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AUTHOR	Morrison, John H., Jr.; And Others
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ABSTRACT

This report is the first in a quarterly series which will contain statistics and epidemiologic notes on lead poisoning at both the national and local levels. This report contains (a) statistics on childhood lead poisoning; (b) a status report on the Community Lead Poisoning Data System, which was designed to assist local lead control programs and to provide national data; (c) an overview of the epidemiology of childhood lead poisoning; and (d) a statistical study of patients with lead poisoning who were given short-term treatment at general hospitals in the United States. (HMD)

STATISTICS AND EPIDEMIOLOGY OF LEAD POISONING

No. FY 72-L1

U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
HEALTH SERVICES AND MENTAL HEALTH ADMINISTRATION
BUREAU OF COMMUNITY ENVIRONMENTAL MANAGEMENT
DIVISION OF PLANNING AND STANDARDS
ENVIRONMENTAL EPIDEMIOLOGY BRANCH
CINCINNATI, OHIO 45202

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STATISTICS AND EPIDEMIOLOGY OF LEAD POISONING

February, 1972
(FY 72-L1)

INTRODUCTION

This report begins a new quarterly series that will contain statistics and epidemiologic notes on lead poison at both the national and the local level. In addition, special reports will be prepared from time to time. Status reports on epidemiologic studies and the statistical program of the Bureau of Community Environmental Management will also be featured.

Contributions on the epidemiology of lead poisoning are welcome. They may be in the form of short epidemiologic reports on specific cases, more general reports on statistics or statistical analysis that will provide information for other local areas, and status reports on epidemiologic or statistical studies. Such contributions should be sent to:

Statistics and Epidemiology of Lead Poisoning
Environmental Epidemiology Branch, DPS, BCEM
Room 8004 - Federal Office Building
550 Main Street
Cincinnati, Ohio 45202

STATISTICS ON CHILDHOOD LEAD POISONING*

• CHILDREN IN SUSCEPTIBLE AGE GROUP (Under 5 Years)	20,000,000
• CHILDREN AT RISK (Under 5 Years, Live in Metropolitan Areas, Families in Poverty Classification)	2,500,000
• CHILDREN WITH ELEVATED BLOOD LEAD LEVELS (Blood-Lead Level Above 40 µg/100 ml.)	600,000
• CHILDREN WITH SYMPTOMATIC LEAD POISONING PER YEAR	30,000
• CHILDREN WITH A-SYMPTOMATIC LEAD POISONING PER YEAR (All Should be Treated)	80,000
• CHILDREN WITH NEUROLOGICAL HANDICAPS INCLUDING MENTAL RETARDATION	6,000
• CHILDREN REQUIRING LIFETIME INSTITUTIONAL CARE	150
• DEATHS - PER YEAR (Includes Acute and Long-Term Consequence of Lead Poisoning)	200
• ANNUAL COST OF LEAD POISONING	$195,000,000

*See Technical Note for Qualifications

TECHNICAL NOTE ON STATISTICS ON CHILDHOOD LEAD POISONING

The children in susceptible age group and children at risk are based on Bureau of Census data which has been rounded. Children at risk are those under 6 years of age living in dilapidated housing containing hazardous concentrations of lead. This latter estimate is taken from: National Estimates of Lead-Based Paint Poisoning of Children, National Bureau of Standards Report No. 10657, 1971.

Twenty-four percent of those at risk are estimated to have elevated blood lead levels. The percentage is the median values of surveys in Illinois and New York City. If other cities are used, the percentage is higher. There is, however, little data from the West and for small cities so we decided to take a moderate position.

From current screening programs such as New York, Philadelphia, and Chicago, it has been the experience that about 5 percent of the children with elevated blood-lead levels (over 40 µg/100 ml.) have symptoms--convulsion, anemia, cramps, etc.

The estimate of children with asymptomatic lead poisoning is 3.2 percent of the population at risk. This is defined as children with blood lead levels above 60 ug per 100 ml., but no overt symptoms. This estimate is based upon the results of Illinois and New York City screening projects.

Children with neurological handicaps including metal retardation are estimated at 20 percent of the cases of symptomatic lead poisoning based on follow-up studies in Chicago.

Children requiring lifetime care are 0.5 percent of the symptomatic cases of lead poisoning based on follow-up studies and reported by Julian Chisolm, M.D.

