Answers to a questionnaire were compared with serum antibody determinations of the children.

Use of a Questionnaire to Estimate Children's Susceptibility to Measles

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THE efficiency of mass immunization programs directed toward eradication of measles (rubeola) has depended, to some extent, on accurately identifying the susceptible portion of the population. Since measles usually is a disease of childhood, age has been a useful criterion of susceptibility. However, many children already are protected against measles by having had the disease, and the high cost of measles vaccine makes it desirable to identify these children to avoid unnecessary use.

Since measles infection usually produces easily recognizable clinical disease, not having had the disease is widely used as a criterion of susceptibility. Still another criterion is the absence of serum antibody, since measles infection usually confers lifelong immunity and persistent detectable antibody. Serum antibody determinations, however, cannot be made easily on large populations.

In the fall of 1964, the Allegheny County (Pa.) Health Department developed a program under the Federal Immunization Act to improve the immunization status of the county's children. In order to identify children needing immunization against smallpox, diphtheria, tetanus, measles, and poliomyelitis, questionnaires with queries about previous immunization against and history of these diseases were filled in by the children's parents. This paper reports the extent of agreement between estimates of susceptibility to measles based on answers to the questionnaires as compared with those based on serum antibody determinations for the same elementary school children.

Methods

Population. In November 1966 the prevalence of anemia was studied in children aged 3 to 13 years attending two elementary schools in a poverty area of Pittsburgh. A poverty area was defined by the Mayor's Committee on Human Resources from socioeconomic data including that from the 1960 census which were then grouped into an Urban Level of Living Index. These data were median family income; median years of completed education for persons 25 or more years old; percentages of male labor force unemployed, welfare recipients, defective housing, and home ownership; and rates of juvenile delinquency.

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This study, supported by research grant No. 2-856 as a component of a fourth-year medical student elective program, was part of a clerkship in preventive medicine and pediatrics performed by Dr. Levine and Dr. Lanz at the university.

Blood specimens were obtained from 1,098 of 1,292 children enrolled in the two schools. Parents of 35 children refused permission, 133 parents did not return consent slips, 14 children were absent at the time of testing, and 12 children refused to allow a blood specimen to be taken. There were 450 white and 648 nonwhite children and in each group approximately equal numbers of boys and girls.

Of the 1,098 children tested for measles antibody, 45 had questionnaires with incomplete or ambiguous answers. Thus, there were 1,053 children for whom there were both questionnaire answers and serologic test results suitable for analysis.

Questionnaire. The part of the immunization questionnaire of the Allegheny County Health Department pertaining to rubeola used in this study was:

"1. Has your child ever had REGULAR MEASLES (9 DAY MEASLES)?
Yes——— No———
2. Has your child had MEASLES VACCINE?
Yes——— No———

Antibody determination. Measles antibody was determined by a hemagglutination-inhibition test (*1*) which was adapted to microtiter technique. Capillary blood was drawn by finger puncture and collected on filter paper disks (*2–5*). Disks were dried and stored at 4° C. One day prior to testing, serums were eluted from single disks by addition of 0.6 cc. of 25 percent kaolin in borate saline, agitated 30 minutes, centrifuged, and inactivated at 56° C. for 30 minutes. An equal volume of 50 percent suspension of grivet erythrocytes was added, and the samples were adsorbed overnight at 4° C.

The final concentration of serums was considered a 1:8 dilution. Measles antigen with titer 1:128 was supplied by the National Communicable Disease Center, Public Health Service, Atlanta, Ga.

Each serum was tested with two hemagglutinating units of antigen. Test results were graded as + presence of antibody, − absence of antibody at 1:8 dilution, and ± weakly reactive serums, most likely indicative of a low antibody titer. All seronegative and question-

Table 2. Measles antibody status compared with history of disease and vaccination of children from two Pittsburgh, Pa., schools, November 1966

History	Measles antibody status			
	+	±	−	Total
Measles and vaccine	231	2	7	240
Measles, no vaccine	531	1	15	547
Vaccine, no measles	110	2	5	117
Neither measles nor vaccine	121	3	25	149
Total	993	8	52	1,053

Table 1. Proportion of children with historical and serologic evidence of measles in two Pittsburgh, Pa., schools, November 1966, by age

Age (years)	Total number	History of measles or immunization (percent)	Seropositive [1] (percent)	Without history of immunization [2]		
				Number	History of measles (percent) [3]	Seropositive (percent) [3]
3	13	69.2	61.5	8	50.0	50.0
4	41	73.2	80.5	31	64.5	77.4
5	177	84.7	90.4	131	79.4	88.5
6	136	87.5	98.5	117	85.5	98.3
7	120	84.2	95.8	112	83.0	95.5
8	123	85.4	97.6	113	84.1	98.2
9	136	88.2	98.5	126	87.3	98.4
10	117	93.2	96.6	114	93.0	96.5
11	117	85.5	96.6	114	85.1	97.9
12	50	82.0	98.0	48	81.3	97.9
13	23	87.0	95.7	22	86.4	95.5

[1] N=1,053.
[2] Children with no history of disease who received measles vaccine were excluded to allow comparison of present study results with those of studies done before the advent of measles vaccine.
[3] N=936.

able samples, as well as random seropositive samples, were tested in duplicate. (Dr. David Kirch of the National Communicable Disease Center, Public Health Service, and Dr. Donald Medearis, chairman, department of pediatrics, University of Pittsburgh School of Medicine, assisted in these determinations.)

