for EDI.

The many issues in adopting the standards include conflicting standards, conflicting implementations, incomplete standards (e.g., with no implementation guides), proprietary code sets, the considerable cost of change, privacy fears (particularly concerning the Social Security Number), and security issues (involving protection from failures of availability, integrity and confidentiality). In addition to the security issues, which are technical, there are the privacy issues, which are a matter of policy -- e.g., the tradeoffs between recommended privacy mechanisms and the cost of implementing and maintaining them.

Mr. Braithwaite offered his thoughts on NCVHS's role in this area. Congress has asked it to synthesize and present the private sector input to HHS, to recommend new standards where appropriate, and to help the Department with recommendations about the choices between the existing standards. He said he expected the "broad thinkers" on the Committee to develop a vision of standard evolution over time and a process for updating the standards.

In Mr. Moore's absence, Mr. Scanlon commented on the current HHS implementation process, which involves not only a Department-wide but a government-wide effort. HHS is working to have a very fair and open process in which all perspectives in the standards and users communities are heard, including that of NCVHS. The approach is intended to involve all HHS agencies with an interest in standards, including payment, grant, and research programs. Other federal agencies will be invited to participate. The Department will publish any formal NCVHS recommendations in the Federal Register. The Committee is the major vehicle for providing input from the standards community.

OVERVIEW OF AGENDA. Turning to the next segment of the meeting, Dr. Detmer explained that the Committee is beginning the process of responding to the Kassebaum/Kennedy mandate to hear from standards groups and others with a stake in standards. Representatives' presentations will be interspersed throughout the day. They have all been asked to address how their organization would respond to the new legislation, their concerns and issues, and their advice to the Committee. The first speaker was Peter Waegemann, Chair of the American National Standards Institute Healthcare Informatics Standards Board (ANSI HISB), which recently submitted a report to the Department summarizing existing standards.

Mr. Waegemann observed that most discussions of security confuse confidentiality and

security. At the center of both are eight patient rights, including the rights to privacy, access to information, anonymous care, and the opportunity to correct erroneous information. There is an emerging awareness of the right to be treated using all the information in the provider's possession. All of these rights correspond to confidentiality measures.

Systems security has four major areas: accountability, data integrity, availability, and auditability; standards are needed in the last three. ASTM has initiated a major program to develop 13 standards to be ready by early 1997. They include standards for security training, audit trails, and telemedicine. Mr. Waegemann reiterated that HISB is working on harmonizing activities in all of these areas, and he invited questions and comments. Dr. McDonald called attention to Internet standards for sending EDI over Internet, which should remain high in the Committee's sights.

Dr. Detmer asked for an estimate of the total number of standards to be contended with, prompting a lively discussion that echoed through the two-day meeting. Dr. McDonald asserted that the total number is not important, as only 20 to 30 are of concern to the Committee. Mr. Waegemann suggested 5,000 as the rough total number, including about 30 key applications standards and several hundred networking standards. He agreed that some are far more significant than others, but pointed out that it is necessary to be aware of all of them because changes in any of them can affect "the upper layers." The focus should be on the application standards, which number about 1,200 worldwide. To help maintain a focus amid the vastness, Dr. Lumpkin suggested as a lens the changes that would simplify the operations of a clinician in his/her office.

Mr. Moore said that about 95 percent of HCFA's claims are on the NSF, the flat file. The agency does not intend to force providers to buy more equipment or software to comply with new standards, but rather visualizes a slow transition process as clinicians' information capacities grow more sophisticated. He added that HCFA saves five to six billion dollars a year in claims processing by using computers. Doctors' offices have indicated in surveys that they are willing to spend money on information systems once all payers agree on a common format. Thus, the first step is to "get that environment straight and ready."

In conclusion, Mr. Waegemann observed that the challenge is to find a balance between existing standards and a vision of future needs, given that technology is always moving. The tension between these two provided another focus of Committee discussion over the course of its meeting. Mr. Moore stated that his agency cannot sacrifice short-term practical imperatives for an ideal that may never materialize; others acknowledged the deadlines in Kassebaum/Kennedy, but noted the pitfalls of getting locked into old technology.

