That children have families, and that
the health of children—the obvious concern of pediatricians—depends, in part,
upon the universal social institution of the
family, needs no defense. Indeed, the skeptic asks, "What is there new about the family
that helps me give better care to children?" The purpose of this symposium was
not so much to describe what was new but as Dr. Kempe, Chairman of the meeting
pointed out, to indicate some of the opportunities in practice to make new observa-
tions of health and illness in family groups—observations that can only be made in this
natural setting. Its purpose was also to illustrate that epidemiology as a method of
study can be applied not only to infectious
diseases, but to genetic, environmental,
emotional, nutritional, allergic, and neo-
plastic diseases and that the the family is a
natural epidemiologic unit for such studies.

FAMILY EPIDEMIOLOGY

Dr. Kempe defined epidemiology as a
way of solving problems. Its tools are similar
to those of the good reporter who seeks
answers to what, when, where, who, how,
and eventually why. One of the classic ex-
amples of epidemiologic work in practice
is that of Pickles,2 a general practitioner in
Britain who demonstrated by careful rec-
ord-keeping that the incubation periods of
herpes zoster and infectious hepatitis were
very precise rather than the broad time
range that had been previously stated. This
was determined because the exact dates
of contact were known in his family prac-
tice in contrast to retrospective studies in
hospitals. The hope was that from this
symposium some questions might be posed
that could be studied in similar fashion in
pediatric practice.

Dr. Kempe read Dr. Wishik's paper on
The Determinants of Family Epidemiology.
This paper outlined the specific factors of
who, what, when, and where that need
systematic description in any epidemiologic
study: definition of the sample by age, sex,
heredity, intelligence, education, religion,
mobility, housing, social relations, etc. He
gave as an example of one such epidemi-
ologic determinant of health, how the moth-
er's previous education was the most im-
portant factor determining the time of her
seeking prenatal care. Previous unsatisfac-
tory outcome of a pregnancy such as abort-
tion or stillbirth did little to influence a woman to seek care early for the next pregnancy, but her education—if she had completed high school or beyond she was much more likely to get such care early in the course of the pregnancy—was the major determinant. Yet no single epidemiologic factor will explain most problems of the etiology of illness or receipt of medical care remaining to be answered. The concept of multiple causation must be used. The separate or joint action of the many epidemiologic factors constitutes the dynamics of family epidemiology.

Dr. Haggerty apologized for not being able to outline the Epidemiology of Health in Families, the title of his paper, because so few studied have been made of healthy people. It does seem, from at least two studies, that optimal health is not about to become an epidemic, for somewhat less than 10% of families in two separate studies were classified (Table I) as being in this state! Pediatricians dealing with healthy, as well as ill, children could make a significant contribution to this field by recording some of these epidemiologic determinants in healthy as compared to ill families. Merely recording the age of parents, educational achievement, or residence of healthy families as compared to sickly families in a pediatrician’s practice would be useful, for while there is considerable evidence that certain families have more illness of all types than others7 (Table II), the many factors responsible are not so clear.

<table>
<thead>
<tr>
<th>Classification of Disease</th>
<th>Ratio*</th>
</tr>
</thead>
<tbody>
<tr>
<td>All causes</td>
<td>1.28</td>
</tr>
<tr>
<td>Respiratory disease</td>
<td>1.19</td>
</tr>
<tr>
<td>All other</td>
<td>1.29</td>
</tr>
<tr>
<td>Bed illnesses</td>
<td>1.57</td>
</tr>
<tr>
<td>Hospital illness</td>
<td>1.81</td>
</tr>
<tr>
<td>Medical care</td>
<td>1.34</td>
</tr>
<tr>
<td>Physician visits</td>
<td>1.48</td>
</tr>
<tr>
<td>Clinic visits</td>
<td>1.48</td>
</tr>
<tr>
<td>Deaths</td>
<td>1.12</td>
</tr>
</tbody>
</table>

Currently we cannot explain all of this increased risk of illness in certain families on either an infectious or genetic basis and it would be useful to look for other determinants in the environment and the way people live.