Results

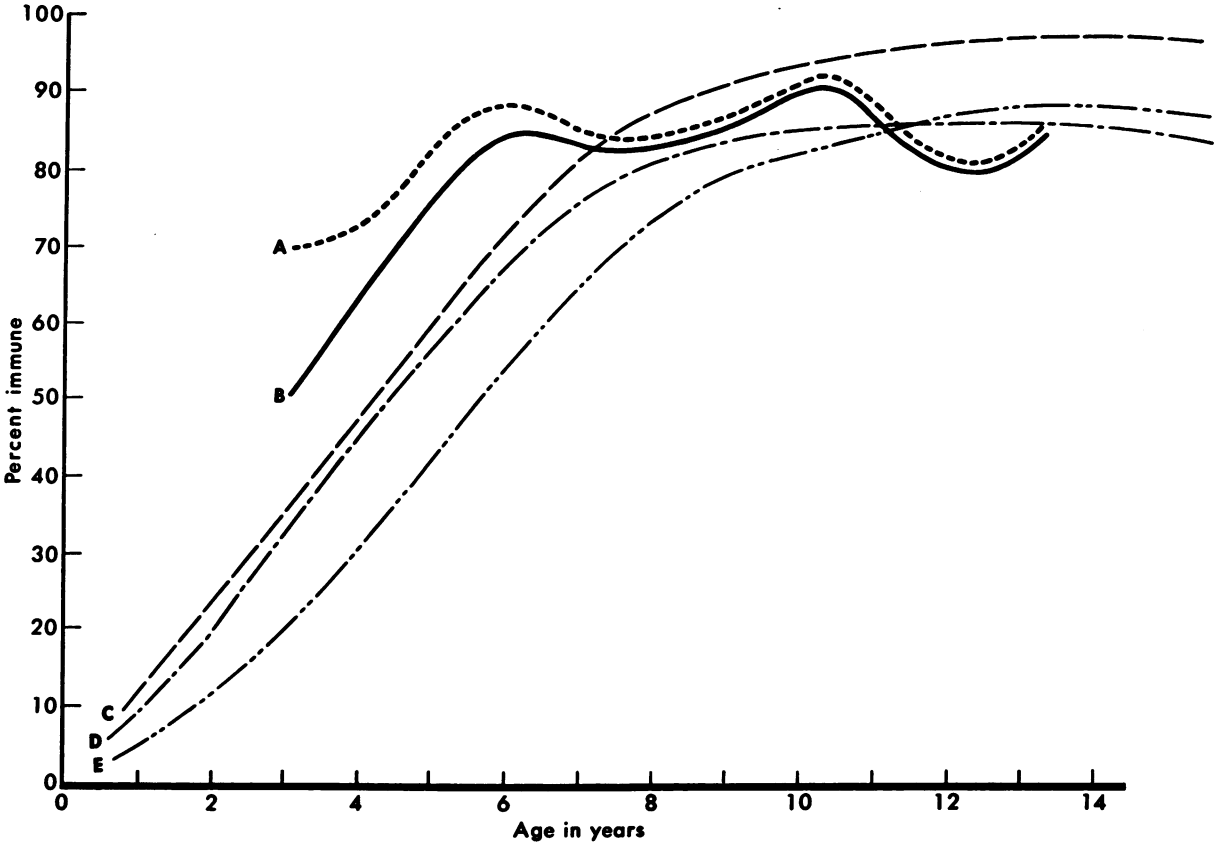
History. Of the 1,053 children tested, 85.8 percent gave a history of either artificial or acquired active immunity. The remaining 14.2 percent gave a history of neither measles nor measles vaccine. Of the group giving a history of measles immunity, 26.6 percent stated that they had both received vaccine and had measles. A total of 60.5 percent stated that they had had measles but had not received vaccine, and 12.9 percent had not had measles but had received vaccine (table 1, fig. 1).

Antibody levels. Serums from 94.3 percent of the 1,053 children had detectable measles antibody by hemagglutination-inhibition test at a 1:8 dilution, 0.8 percent of the children's serums showed partial inhibition of agglutination at 1:8 dilution and were thought to have low level antibody, and 4.9 percent of the children had no detectable antibody at this dilution. Duplicate testing of all seronegative and low-titer positive samples and of random positive samples were performed for validation.

Table 1 shows the proportion of all study children by age who were seropositive and the proportion of nonimmunized children by age who were seropositive. These data are depicted also on figure 2.

