THE SCOPE
OF EPIDEMIOLOGY
IN PSYCHIATRY

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WORLD HEALTH ORGANIZATION
GENEVA
1962
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The epidemiology of mental disorder has been very much at the heart of the mental health work of the World Health Organization in recent years. As early as 1956 steps were taken to develop a methodological canon for research into this subject, and Professor D. D. Reid’s book Epidemiological Methods in the Study of Mental Disorders — which appeared as No. 2 in the Public Health Papers series — was the first fruit of these efforts. Although Professor Reid enjoyed the collaboration of psychiatrists in writing that book, it was intended as an approach to the problem of mental disorders from the general epidemiologist’s point of view.

Professor Reid’s study served as a basis for discussion at the meeting of the WHO Expert Committee on Mental Health held in 1959, at which recommendations were made on the launching of epidemiological research programmes on an international scale. In particular, the Committee, which was made up largely of psychiatrists, referred to the types of study that are required for the further advancement of mental health knowledge. In addition, it made many practical suggestions on the application of the research methods indicated by Professor Reid.

In the present volume, by Professor Tsung-yi Lin and Mrs C. C. Standley, the emphasis is more on the psychiatric aspects; the approach is through mental health statistics, considered both in themselves and as they affect theories of the etiology of mental disorder, with a view to indicating the gaps that can and should be filled by the use of epidemiological methods.

It is hoped that this study will prove useful not only to psychiatrists interested in contributing to this field of modern research but also to health administrators who are in a position to carry out or facilitate psychiatric survey work.
INTRODUCTION

The growth of psychiatry in the last few decades has been remarkable. An increased enthusiasm for therapy contrasts with the pessimism of the past, and this new optimism is reflected in non-psychiatric circles. The vast additions to the literature and the improvement in treatment facilities and psychiatric education bear witness to this development. There are, however, some gloomier considerations. Criticism has repeatedly been voiced of the exaggerated claims made by certain psychiatrists and there is widespread dissatisfaction with the scientific foundations of psychiatry. This largely stems from the difficulties inherent in psychiatric investigation. The requirements of scientific method are extremely difficult to meet in this field, for the observer himself is an intimate participant in the process under study. It is only the outward manifestations of this process that are susceptible to analysis and their interpretation will be distorted by the observer's frame of reference. The multiplicity of dynamic factors operating in mental illness makes the exact reproduction of the experimental situation impossible.

In the past, the reliance of psychiatry on the study of individual patients has resulted in failure to explain the origin of most mental disorders and in many contradictory theories, the verification of which has always been obstructed by a lack of definition of the phenomena concerned. It has not been decided whether mental illness can be described and dealt with as a whole, or whether the term embraces specifically different disorders. Even with investigations into one particular disorder variations in diagnostic usage have rendered the results of different studies barely comparable. An additional difficulty is due to the fact that the manifestations of psychiatric disorder cannot easily be quantified; it is difficult to measure the degree of severity of psychological disturbance and to determine its time of onset and duration. Hypotheses about the etiology of mental illness are so diverse as to defy incorporation into any comprehensive theory. It is common for individual researchers to work independently, within the range of
their particular disciplines, so that their findings have often been difficult to correlate. Nevertheless, significant contributions to psychiatry have been made by workers in the fields of neurophysiology, biochemistry, genetics, psychology, psychoanalysis and the social sciences. As there is good evidence for the multiple causation of mental illness the need for a broad approach to the problem is clear. One of the fields in which such an approach can be profitable is the epidemiology of mental disease.

Epidemiology may be defined as the study of the distribution of a disease in space and time within a population, and of the factors that influence this distribution (Lilienfeld, 1957). In the field of mental health, epidemiology can serve the following purposes:

1. to assess the prevalence of different types of mental ill-health in a population as a basis for the prevention, treatment and control of these diseases;
2. to uncover associations between population characteristics and disease that may clarify the origins of mental disorder;
3. to test etiological hypotheses originating from laboratory or clinical studies;
4. to assess rates of spontaneous recovery in order to evaluate the effectiveness of preventive and therapeutic measures.