Returning to an earlier point, Dr. Schwartz suggested learning more about the extent to which health information systems are currently automated, who is using them, and how, to have a better sense of the practical realities. He also wondered about methodologies for assessing the cost effectiveness of implementing a new system.

Ms. Leatherman seconded this suggestion, noting the disparity of opinion among the experts and the Committee's need for a common set of assumptions as it pursues its mandate. The two key questions in this regard concern 1) the current infrastructure in the country, including how many physicians' offices are computerized and to what extent, including the capacities of the office workers; and 2) feasibility parameters related to people's attitudes, understanding and acceptance regarding the need to computerize and have standards. In this vein, Dr. Lumpkin suggested developing ways of testing the impact of the Committee's recommendations through "real-life scenarios" that test whether proposed recommendations would make things better or worse for people.

Laura Landrum, Illinois Department of Public Health and Association of State and Territorial Health Officials (ASTHO). Ms. Landrum's focus is the present and future role of health information in the conduct of state level public health functions. She noted that states are under pressure to improve

outcome measurement, to assure accountability, and to reshape population-based services, and many are developing creative individual-level MIS systems and public health surveillance systems. A fundamental principle in public health is that individual level data systems must be conceptualized in terms of their utility for the many uses of aggregated data. These include policy development, health status assessment, research, surveillance and regulation, the latter two of which in particular use individual level data. In surveillance, a priority need is for more promptly reported individual health data. In regulation, where the paradigm in public health is shifting toward an outcomes orientation, states need access to health plan outcome data as well as data from elsewhere, such as patient satisfaction and risk factors.

Ms. Landrum called attention to the need to protect the confidentiality of individual level data, and she urged the Committee not to allow the cost of security measures to be a barrier to these protections. She also urged NCVHS to use its reporting mandates to discuss broader issues of the quality of information. In conclusion, she emphasized that public health practice can be advanced with increased access to meaningful, timely and standardized individual level data.

Margaret O'Kane, President, National Committee for Quality Assurance (NCQA). NCQA has identified three phases in the widespread adoption of an integrated patient record. The current phase is the first one, infrastructure development, and NCVHS can advance those efforts significantly. It has been estimated that phase 3, institutionalization of the integrated patient record, will be accomplished in 10 or 15 years.

NCQA recommends that the Committee address several issues: 1) the lack of consensus on structure, content and coding of the medical record; 2) significant cultural and operational changes needed to retool to computerized records; 3) insufficient guarantees of security and confidentiality of records; and 4) insufficient financial incentives to motivate providers to invest. One idea advanced in regard to the last is broader financial incentives such as tax benefits.

Margaret Van Amringe, Joint Commission on Accreditation of Healthcare Organizations (JCAHO). JCAHO sees the groundwork laid by NCVHS for a core data set as valuable, and hopes for continuing refinement and updating and an effort to encourage its use. Four or five elements, in particular, need clarification and definitional work. The Commission urges that the Committee's recommendations on confidentiality will protect not just the need of accreditors to look at medical records, but also the function of auditor, which has generally been omitted in privacy legislation. It also hopes the Committee will help reduce the time horizon for a computerized patient medical record; and finally, it stresses the importance of adopting unique identifiers for patients, providers, and payers.

Discussion

Dr. Cohn asked for comments on unique personal identifiers. Ms. Coltin described her organization's experience trying to link data to understand the low birth weight problem. It found that by going through some hoops, it is possible to get birth certificate data, which provides more accurate and reliable rates than other sources. Taking up the theme of hoops, Dr. Epstein noted that one problem is that every state and jurisdiction has different ones. He added that having unique personal identifiers would make it much easier to link data across sectors of government within states. Dr. Liu noted the centrality of linking data to research activity, and added that the current confidentiality protections imposed on researchers seem to work quite well. An explicit policy of enforcement must be included in the measures. Ms. Landrum said that in public health, not having unique personal identifiers makes it impossible to do such things as eliminate duplicate accounts of clients in different agencies, look at trends over time in a valid way, develop personal histories of clients, or track users across multiple programs.