History-antibody association. Table 2 shows the association between a history of artificial and natural immunity to measles and presence of measles antibody in serum. Children with a

Figure 1. Immunity of children to measles, by age, as shown in four studies



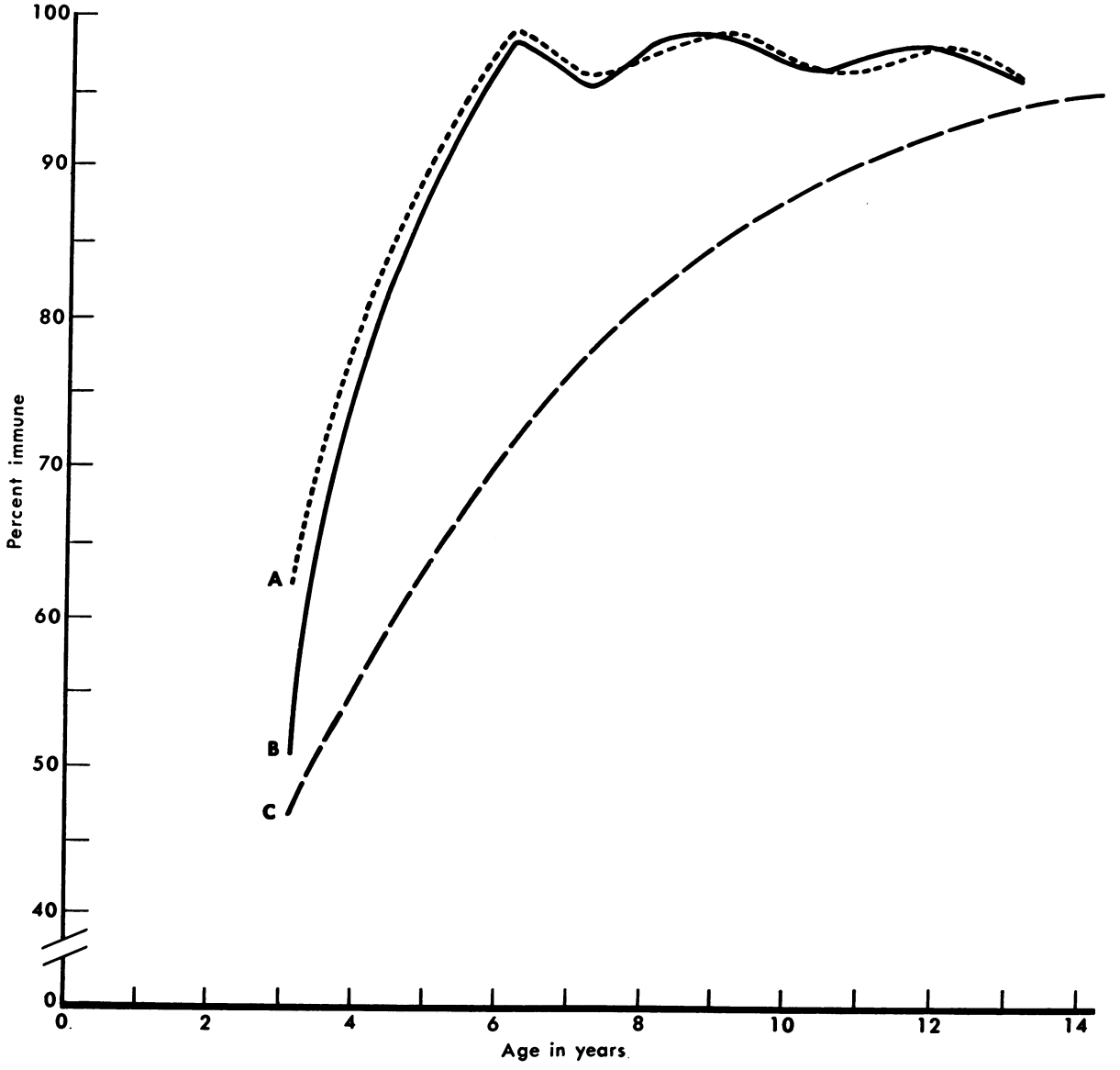
A. With history of measles, immunization, or both; B. Nonimmunized children with history of measles; C. Source: Reference 7; D. Source: Reference 10; E. Source: Reference 11

history of disease, artificial immunization, or both were considered to have a history of measles immunity; those with no history of either disease or artificial immunization were considered not to have a history of measles immunity.

In 877 of 1,053 instances, or 83.3 percent, historical and serologic statements of immunity agreed. Historical and serologic statements of nonimmunity for 25 children, or 2.4 percent agreed. For the remaining 151 children (14.3 percent), there was disagreement between historical and serologic data. Of 124 of these, no history of immunity was elicited but antibody was present, and 27 children had a history of measles or immunization but no detectable antibody.

Sensitivity-specificity. These data were used to calculate rates for sensitivity and specificity of the questionnaire in identifying susceptibles. The presence or absence of antibody at a 1:8

Figure 2. Measles antibody status and immunization history of children from two Pittsburgh, Pa., schools, November 1966, compared with findings by Black



A. All children with antibodies; B. Nonimmunized children who were positive; C. Source: Black, reference 6

dilution of serum was considered evidence of the true state of immunity.