It follows from these considerations that claims for the value of epidemiology applied to mental disorder are unlikely to be exaggerated. "Producing an epidemiology of mental illness and health, therefore, might well be medicine's prime goal for tomorrow... One medical educator describes it as 'the epidemiology of the future'. If that is the goal, then its closest pursuit will consist in the co-operative effort of physicians, psychologists, sociologists, teachers, anthropologists, clergymen and others dedicated to tasks relating to the human personality" (J. Amer. med. Ass., 1959).

In a sense this paper is a continuation or amplification of *Epidemiological Methods in the Study of Mental Disorders* (Reid, 1960) which was intended as "an introduction to ideas and methods of epidemiological enquiry that may prove useful in the study of mental disorder". The present paper consists of three parts. The first discusses prevalence and incidence rates of mental disorder; the second reviews different methods of approach used in epidemiological surveys; and the third seeks to draw together the main hypotheses on the origins of mental disorder that have so far emerged and to review some of the studies on the efficacy of modern psychiatric treatment. Because of the size of the field this review can do no more than indicate perspectives that may assist future investigators.
THE STATISTICS OF MENTAL DISORDER

The apparent increase in mental disorder over the last hundred years—as witnessed by the increase of hospital beds, of delinquents, and of neurotic patients seen in general practice—has often been cited as an indication of the harmful effects of present-day stresses. This, in turn, has prompted research workers to attempt some clarification of the relationships between mental illness and social change.

HOSPITAL STATISTICS

Hospital statistics constitute an obvious initial source of information. There are some classical examples. Esquirol (1838) analysed the increase in number of the insane in Paris from 1009 in 1786 to 4000 in 1836, and showed it to be the outcome of improved facilities for treatment. Maudsley (1872) ascribed the doubling of the number of insane persons in England between 1840 and 1870 to the Lunacy Acts which required registration of the mentally sick and improved the provisions for their treatment. Thus it is at once apparent that the usefulness of hospital statistics as indices of the extent of mental illness within a community is undermined by the fact that the numbers of hospitalized patients depend both on the facilities available and on the legislation enforced. The efficiency of registration will also affect the reliability of the figures. Other factors affecting the total in-patient population at any given time, and the length of stay, include the professional skill of the staff and their enthusiasm for treatment and rehabilitation; the age range of patients; the types and severity of illness; and the conditions governing the death rates of in-patients. The use of tranquillisers and recent improvements in rehabilitation and social services have, in places, greatly reduced the duration of hospitalization and consequently the numbers of hospitalized patients (Macmillan, 1956). In some places, administrators have encouraged early discharge, either because of staff shortages or to prove the modernity of their outlook.

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First-admission rates to mental hospitals have often been used as a basis for assessing the incidence of insanity in the population as a whole. Ødegaard (1952) claims that it is possible, in Norway, to make an approximate calculation of the total number of unadmitted psychotics from first-admission rates. Such a claim, however, is valid only when the provision of mental hospital beds has remained adequate to the needs of the population over many years (Carstairs, 1959a, 1959b). Goldhamer & Marshall (1953) chose to study first admissions to mental hospitals in Massachusetts from 1840 to 1940, and Malzberg (1959) those in New York between 1910 and 1950, precisely because these were among the few parts of the world where this condition was reasonably met. Even so, the two studies arrived at opposite conclusions regarding an increase of insanity in the population during the periods in question. Malzberg concluded that there had been a genuine increase in first-admission rates from 60 per 100,000 in 1910 to 106 in 1950 from which one might infer a corresponding increase of mental disorder in the population as a whole. Yet Goldhamer & Marshall found no marked increase in patients under 50, although the rates had increased progressively for older persons; this they attributed to changed public and family attitudes making it more difficult to care for senile patients, and to increased longevity, rather than to a genuine increase in senile psychosis. Sjögren & Larsson (1959), studying senile psychoses in Stockholm between 1931 and 1957, also found no proof of increasing incidence: “the morbidity risk increases with age, but does not seem to increase with time.”