Four ways in which different types of families are known to influence the health of their members were outlined: (1) as a source or cause of illness, (2) as a factor affecting outcome of an illness once present, (3) illness in one family member affecting others in the family, (4) as a determinant of who is brought to the doctor and when. Illustrations were given of each of these ways other than the obvious infectious or genetic ones that a family may influence the health of its members. The presence of social pathology, described in the classic Newcastle-upon-Tyne studies4 as the three D’s—deprivation and deficiency of care, and dependency upon the community in a family—was associated with a significantly higher frequency of infections, short stature of children at age 3, enuresis, convulsions, and strabismus in the children than in other families. Streptococcal infections5 and childhood accidents6 have been found to occur more frequently following acute family crises such as deaths of relatives, moves, loss of father’s job, and serious illness in

**TABLE I**

**FAMILY HEALTH**

<table>
<thead>
<tr>
<th>Category</th>
<th>Percentage of Individuals</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Peckham*</td>
</tr>
<tr>
<td>Well</td>
<td>10</td>
</tr>
<tr>
<td>Compensated</td>
<td>69</td>
</tr>
<tr>
<td>Decompensated</td>
<td>21</td>
</tr>
</tbody>
</table>

* The Peckham experiment—Pearse and Crocker (N = 1536).
† Family Medical Care—G. A. Silver, 1963 (N = 247).
other family members, suggesting that family stress may alter host resistance to certain illness.

A family may affect the outcome of an illness by not bringing the child back for care. Broken appointments have been shown to be in part due to family factors such as other illness in the family and disturbed family relations.

The effects of an illness in the child on other family members have been dramatically documented by Holt, who showed that 40% of parents of children with cerebral palsy never went out socially together after the affected child’s birth.

The final point that a family may not bring the sickest member to the doctor is demonstrated by Clyne who, in reviewing night calls in general practice, found that in half of the calls for a child someone else in the family was the real problem for which the family doctor had been called. He characterized this the “child as the presenting symptom of other family problems.”

These four ways in which family factors effect health and illness of its children argue for a family-focused type of pediatric practice.

Dr. Shaw presented several examples from his practice of the Epidemiology of the Harassed and Distressed Family and developed the idea that the pediatrician must enter into the family councils to deal with those aspects of childhood illness which involve the relationship of the child to his family and to his environment.

The pediatrician must of necessity be a family counselor. Though Sir William Osler long ago said, “The pediatrician is the vestigial remnant of what was formerly the general practitioner,” it was insisted that his functions were far from “vestigial.”

There has been increasing emphasis on the purely psychological disturbances of childhood in relation to the household environment. It is of no less importance, however, that in physical illness the pediatrician must be alert to the many factors which affect the welfare of his patient. There is a constant playback between the apprehension and worry of parents and of siblings and the discomfort and anxiety of the child patient. Parental worries are a compound of the uncertainty about the outcome, concern about separation and distress, and attendant worries about the financial stress of an illness. In situations deeply traumatic to all concerned, the pediatrician must help to communicate the steadiness and fortitude which accept serious illness, hospitalization, and the possibility of death without panic on the part of the patient and his family. Children will usually accept with fortitude the discomfort and distress of disease but are severely traumatized by surrounding panic and hysteria.

Many things which happen within the family are potentially most devastating to the child: family disharmony, divorce, death—things which the child may not understand even faintly but which he may be encouraged to accept equably by kind and understanding counsel of the pediatrician to the child and to his family. The pediatrician can no more ignore many problems of the family than he can ignore the requirements of fluids, electrolytes, and surgical measures.

Parents must be led to understand that children require not only love and security—which have been sufficiently emphasized—but equally require loving and kind authority, to which need the pediatrician can contribute to the child and to his family.

One of the most challenging aspects of medical care and medical education lies in the complete understanding of the ecology of the child, which extends far beyond the individual to his entire environment.

Dr. Shank discussed Family Epidemiology of Nutrition and emphasized that planning a family’s nutrition requires knowledge of the characteristic patterns of eating in that family, their attitudes to foods, their previous experience with obesity, malnutrition, or growth failure, as well as nutritional requirements.