Sensitivity—the ability of the questionnaire to correctly identify the true susceptibles—was 48.1 percent. Of 52 antibody negative children, 25 had negative histories. Specificity—the ability of the questionnaire to identify nonsusceptibles—was 87.6 percent. Of 1,001 antibody positive children, 877 had positive histories. When the sensitivity of the questionnaire for identifying susceptibles was determined by age, it was 59.4 percent for children age 6 and under and only 30.0 percent for those over age 6.

Comment

Both measles antibody and history surveys have been conducted among children in the United States. Because some children in the current study had received artificial immunization against measles, it was necessary to adjust for this circumstance so that age-specific rates for measles seropositivity and history of disease in the current study could be compared with those of studies conducted before the advent of artificial immunization. Therefore, from both serologic and historical data, rates were computed in which all artificially immunized children without a history of measles were excluded from both the numerator and the denominator (table 1, figs. 1 and 2).

Black, in 1957 (*6*), tested serums of 124 New Haven area school children below age 16 for measles complement fixing and neutralizing antibody. The proportion of seropositivity (positive to either test) by age (*7*) is shown in figure 2 as curve C. This curve, as compared with curves A and B in the same figure, indicates lower age-specific seropositivity in children studied by Black than in those in this study. Also, in children in this study, the age-specific proportion of those seropositive increased through age 6 and plateaued at about 95 percent. In contrast, the proportion of seropositive children in Black's study increased steadily to age 15.

The increase in age-specific seropositivity observed in this study, as compared with Black's findings, may have several explanations. First, this study population, although larger than Black's, was drawn from a much smaller geographic area. Thus, results may reflect local experience (a recent measles epidemic) rather than the immune status of the larger community. Second, whereas Black determined neutralizing and complement fixing antibodies, we determined hemagglutination-inhibiting antibody.

The hemagglutination-inhibition test is more sensitive (*8*, *9*) and may have accounted for finding a greater number of immune children who would have been missed with less sensitive antibody tests. Finally, the difference in age-specific immunity may reflect early measles exposure of poverty area Pittsburgh children as compared with children in Black's study.

Collins, in 1929 (*10*) and 1942 (*11*), used historical data to estimate susceptibility to pertussis, varicella, rubeola, and rubella in two nationwide studies. In 1961, officers of the Epidemic Intelligence Service (EIS) of the Public Health Service (*7*) surveyed children 1 to 15 years old in Atlanta for a history of measles. The age-specific positive history rates for the studies of the epidemic intelligence officers and of Collins' 1929 and 1942 papers are shown in figure 1.

When the curves for the present study (A and B) are compared with curves C, D, and E, higher proportions of children below age 7 are seen with histories of immunity in the present than in past studies. These differences may have the same explanations as discussed previously in relation to seropositivity. Whatever the explanation, it is noteworthy that there has been a progressive shift downward from 1929 to the present in the age at which children, on the basis of historical data, are observed to have measles immunity. Above age 7 there appears to be no great difference in the proportion of children with positive histories between the current study and those of Collins, but rates for children in the Atlanta survey are higher. Since details of this later study were not included in Langmuir's report (*7*), we cannot discuss explanations for its differences from the present study.

The association between a history of measles and the presence of antibody in the same patient also has been reported previously. In Black's study, there were 135 persons under 19 for whom both antibody and measles history were avail-

able. Two of 96 (2.1 percent) reported to have had measles had no measurable antibody, and 12 of 37 persons (32.4 percent) with no history of measles had detectable antibody. Two did not know if they had had the disease. Snyder and co-workers (*12*) in 1962 reported that 17 percent of 100 persons with a history of clinical measles did not have complement fixing antibody.

In this study, only 22 of 787 (2.8 percent) children with a history of measles did not have antibody, and only 5 of 117 (4.3 percent) reporting measles immunization but not disease did not have antibody. On the other hand, 124 of 140 (83.2 percent) children reported to have had neither disease nor immunization had antibody.

There are several possible explanations for the finding of seropositivity in history-negative children. These include inapparent or atypical disease as well as faulty parental recall of past illnesses. An explanation for the much higher proportion of seropositivity in history-negative children now as contrasted with those in earlier studies may be the current possibility for a child to have received artificial measles immunity which the parents did not remember or recognize as such. The question, "Has your child had measles vaccine?", may not have been understood by all parents.

The effectiveness of the questionnaire used in this study can be viewed in two ways. If one views its purpose as screening undifferentiated children into categories of "needing" and "not needing" measles immunization, it can be considered quite effective. It correctly identified as immune 877 of the 1,001 children with measles antibody and as nonimmune 25 of 52 children who did not have antibodies. In the process, however, it erroneously identified 124 children as needing immunization and 27 as not needing it.

Since this study Joseph Weber, a medical student in the University of Pittsburgh department of preventive medicine during summer 1968, investigated the association of history of rubella and rubella antibody in 148 student nurses. Three-fourths of these women gave a positive history of disease, and 89 percent of these had antibody (1:20 by HI test). About 60 percent of the students with no history of rubella had antibody.

As in our study, about half of the true susceptibles were not identified by history, and a large number of immune persons were identified as susceptible.