As noted, the number of deaths is estimated to be 200 per year for acute and long-term consequences of lead poisoning. The National Center for Health Statistics, however, shows deaths from lead poisoning at under 100 each year. The difference is because of imprecise diagnosis for acute cases as well as the exclusion of all cases where there is long-term consequences of lead poisoning. The estimate is based on discussions with various experts in the field of lead poisoning and are not based on particular studies.

The annual cost of lead poisoning includes hospitalization, present value of earnings loss for children with mental retardation, present value of added education and child development costs, and present value of lifetime care.

As can be seen by the above discussion, much more rigorous data collection is necessary in order to increase the accuracy of the statistics. We hope a proper balance is struck between data collection and control of the problem.

STATUS REPORT - COMMUNITY LEAD POISONING DATA SYSTEM [1/]

In late June 1971 the Bureau of Community Environmental Management contracted with Programming Methods, Inc. to design a data system to assist local lead control programs and to provide national data. The initial thrust of the contract is to develop three compatible local systems in various levels of complexity:

a) Manual

Requiring no computer whatsoever

b) Semi Automated

Designed for use with a mini-computer, such as the IBM System 360/Model 20 or PDP 8.

c) Automated

Designed for use with a System 360/Model 30 or higher. (Even at this most automated level, the system will essentially employ a batch design, using tape only for major storage to avoid undue complexity and encourage community utilization)

The systems have been designed and printing is being completed. A document comparing the three systems is being prepared. Clearance procedures to use these as the starting point for a Federal system is underway.

[1/] This report was written by John H. Morrison, Jr., Project Officer and Chief, Environmental Epidemiology Branch

EPIDEMIOLOGY OF CHILDHOOD LEAD POISONING - AN OVERVIEW*

When young children have eaten lead paint chips over a period of a few months, any one or more of several results can follow, depending upon the intensity of the exposure and individual susceptibility. A small proportion of such children have died as the result of pressure on the brain from excess fluid within the skull. Others have been so impaired as to require extensive custodial care for the remainder of their lives. Still, others have lost sight, hearing, or the use of one or more limbs. In other cases, apparent learning deficiencies have developed so that the children are unable to perform adequately in school and prepare themselves for useful work as adults.

The amount of lead necessary to poison a child is very small. A paint chip the size of a fingernail can contain 100 times the quantity of lead considered safe for a person to eat daily. Yet, abdominal X-rays have shown that children can eat a great many paint chips in a short period of time.

Prior to 1940, lead-based paints were used extensively for interior painting in the United States; therefore, most cases of lead poisoning in children are found in houses and apartments built before World War II. Since some exterior paints, however, are still lead based and children can eat exterior paint chips as well as chips from interior surfaces where exterior paint has been inappropriately applied, poisoned children may be found in areas of newer housing.

*This report was prepared by John L. Clark, Ph.D., Epidemiologist, Environmental Epidemiology Branch.

The diagnosis of lead poisoning in children is difficult. The initial symptoms--poor appetite, irritability, and occasional vomiting--are not specific for lead poisoning and are often attributed to a typical minor childhood infection. Routine laboratory tests do not disclose the presence of lead. A high degree of suspicion on the part of the physician, together with the availability of a laboratory competent in the analysis of urine and blood for traces of lead, are necessary for the successful diagnosis of lead poisoning.

Once lead poisoning has been diagnosed, powerful drugs are available that will remove much of the lead from the body. Experience, however, has shown that a treated child will almost inevitably suffer a recurrence of the disease if returned to an unaltered environment. Prevention of recurrence thus depends upon a suitable housing code that is adequately enforced. In the past, identification of the lead-paint-bearing surfaces required the removal of paint chips for laboratory analysis, which is a tedious and expensive procedure. Nondestructive testing devices, however, that will identify those surfaces having dangerous amounts of lead paint are now available.

PATIENTS WITH LEAD POISONING IN U.S. SHORT-TERM GENERAL HOSPITALS IN THE UNITED STATES*

During 1970, 729 hospitalizations involving lead poisoning in persons under 15 years old were reported in United States hospitals participating in the Professional Activity Study (PAS). Data from all patients discharged from hospitals participating in the PAS during 1970 and who were under 15 years old and had a disgnosis of lead poisoning, either as final diagnosis explaining admission or as a secondary diagnosis, were selected.

PAS has 1,379 hospitals participating in the medical record information service by submitting abstracts of medical records. In return, the hospitals receive reports on their cases.