The need for such understanding may be more evident in other cultures. Thus, in
Brazil an attempt to treat malnutrition with dried skimmed milk often failed because of the family pattern of avoiding "strong" foods to treat diarrhea. This belief was interpreted by some to call for as much as tenfold dilution of the provided skim milk thereby aggravating protein malnutrition.

More subtle influences condition dietary practice in the United States. Among these are:

**Heredity Factors**

Different rates of growth require different amounts of nutrients. Caloric intakes of boys and girls differ strikingly, even when these are corrected for height and weight\(^6\) (Fig. 1). These differences are probably due to both hereditary and environmental factors.

**Ethnic Influences**

Preferences such as that of Italians for spaghetti, Latin Americans for highly seasoned foods, Orientals for rice, are obvious, but the size and number of meals per day and the social attitude to obesity or thinness in a family will also determine acceptance of diets.

**Religious Beliefs**

Fasting, feast days, and special food practices carry weight in some families.

**Economics**

Income determines in part how much and what type of food is consumed by the family. There is, however, very limited information about the variation in food consumed by individuals in different types of families—an example of a study possible in practice.

**Parent Characteristics**

Age, marital relations, education, meal time routines, the father's occupation, the working mother all determine in part the consumption of nutrients.

**Availability of Nutrition Information**

This considerably influences a family's diet. Unfortunately the rapid reporting of research findings in mass news media may bring about ill-considered changes even among the best informed. In St. Louis, when monthly reports of strontium 90 were stated in the press to be near tolerance levels, some informed parents restricted milk in the diets of their children to the point of malnutrition. Additional study demonstrated that sampling had represented only a few farms, with strontium 90 contamination similar to that in other cities. Families following premature advice had needlessly compromised their nutrition.

**Health of Parents**

Obesity in the mother is particularly likely to result in unwise limitations in the diet of her children, who may then seek to make up calories from more readily available sources—usually carbohydrates. The emotional relation of children to their parents also conditions the amount and type of food taken. Marked differences in ca-
The pediatrician, knowing these factors about the families under his care, is in a particularly opportune place to advise them on sound nutrition. He is also in a position to obtain data to fill the many voids in knowledge about different patterns of family nutrition.

Dr. Wheeler, discussing *The Family Spread of Infections*, cited as one type of study possible in practice that of Dingle and associates¹⁰ on the number of illnesses in different family members per year. These studies have shown that the nursery school child is the most frequent introducer of common respiratory infections into families (Fig. 3) and that he also has the most total number of such infections.

The age of the family member may also determine the manifestation of family-wide illness. For example ECHO 9 infections show very different symptoms in older children (more aseptic meningitis) than younger (more with rash). The practitioner could make very useful observations by carefully recording which child got a dis-

**Fig. 2.** Variation in caloric, protein, and calcium intake between older and younger children in the same family.
ease, to whom he gave it, and how its manifestations differed in different persons in the family.

School age children are much more likely to acquire a beta hemolytic streptococcal infection than infants or adults after an exposure in the home (Fig. 4). Similar data are needed for many other infections. In some instances the household as well as the family must be considered. As an example, meningococcal infections in one member of a household may spread to anyone else living in the house, even though a non-relative; these other members should receive treatment with a sulfonamide.

Staphylococcal infections are particularly likely to be spread within family groups. Most often newborns introduce this agent into a family, but other sources should also be looked for, such as the community laundromat found to be the source in one epidemic in a student housing project.

A recent study with the engaging notion that sex is related to staphylococci indicated that newborn boys are much more likely to have infected skin lesions than girls (Fig. 5). The good epidemiologist asks why. An obvious difference that could explain this is circumcision, but the circumcision of 95% of the newborn boys in the study reported left no control group. In practices where fewer boys are circumcised an answer to this question might be found.

By careful histories, complete records, and a thirst for answers to questions, pediatricians can still learn much about infectious diseases in family groups.

Dr. Childs discussing Genetic Determinants, pointed out that genetic counseling, as distinct from medical counseling, involves a knowledge of the frequency of the condition and its mode of inheritance. From these data the risk of appearance of particular disorders among the offspring of particular matings can be calculated. If the basic facts are known, such figures can be given to the family, but risk figures based upon imperfect understanding of the frequency and mode of inheritance of such disorders are less useful.