If the objective of mass measles immunization programs is to provide protection for children not now protected, the questionnaire, to be effective, should correctly identify a large proportion of susceptibles. As noted, it failed to do so more than half of the time.

However, under the prevailing circumstances, a screening test would have to possess high performance values to identify correctly most persons susceptible to measles while simultaneously limiting the number falsely considered so. The difficulty in achieving better levels of performance arises out of the fact that, in the population studied, susceptibility to measles was a rare event. Under such circumstances any screening test must approximate 100 percent in specificity if large numbers of false positives are to be avoided and approximate 100 percent in sensitivity if the cost and trouble of screening large numbers of persons is to be justified.

Summary

In November 1966, serums from 1,053 Pittsburgh, Pa., elementary school children aged 3 to 13 years were tested by the hemagglutination-inhibition method to determine measles immunity. These determinations were compared with history of measles immunity supplied from questionnaires filled out by the children's parents.

Parental answers correctly identified 86 percent of the children with respect to susceptibility as indicated by serum antibody. Of those incorrectly identified, most were judged nonimmune on the basis of their histories but actually had measles antibody.

The questionnaire used in this study, although not sufficiently sensitive to detect all susceptible children, constituted a good screening device which could prevent immunizing most nonsusceptible children and allow immunization of about half of the relatively few susceptible children.

Comparison of the ages of immune children in this study with those in earlier studies by other investigators suggests that these children obtained immunity younger.

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Midwest Regional Medical Library Established

The John Crerar Library, Chicago, has been designated the Midwest Regional Medical Library through a $150,000 grant awarded by the National Library of Medicine under authority of the Medical Library Assistance Act of 1965 (Public Law 89–291).

As a regional medical library, the Crerar Library serves medical practitioners, researchers, and educators throughout the five-State area of Illinois, Indiana, Iowa, Minnesota, and Wisconsin. It is one of a national system of regional medical libraries, a component of a proposed biomedical communications network. This system is designed to make information services available to health professionals in all areas of the country.

Crerar's Regional Medical Library services will include document services, reference and bibliographic services, and production of a union catalog of books and a union list of periodicals in the biomedical collections of libraries in the region served. When trained personnel are available, Crerar will formulate computer searches of the biomedical journal literature to be processed by MEDLARS (Medical Literature Analysis and Retrieval System).

The Midwest Regional Medical Library is the fourth of a proposed network of 10 or 12 to be in operation by 1970. Others are the Francis A. Countway Library, Boston, the New England Regional Medical Library; the Library of the College of Physicians of Philadelphia, the Mid-Eastern Regional Medical Library; and the Health Sciences Library of the University of Washington, Seattle, the Pacific Northwest Regional Medical Library.

Education Notes

Pesticides and Public Health. A training course in pesticides and public health will be held at the National Communicable Disease Center, Public Health Service, Atlanta, Ga., May 13–15, 1969.

Designed to present an overview of the health aspects of pesticides, the course will be directed to personnel from State and local health departments, Federal services, arthropod control districts, conservation groups, and other appropriate agencies. Biologists, sanitarians, engineers, chemists, physicians, nurses, veterinarians, other members of the health team, and persons whose employment includes responsibility for applying or dispersing pesticides or supervising their use are invited to apply for this course.

Additional information is available from the Chief, State Services Section, Division of Community Studies, Building 28, Chamblee, c/o National Communicable Disease Center, Public Health Service, Atlanta, Ga. 30333.

Graduate Program in Biomedical Communication. The Tulane University School of Medicine is sponsoring a graduate program in biomedical communication from September 3, 1969, to August 23, 1970.

The program, leading to a master of medical science (M.M.S.) degree, will be directed to graduates of acceptable schools of medicine, dentistry, veterinary medicine, or nursing and graduates of other programs in biomedical specialties, education, or the behavioral sciences. Nurses must have obtained a college degree and have had 2 years of specialized experience acceptable to the committee on admissions.

The program is intended to provide professional personnel with skills required to plan, organize, establish, and administer broad-gauged programs in biomedical communication in schools of health professions, teaching hospitals, national organizations of health or medical interest, and official health departments or other agencies.

The curriculum will include the biomedical community; introduction to information engineering; equipment of information systems; communication tools in action; management; biomedical writing and editing; quantitative techniques for administration; sociological, educational, and group dynamics; the library and biomedical communication; information systems, computers, and programing; medicine and health today—tomorrow; practicum in planning the biomedical communication center; and other subjects.

Sessions in New Orleans will be held at Tulane University, September 3–December 20; in Atlanta, Ga., at Emory University, Georgia Institute of Technology, and the National Audiovisual Center, Public Health Service, January 5–March 18; in Bethesda, Md., at the National Library of Medicine, March 23–27; in Lincoln at the University of Nebraska, April 1–June 12; and at Tulane University, June 16–August 23.

Stipends will be available for persons who qualify as postdoctoral candidates, and the program has been approved for those with Veterans' Administration educational benefits.

Additional information is available from Dr. Walter G. Unglaub, Director, Graduate Program in Biomedical Communication, Tulane University School of Medicine, 1430 Tulane Avenue, New Orleans, La. 70112.