On that subject, Ms. Van Amringe noted that

to meet standards regarding the continuum of care, it is necessary to track patients across settings. In addition, some quality improvement measures could be enhanced if providers had access to tumor registries and if immunization records could be compiled from all community sources.

Mr. Van Amburg cautioned that the common identifier is "not the end-all that will solve all the problems." Even with a common identifier, his agency has found that linkage is not easy because of quality issues, among other things.

Mr. Gellman called attention to the tension between two values advanced by the panelists -- more and better data, and confidentiality rules. Ms. O'Kane agreed that there are trade-offs, and what is needed is an honest dialogue about them. Dr. Detmer said the Committee hopes to facilitate just such a dialogue. Dr. Epstein observed that there is a lot of misinformation afloat about supposed violations of confidentiality and privacy; in fact, his organization has not found instances of any violations by state agencies.

NATIONAL BIOETHICS ADVISORY COMMISSION BRIEFING

Dr. Detmer introduced Ms. Patricia Norris, Communications Director for the National Bioethics Advisory Commission. Ms. Norris said the Commission was created in October 1995 by Executive Order, to advise the Office of Science, Technology and Policy (OSTP) and other appropriate government entities on human research subjects protections and genetic information issues. It plans five meetings this fiscal year, including one in July outside Washington, D.C. In addition, a special panel will soon convene at an international bioethics conference in San Francisco to talk with bioethicists from around the world about how their commissions have been managed and the issues they have dealt with.

The Commission held its first meeting in October 1996, focusing on exchanging information about each Commissioner's particular interests and reports from the Office for Protection from Research Risk and the NIH Human Genome Project. The 18 members include lawyers, physicians, bioethicists, and representatives from the public. At its recent meeting the group formed subcommittees on human research subjects and genetics. Meetings are open, and all will have a public forum when people can present their concerns and issues. Ms. Norris said that if the Committee is interested in working with the Commission, it can express it by sending a representative to one of its meetings or by sending a written statement. Dr. Detmer noted the connection between the two bodies' concerns, particularly because Kassebaum/Kennedy has mandated that NCVHS make recommendations on privacy. The Commission's web site is at: http://www.whitehouse.gov/WH/EOP/OSTP/hmtl/OSTP_Home.html. Ms. Norris also maintains a mailing list for the Commission, and people can ask to be put on it.

The Commission was established to last until October 1997, but OSTP wants to extend that lifetime. Asked about the stimulus for its creation, Ms. Norris said it was not, as has been rumored, spawned by the Radiation Commission, but rather came about because of the longstanding interest of Senators Hatfield and Kennedy, partly in regard to genetic information issues.

Dr. Schwartz asked if it would get involved with survey-related research, for example in regard to respondents' rights, especially those of children, and informed consent. Ms. Norris said she would take the idea back to the Commission. She added that upon creating the Commission, the President directed all government agencies to submit reports regarding the status of their research with regard to human subjects. The Subcommittee on Human Research Subjects will analyze those reports and produce a report on that by the end of this fiscal year. The Commission will also consider what to do about projects that are not federally funded.

COMMITTEE DISCUSSION: Much of this

discussion centered on the charge and role of the Committee in respect to the Kassebaum/Kennedy legislation, and perceptions of the nature of the task. It was agreed that the order of magnitude of the number of standards the Committee needs to be concerned with is closer to 20 than 5,000. There was some discussion of the meaning of key terms, such as "transaction," and agreement that opportunities are needed for further education of Committee members. Some ideas put forward were a glossary, summaries and standards on the Web for individual study, and an orientation session at a meeting. It was noted that the matrix developed for the core data project has useful comparisons among several claims formats and data sets.