Based on the PAS data, it is estimated that between 2,000 and 2,500 children are hospitalized each year. The estimate is based on ratios of national to PAS hospital beds and on discharges by State. Some States had no reported cases, and in these the percent of beds and discharges in PAS hospitals is small. Thus, the estimate is considered conservative.

Table 1 shows the number of patients, number of deaths, and average length of stay by age and by race. The race categories are not entirely exclusive since some hospitals record only white and nonwhite, while others code the specific race. The figures for the average stay excludes the length of stay of patients who died.

Many persons assume that all, or nearly all, victims of lead poisoning are black. Fifty percent of such patients are white. This may be the

*This report was prepared by John H. Morrison, Jr., Chief, Environmental Epidemiology Branch.

result of a better quality of medical care. The length of stay of all victims of lead poisoning is about 10 days. It should be noted that several age or age and color groups have few cases, so the average stay may be especially high, or low.

The number of cases, distributed by State and Census Division, are given in Table 2. It should be noted that not all States have the same percentage of their hospitals in PAS, and therefore the percentage distribution is subject to this qualification.

Table 1.--NUMBER OF PATIENTS UNDER AGE 15, NUMBER OF DEATHS, AND AVERAGE HOSPITAL STAY IN DAYS BY RACE: PAS UNITED STATES SHORT-TERM GENERAL HOSPITALS, 1970

Patients by race	Total or average under 15	Age: Under 1	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Total-Patients	729	6	182	208	114	84	68	29	10	7	6	3	3	4	1	4
Deaths	5	-	3	2	-	-	-	-	-	-	-	-	-	-	-	-
Average stay	10.4	8.0	11.6	10.5	10.3	9.2	8.8	7.4	11.8	10.0	7.5	5.0	26.3	17.3	19.0	14.3
White-Patients	217	2	48	59	36	24	21	11	4	2	3	2	-	1	1	3
Deaths	2	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-
Average stay	10.1	12.0	11.2	10.3	9.4	7.8	10.2	9.5	12.0	11.5	7.0	5.0	-	47.0	19.0	4.0
Non-White-Patients[1/]	75	1	16	21	12	11	9	2	1	2	-	-	-	-	-	-
Deaths	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-
Average stay	10.8	9.0	12.9	10.6	10.5	12.4	9.2	7.0	6.0	4.5	-	-	-	-	-	-
Black-Patients	382	2	99	111	62	44	33	15	5	3	3	1	1	3	-	-
Deaths	2	-	1	1	-	-	-	-	-	--	-	-	-	-	-	-
Average stay	10.5	6.5	12.0	10.5	10.8	9.4	7.7	5.8	12.8	12.7	8.0	5.0	45.0	7.3	-	-
Other-Patients	13	-	5	4	2	2	-	-	-	-	-	-	-	-	-	-
Deaths	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Average stay	9.0	-	8.2	11.3	9.0	6.5	-	-	-	-	-	-	-	-	-	-
Race Not Stated -																
Patients	42	1	14	13	2	3	5	1	-	-	-	-	2	-	-	1
Deaths	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Average stay	10.9	2.0	9.3	11.5	9.0	7.3	9.8	9.0	-	-	-	-	17.0	-	-	45.0

[1/] Black patients and other patients not included

Table 2.--NUMBER OF CASES OF LEAD POISONING BY STATE: PAS UNITED STATES SHORT-TERM GENERAL HOSPITALS, 1970

Census division, State	--Cases of Lead Poisoning--	
	Number (3)	Percent of Total (4)
Total	729	100.0%
Division 1	141	19.3
Connecticut	32	4.4
Maine	6	0.8
Massachusetts	7	1.0
Rhode Island	95	13.0
Vermont	1	0.1
Division 2	483	66.3
New York	336	46.1
New Jersey	134	18.4
Pennsylvania	13	1.8
Division 3	24	3.3
District of Columbia	11	1.5
Maryland	8	1.1
North Carolina	1	0.1
Virginia	3	0.4
West Virginia	1	0.1
Division 4	42	5.8
Illinois	11	1.5
Indiana	2	0.3
Michigan	14	1.9
Ohio	15	2.1
Division 5	3	0.4
Alabama	1	0.1
Kentucky	2	0.3
Division 6	31	4.3
Iowa	1	0.1
Missouri	29	4.0
South Dakota	1	0.1
Division 7		
Oklahoma	1	0.1
Division 8	2	0.3
New Mexico	1	0.1
Wyoming	1	0.1
Division 9		
California	2	0.3