Seminars in European Community Mental Health Practice. International Community Mental Health Seminars, a nonprofit affiliate of the World Federation for Mental Health, will sponsor four 21-day seminars in Europe during the summer of 1969. These seminars are designed to familiarize American specialists with outstanding programs in European community mental health practice and delivery systems.

The seminar departing May 29 will visit Denmark, Holland, France, and England and focus on treatment and educational programs for disturbed children and adolescents. Cost: $975.

Designed to provide an intensive view of the French and British community mental health programs, the seminar departing June 30 will have an orientation program in Paris before dispersing in

small teams to spend several days in the provinces where they will follow the professional activities of French counterparts. The second half of the seminar will be spent studying programs in Edinburgh and at the Dingleton Hospital in Melrose. Cost: $925.

Departing July 7, the third seminar will visit Holland, France, Czechoslovakia, and Hungary. Cost: $1,000.

The seminar departing July 10 will visit Norway, Sweden, Finland, and Leningrad. Cost: $1,150.

Additionally scheduled seminars include one leaving for Japan on September 1 and one departing to Mexico on December 20. Costs for these two seminars have not been determined.

A limited number of advanced students will be accepted at reduced cost. These applicants should submit their curriculum vitae and a letter indicating how the seminar will relate to their professional training.

Further information may be obtained from International Community Mental Health Seminars, c/o National Association for Mental Health, Room 1300, 10 Columbus Circle, New York, N.Y. 10019.

Ph.D. Program in Urban and Regional Planning. The University of Michigan is offering an interdisciplinary program leading to a doctoral degree in urban and regional planning.

The curriculum, under the direction of the program committee on urban and regional planning, combines the faculties and the research and teaching facilities of the college of literature, science, and the arts, college of engineering, school of natural resources, law school, school of education, college of architecture and design, school of public health, and school of business administration.

The period of study for students qualifying for regular admission would typically involve no less than 2 nor more than 3 years of full-time coursework. There are no general language requirements although the doctoral program committee may request competence in a foreign language if the applicant plans research outside the United States.

The basic requirement for admission is evidence of an undergraduate degree completed in high standing. Although less time and fewer courses may be required of those experienced in professional planning or having degrees in related fields, such as economics or political science, the program is designed to accommodate almost any undergraduate major.

Applicants for the degree program must demonstrate competence by completing formal coursework and through satisfactory performance on qualifying examinations within five core subject-matter areas—environmental design and resource appraisal, analytic tools for urban and regional analysis, social group interaction processes, economic development of urban and regional areas, and governmental planning process.

Scholarships, research fellowships, teaching fellowships, and traineeships are available to applicants with superior qualifications.

Further information and application forms are available from the Admissions Office, Horace H. Rackham School of Graduate Studies, University of Michigan, Ann Arbor, Mich. 48104.

Summer Statistical Session at Seattle. The 11th annual summer statistical session in the health sciences will be held at the University of Washington, June 23–August 1, 1969.

This program offers courses at a wide range of academic and experience levels for statisticians and epidemiologists from local, State, and Federal agencies; graduate students in statistics and the health sciences; professional workers in health sciences from departments of research and medical records in hospitals, voluntary health agencies, and the pharmaceutical industry; research workers in epidemiology and the medical sciences; persons interested in research design, demography, vital statistics, bioassay, and statistical applications in genetics, sociology, psychology, pharmacology, or other fields.

A registration fee of $10 (not refundable) is the only charge. Stipends (to a maximum of $600) are available for candidates qualified academically, or by professional experience and training or both. Graduate students currently receiving stipend or tuition support from National Institutes of Health, Public Health Service, training grants are not eligible for funds for this summer session. Funds are available to provide financial assistance to professional health workers not employed by the Federal Government.

Additional information is available from the Division of Biostatistics (SSS), Department of Preventive Medicine, University of Washington, Seattle, Wash. 98105.

Announcements for publication should be forwarded to Public Health Reports *6 months in advance of the deadline date for application for admission or financial aid, whichever is earlier.*

phr synopses

GORWITZ, KURT (Maryland Department of Mental Hygiene): *Programs in biostatistics at the master's and doctoral level. Public Health Reports Vol. 84, April 1969, pp. 299–304.*

Data available from the American Public Health Association regarding biostatistics programs in schools of public health indicate that the number of enrolled students, graduates, courses, and faculty members has increased since 1960. Enrolled students and graduates in biostatistics, however, continue to form only a small percentage of the total student body of schools of public health; this proportion is higher among doctoral students than among students at the master's level.

Federal grants of various kinds continue to be the major source of funds for enrolled biostatistics students; only a small number receive financial support from their own employers or pay their own expenses. Work-study programs are rather limited, and only a minimal number of students are presently enrolled in them.

Proportionally, faculty members in biostatistics departments are more often full professors and conversely less often lecturers and assistants than the faculty members in other disciplines. Most courses in biostatistics are taught by members of the biostatistics faculty and, conversely, most of these persons teach only biostatistics courses. In recent years, the faculty of biostatistics departments has formed a decreasing proportion of the total faculty in schools of public health.