Dr. McDonald said a pivotal problem is the variability among standards and their unsystematic content, and he suggested that the Committee help the Department think about how to regularize things without changing the standard. Everyone will benefit from more universal code sets. Dr. Lumpkin pointed out that the Committee will be looking at the schema of the various standards and analyzing where they contradict each other and how they can be simplified.

Mr. Moore noted that the HISB inventory shows that for some transactions, only one standard has been identified. HCFA is proposing to the Secretary that they put together teams to analyze each of the nine or ten transaction sets. They would report to NCVHS, the Data Council and others about what the transactions are, what data are there, and whether they meet the needs of the community. In effect, he said, these teams would be doing the staff work for NCVHS in this area. They will also go to the SDOs and other organizations to find out about their priorities and concerns, and on the basis of these discussions they will simplify and standardize to the fullest extent possible. The final product will be put into a proposed regulation that will go through the Department, OMB, and out to the public, which will have 60 days to comment. Then the process will be repeated, with another NCVHS opportunity to respond, followed by the posting of a final regulation by February 1998.

Ms. Ward raised the issue of the patient identifier and how best to approach it, a subject that generated considerable discussion. Mr. Moore said he doubts that recommendations on the individual identifier can be ready by February 1998. It was suggested that the entire Committee work on the patient ID, rather than delegating it to a work group or Subcommittee. Dr. Detmer asked all sub-groups of the Committee to identify such cross-cutting issues that need to be addressed by the entire group. As for process, the consensus was that the Committee should begin working on the individual identifier before long, because of its complexity, but should reserve a final decision until it has thought through its recommendations on other issues. Dr. McDonald pointed out that good analytical work and research would help the Committee support and defend its recommendations -- e.g., on the relative cost of various alternatives, the security tradeoffs, and mechanical and technical issues.

At this point, Dr. Lumpkin suggested a shorthand for Kassebaum/Kennedy -- "K2" -- in reference to the rigorous challenge facing the Committee and the nearly Everest-sized mountain with the name K2. It was adopted with enthusiasm.

Dr. Detmer responded that ultimately, the goal is to have intersecting computer-based consumer health records, computer-based population records, and computer-based patient records using a broader definition of "patient." Dr. Cohn pointed out that the Committee has an opportunity now to put in place data sets that meet real data needs, and to do so in a way that meets other needs. He asserted that this important process needs everyone's participation, including "the people who actually have an idea of what the data need to be used for." He added that in the future, surveys, too, will likely be conducted with the aid of transaction standards.

Subcommittee on Privacy and Confidentiality: Mr. Gellman said that the core of the proposal is for the

Subcommittee to conduct a series of hearings by the end of February. Given that Congress has already decided there should be health privacy legislation or regulations, the question is what their content should be. The hearings would be unlike typical Congressional hearings in that they would not be for the purpose of building public support or educating, but rather would get the major interest groups and players to go over proposed legislation in detail to look at specific trade-offs. Bringing about this process is something the Committee is uniquely positioned to do, and it would be a significant contribution to policy development in this area. It will be critical that all points of view are represented and forced to confront alternatives, on the record. The process will create a background that will help focus and inform the Committee's recommendations to the Secretary, and also will focus attention on the sharp conflicts raised by legislation. Mr. Gellman referred fellow members to an article he authored on the basis of confidentiality issues.

Subcommittee on Data Needs, Standards and Security: Dr. Starfield said that the current thinking is that the charge and function of the Work Group on Data Standards (established at the last meeting) should be put into the broader context of a subcommittee that deals more generally with data needs and data quality -- e.g., clinical data, including the Committee's past work on core data elements, and population data.