If one were to offer advice to prospective parents, one would wish to know their genetic constitution with some precision, but this is a state of knowledge not yet possible. However, when unaffected siblings of genetically blighted persons request such advice, some probabilities can be given. The advice ought properly to be given by the patient’s own physician as a part of his counseling upon other matters relevant to the health of the patient and his family. In general, he would be wiser to offer the statistics as information to help parents make their own decisions than to urge them in favor of, or against, having children.

Dr. Miller discussed the growing knowledge of Family Epidemiology of Childhood Cancer. Diagnostic x-ray exposure of the mother’s abdomen during pregnancy, increasing maternal age, and maternal history of miscarriage have each been associated with an increased risk of leukemia in the child. Maternal age and excessive miscarriage have also been associated with mongolism. Among the siblings of leukemic children higher frequencies than usual have been found of mongolism and of cancer. In one series of 1,000 such siblings, five were mongols and eight others had cancer as compared with about one case of each
expected. Since the usual incidence of childhood cancer is only about 7/100,000 per year, even an increased risk among the siblings is not of great concern to the individual family with a leukemic or mongoloid child. The observation may be important, however, in understanding the genesis of childhood leukemia. The epidemiologic findings described above suggest that some mothers have a tendency to chromosomal aberration which in one form produces mongolism, in another miscarriage, and in another leukemia.

In only one of several hundred mothers with leukemia during pregnancy has the child also been reported to have leukemia, and no excess of leukemia has been found among the mothers of leukemic children. This application of family epidemiology has thus given no evidence that a virus produces leukemia in mother and child. Study of the coexistence of Wilms' tumor and congenital defects has shown an increased rate of absence of the iris (1:73 in Wilms'-tumor patients compared to 1:50,000 in the general population), of congenital hemihypertrophy, and of malformations of the genitourinary tract. It must now be determined whether there is an increased risk of these or other anomalies among the relatives of Wilms'-tumor patients.

When two or more diseases are found with extraordinary frequency in the same individual or in families, the opportunities for understanding the genesis of the diseases may be much increased, as in leukemia and mongolism, Hashimoto's thyroiditis and connective tissue diseases, ankylosing spondylitis and ulcerative colitis, or Wilms' tumor, aniridia, and hemihypertrophy. One can approach the common mechanism through the diverse clinical manifestations. Should a biochemical disorder be discovered in children with aniridia, mass screening may be possible to detect other children destined to develop Wilms' tumor. With such a detection procedure it may become possible to prevent or treat early some fatal or incapacitating diseases.

The clinician, by observations which require nothing more than alertness, may contribute to knowledge of etiology by recognizing an excessive concurrence of disease as he makes his daily rounds, or by simple hand tabulation of case records in the hospital or private medical office.

**COMMENT**

The question could well be asked, after such a symposium, "Why have a program on Family Epidemiology at the Academy of Pediatrics meeting?" "Was anything accomplished by putting together such a smorgasbord?" I suppose the answer must be left to each listener or reader. But to this biased reporter, the fact that seven pediatricians, each with very different interests, could each talk about the family and its relation to one or another aspect of children's health suggests that we need to know more about this universal institution—the family. Many questions were posed by each speaker, questions that might be answered in whole or in part by pediatricians, singlehanded or in collaboration, making systematic observations in their practices. The symposium also points out some of the skills that pediatricians should learn during residency training—simple sounding skills such as how to ask questions that would be useful in an epidemiologic study, how to systematically
record the answers to such questions and how to work together on some common studies. In collaboration with universities which may provide some of the statistical, laboratory, and clerical help, significant epidemiologic studies should be possible in pediatric practice. Not only might valuable knowledge thus be gained, but some of the disillusionment with practice might thus be avoided. Perhaps—who knows?—through such contacts even those in teaching hospitals may learn that pediatric practice can be a stimulating career!

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http://pediatrics.aappublications.org/content/35/5/856