THOMAS, WILLIAM G. (University of North Carolina Hearing and Speech Center, PRESLAR, MACK J., SUMMERS, RAYMOND R., and STEWART, JOSEPH L. *Calibration and working condition of 100 audiometers. Public Health Reports, Vol. 84, April 1969, pp. 311–327.*

The University of North Carolina Hearing and Speech Center, in cooperation with the Public Health Service, in 1966 investigated 100 audiometers, all but two of which were in current general use. The instruments were selected at random from various sources in North Carolina. The sample consisted of 30 models manufactured by eight companies and owned by 11 agencies or persons, such as health departments, public school systems, hearing and speech centers, and physicians.

Technical data were obtained on the extent to which each instrument met the specifications adopted by the American Medical Association and the American Standards Association and, when indicated, those of the International Organization of Standardization and the International Electrotechnical Commission. Additional information was obtained on date of purchase and last date of calibration.

The investigators found that none of the screening audiometers was in satisfactory condition. The two diagnostic audiometers not yet in use were in calibration. None of the audiometers in general use was in condition to satisfactorily do the testing for which it was manufactured.

The most frequent defect encountered was incorrect sound pressure output. The second most common defect was excessive rise time. The third ranking deficiency was frequency outside the 5 percent tolerance level. The 100 audiometers failed to meet standards a total of 206 times, with 162 deviations involving parameters affecting threshold measurements.

The investigators' assumption that audiometers in general use are in a state of discalibration, resulting in inaccurate test results, was supported by the study data.

WINGERT, WILLIS A. (Los Angeles County–University of Southern California Medical Center), LARSON, WILLIAM, and FRIEDMAN, DAVID B.: *Indigenous health aides as counselors to parents about nutrition. Public Health Reports, Vol. 84, April 1969, pp. 328–332.*

The effectiveness of indigenous health aides in counseling persons from low socioeconomic levels was explored in a study of parents who came to the pediatric emergency room of Los Angeles County General Hospital. Fifty-nine parents whose children had iron deficiency anemia were advised on nutrition. Four female aides counseled 30 parents and two second-year medical students with middle class backgrounds counseled 29 parents.

Tests of parents' compliance with and recall of advice were given 3 weeks later. Both the aides and the students successfully counseled two-thirds of the parents. There were no statistically significant differences in the effectiveness of the aides and the medical students. These results suggest that young aides can, after brief on-the-job instruction, give advice on nutrition and thus help to lower the incidence of iron deficiency anemia, a condition that is still widespread among children in low socioeconomic groups.

GORDIS, LEON (Sinai Hospital, Baltimore), LILIENFELD, ABRAHAM, and RODRIGUEZ, ROMEO: *An evaluation of the Maryland Rheumatic Fever Registry, Public Health Reports, Vol. 84, April 1969, pp. 333–339.*

The increasing use of case registries for chronic diseases prompted a critical evaluation of the Maryland rheumatic fever registry. The adequacy of the registry as a source of statistical and epidemiologic data on rheumatic fever was evaluated by comparing registry records with the medical records of 413 patients discharged from Baltimore hospitals with a diagnosis of acute rheumatic fever during 1960–64. Only 61 percent of these patients were reported to the registry. There was a tendency for invalid cases not to be reported, but 14 percent of the reported cases were invalid. Once patients were reported, regardless of diagnostic validity, approximately one-third were lost to registry followup by 1966. Presence of rheumatic heart disease correlated with initial reporting to the registry, but once reported, presence or absence of rheumatic heart disease was not related to continued registry followup. These data suggest the extent of the error introduced by using the registry as a basis for estimating the incidence of rheumatic fever and rheumatic heart disease.

Effectiveness of the registry in stimulating physician and community education was evaluated by surveying the management of streptococcal infections in Maryland. Among 261 first attacks of rheumatic fever, 34 percent had no history of prior respiratory infection. Thirty-two percent had respiratory infections but did not consult a physician. The remaining 34 percent had respiratory infections and consulted physicians but nevertheless developed rheumatic fever. The data indicate that physicians make inadequate use of throat cultures, suggesting that these infections may have been inappropriately managed.

The reporting of new cases of rheumatic fever to the registry by physicians is important and efforts should be expended toward increasing such reporting, but a greater need is to explore new methods of casefinding. One approach is monthly monitoring of hospitals, either by phoning the hospital record rooms or by having a registry staff member review the charts at each institution. Ideally, the best method of verifying the diagnosis for each new case of rheumatic fever is examination of each new patient in a clinic staffed by expert clinicians experienced in the diagnosis of rheumatic fever.

The main objective of any rheumatic fever registry is effective followup of patients for continued prophylaxis. The structuring of an active followup program within the registry framework is needed. Additional personnel are required for direct followup and to coordinate other available resources for followup in the community. A priority scale could be developed for patients based on factors relating to risk of recurrence and risk of noncompliance. Intensive followup services could then be directed to the high-risk patients assigned priority ratings based on both sets of factors.