Mr. Van Amburg noted that two objectives of the reorganization are to reduce the number of subcommittees and to have a home for outstanding activities and agendas of previous subcommittees. Dr. Lumpkin noted that some mechanism is needed to ensure attention to changes underway in NHANES and other surveys. In general, Committee members favored finding a way to have a short-term focus on responding to K2 without losing sight of broader concerns such as surveys. It was noted that standardization itself may prove to be a long-term activity of the Committee, and it should not be assumed that it will recede. There was general agreement that whatever structure is chosen for this and other Subcommittees will be reevaluated in a year or so, to see if it is working or needs to be changed.

Subcommittee on Populations at Risk: Dr. Iezzoni began with some history, noting that among the discontinued NCVHS subcommittees are ones on minority and other special populations, long-term care and disabilities, mental health, ambulatory care, and state and community health data. Some NCVHS members have been concerned that this structure supported a sense of looking at data within settings of care, and that this set of lenses leads to problems and should be transcended. Dr. Iezzoni noted the value of relating to various constituencies, especially those left out of the health care system, and of assuring advocacy for their interests in the policy debate.

Regardless of the name, the underlying concept for the Subcommittee in question is people who are at risk. The three categories that put people at risk are: (1) difficulties with financial access, (2) the burden of chronic illness, and (3) difficulty negotiating through the health care system caused by various attributes (e.g., race and ethnicity, being very young or old, immigrant status, language barriers, geographic barriers). Each of these causes of vulnerability has implications for both privacy/confidentiality and standard setting, so there are overlaps with the other NCVHS Subcommittees.

Net Site of Interest for this Edition:

Visit the Office of Research and Methodology's (ORM/NCHS) new Atlas of United States Mortality at http://www.cdc.gov/nchswww/whatsnew/whatsnew.htm. This atlas shows leading causes of death by race and sex for small U.S. geographic areas referred to as Health Service Areas (HSAs). The 18 causes of death included in this atlas account for 83 percent of all deaths in the United States during 1988-92. In addition to maps with age-adjusted death rates for each HSA, the atlas includes maps that compare each HSA rate to the national rate, smoothed maps for each cause that show the broad geographic patterns at selected ages, and a chart with regional rates for each cause of death.

Final Thought(s)

An EPA-funded study to assess total organophosphorus pesticide exposure among children in urban and rural environments will commence data collection in the spring of 1997. The planned design of the study is such that pre-school children will be sampled in rural and urban areas and urine samples will be collected from these children weekly for one year. The urine samples will be subjected to organophosphate metabolite assay, with the main metabolite of interest being dimethyl thiophosphate or DMTP. In a previous cross sectional study of a Washington rural community only 47% of children had "detectable" levels of DMTP. The goal of the study is to characterize exposure and specifically to compare urban and rural levels as well as exploring seasonal variability in DMTP level. See proposal "Modelling time series of multiple censored data" at NRCSE web site http://www.stat.washington.edu/NRCSE/research/proposals/thompsonprop.html.

Because some fifty-three percent of the U.S. population relies on groundwater as a source of drinking water, do we know how much vinyl chloride [a common groundwater contaminant near hazardous waste sites] is in drinking water? "Minnesota investigators report that current guidelines for water testing could result in underestimating the concentration of vinyl chloride. The U.S. Environmental Protection Agency recommends that water samples be analyzed for vinyl chloride within 14 days of collection. However, anecdotal reports suggest that water samples analyzed immediately after collection have consistently higher vinyl chloride levels than similar samples held for longer periods. A study conducted by the Minnesota Department of Health (MDH) confirmed the reports." For more information on the relationship between the loss of vinyl chloride and holding time (and added losses during the process of drawing, packaging and subsequent handling of the samples), and other timely hazardous health exposure news, please visit http://atsdr1.atsdr.cdc. gov:8080/atsdrhome.html, web site for ATSDR's quarterly publication *Hazardous Substances & Public Health.*

Charles M. Croner, Ph.D., Editor, ***PUBLIC HEALTH GIS NEWS AND INFORMATION***, Office of Research and Methodology, National Center for Health Statistics <cmc2@nch09a.em.cdc.gov>

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