The approach described in this study can serve as a model for evaluating registries for chronic illness with low fatality rates.

HERSHEY, NATHAN (Graduate School of Public Health, University of Pittsburgh): *Compulsory personal health measure legislation. An analysis and commentary. Public Health Reports, Vol. 84, April 1969, pp. 341–352.*

All States by law require health measures of some kind. Legislation requiring compulsory health measures is enacted by States as an exercise of the police power. Such measures interfere with the completely free exercise of choice by the individuals subject to them.

In a review of a limited area of this kind of legislation, personal health measures pertaining to children of four States, the legislation of each of the four States was compared with the comparable legislation of the other States. Each item of each State's compulsory personal health measure legislation was also compared with other items of legislation in the State to determine the consistency of approach within each of the four States on specific matters such as exemptions from the measures based on religious beliefs and upon whom the duty of compliance is placed.

The study revealed varying approaches with regard to a particular health measure from State to State, as well as variety within a single State in the way in which certain issues are dealt with. Some of the differences may not be based upon conscious determinations that different approaches or methods are desirable, but rather they are the result of insufficient attention to the establishment of a program and to the drafting of the legislation concerning it.

phs synopses

McDONALD, GLEN W. (Public Health Service), BURNHAM, CLINTON E., and LEWIS, FRANK W.: *Reproducibility of glucose tolerance in 101 nondiabetic women. Public Health Reports, Vol. 84, April 1969, pp. 353–357.*

Reproducibility of the 100 gm. oral glucose tolerance test was explored in a study of 101 female nondiabetic prisoners. The women participated in a series of four individual tests for a 5-month period.

Five to ten women were tested daily, and each woman was retested at 4-week intervals. Venus blood was drawn at fasting, ½, 1, 2, and 3 hours after the administration of a 100 gm. glucose drink, and the blood was processed using an Auto-Analyzer. Average blood glucose levels for the total group remained stable for the period of testing. Blood glucose levels for individual persons, however, varied considerably. On single tests, some women had borderline or diagnostic test readings, but only one woman was consistently abnormal for all tests.

Analysis of a person's variability with such factors as age, race, weight, number of pregnancies, miscarriages, and having babies of 9 pounds or more revealed no apparent relationship. The only relationship of any significance was between mean blood glucose values and individual variability. Comparisons of commonly used criteria for defining glucose abnormality showed much inconsistency in determining a person's status.

The observations strongly support conclusions of a previous glucose tolerance study of male prisoners in which individual variability was also observed. The two studies showed that freedom from diabetes cannot be predicted from a single reading and that followup testing is needed on persons otherwise suspected of having diabetes.

FLOOK, EVELYN (Public Health Service): *Health services research and development. Grant and contract support. Public Health Reports, Vol. 84, April 1969, pp. 358–362.*

The National Center for Health Services Research and Development is the national focus for health services research and development but does not have exclusive responsibility for these functions. Although it has brought together four Public Health Service organizational units that previously operated under separate appropriations and administrative direction, several closely related programs within the Service as well as all those of other constituent agencies of the Department of Health, Education, and Welfare still have independent programs.

The Center proposes to become a true focus through involvement. It cannot operate in isolation. It is trying to build effective working relationships, or at the very least open two-way channels of communication with three main groups: (*a*) operating programs of the Health Services and Mental Health Administration, such as Regional Medical Programs and Community Health Service; (*b*) other organizations, institutions, and agencies, both governmental and nongovernmental, engaged in or supporting health services research—particularly other constituent agencies of the Department; and relevant professional organizations, both the producers and appliers of research. This is the basic tenet that governs and permeates all of the Center's operations.

To foster these relationships, a liaison staff has been placed in the immediate office of the director. This small group is charged with identifying and searching out fragmented efforts and bringing to the Center's attention the plans, activities, and projects of others with whom it needs to relate.

The liaison staff also must inform others of the Center's plans and programs. In this way the groundwork is laid for any cooperative action that is indicated. At the very least, unilateral action, if that is the choice, will be deliberate, not accidental.

LEVINE, SHELDON (Children's Hospital of Pittsburgh, Pa.), LANZ, RICHARD, ROGERS, KENNETH D., and MICHAELS, RICHARD: *Use of a questionnaire to estimate children's susceptibility to measles. Public Health Reports, Vol. 84, April 1969, pp. 373–379.*

In November 1966, serums from 1,053 Pittsburgh, Pa., elementary school children aged 3–13 years were tested by the hemagglutination-inhibition method to determine measles immunity. These determinations were compared with history of measles immunity supplied from questionnaires filled out by the children's parents.

Parental answers correctly identified 86 percent of the children with respect to susceptibility as indicated by serum antibody. Of those incorrectly identified, most were judged nonimmune on the basis of their histories but actually had measles antibody.

The questionnaire used in this study, although not sufficiently sensitive to detect all susceptible children, constituted a good screening device which could prevent immunizing most nonsusceptible children and allow immunization of about half of the relatively few susceptible children.

Comparison of the ages of immune children in this study with those in earlier studies by other investigators suggests that these children obtained immunity younger.