Other factors affect hospitalization rates: the location of hospitals; the availability of other communal resources such as psychiatric wards in general hospitals, psychiatric clinics and private psychiatrists; the costs of hospitalization; and public confidence in the quality of hospital services. All these considerations make it difficult to accept incidence rates for mental disorder derived from first-admission rates, for these leave two major factors undetermined—the number of patients outside hospital and the time-lag between the onset of illness and admission. This time-lag may be broken down into the intervals between the onset of illness and the recognition of symptoms; between the recognition of symptoms and the awareness of a need for hospitalization; and between the awareness of this need and the actual time of admission. Relevant in this context is the following extract, quoted by Plunkett & Gordon (1960), from the Annual Report for 1843 of the MacLean Asylum in Waverley, Massachusetts:

“No reason has presented itself to justify receding from the views presented for several years past, of the unsoundness and consequent uselessness of what are called the statistics of insanity. Every year's experience convinces me that those
facts regarding this subject, which are capable of being arithmetically noted, are of too little moment to be worth recording at all, while those circumstances touching the duration, form, symptoms and event of cases, which would be truly important are, from their nature, incapable of being generalized tabularly into even a loose approximation to the truth. Statistics are doubtless valuable in relation to topics where accuracy is capable of being approached, but not in a legitimate mode of expressing mere opinions.

I still find it impracticable in a vast proportion of cases, to fix with any certainty the point at which the mind lost its balance, and by which the duration of disease before admission can be determined, notwithstanding the great body of our inmates are from the intelligent and educated classes of society, where facts of this sort are attainable, if at all."

An extreme example of the discrepancy between the number of hospitalized and non-hospitalized psychotics in a community is given by Bremer (1951) in a study of a Norwegian fishing village in which he was the only practitioner during 5 years of the Second World War. Although 38 persons presented or had presented psychotic symptoms, only 13 of these had ever been hospitalized. Strømgren (1938) investigated the entire population of the island of Bornholm and found that all but 15% of psychotics had received some form of hospital treatment; yet Fremming (1947), in a more intensive study of the same population, found that 25% of the island’s psychotics had never been hospitalized.

DATA FROM PRIVATE PSYCHIATRIC AND GENERAL PRACTICE

Some of the shortcomings of hospital records as indices of the extent of mental disorder within a community may be overcome by supplementing them with data from private psychiatric practice. This has been done in a number of surveys, one of the most comprehensive of which—carried out in Texas—covered a population of nearly 8 000 000 (Jacq, 1960). During the two-year period covered by the investigation a total of 11 298 individuals were found to have developed a psychosis for the first time; this was estimated as equivalent to a crude annual incidence of 73.3 per 100 000 of the population. However, only psychotics were studied; individuals with psychoneurosis, character disorders or convulsive illness were not included, since it was felt that they were less likely to attract psychiatric attention.

The picture of psychiatric morbidity can also be filled out in certain countries by examining morbidity statistics from general medical practice (Logan & Cushion, 1958) or by scrutiny of the records of one particular practice (Shepherd et al., 1959; Kessel, 1960; Stein, 1960). In the Shepherd study of a large group practice in London, conspicuous psychiatric abnormality was found in 9% of patients, mostly in the form of neurotic disability. " By adjusting our criteria to include the so-
called psychosomatic illnesses, stress reactions and the like, we could have inflated this figure by a number of increments to a total of over 50% of all cases” (Shepherd, 1960). A relevant finding in this study was that only one psychiatric patient in 10 was referred to hospital. However, it is impossible to arrive at a coherent picture of psychiatric morbidity in a community by juxtaposing information obtained from uncoordinated surveys and sources. A complete picture might be obtained by combining the information yielded by records of all kinds with the results of field surveys, provided that uniform criteria were employed throughout. For this reason epidemiologists have turned to household interviews, large-scale medical examinations and field surveys in order to arrive at a more precise estimate of the prevalence of mental disorder. This is the sense in which “field surveys” will be used in this paper, although the words are also frequently understood to cover studies of documentary records obtained from hospitals, general practitioners and social services.

FIELD SURVEYS

Many arguments may be advanced in favour of field surveys within a community. Such surveys, aimed at discovering the prevalence of mental disorder, will be more efficient in case-finding than restricted hospital sampling. This is certainly true in those countries—the majority at present—where hospital facilities are limited. It may be added that the hospital sample is likely to become even more restricted and non-representative in countries where the movement away from custodial care and towards out-patient and community care is rapidly developing. Moreover, changes in hospital systems of record-keeping and differences in this respect between hospitals often impede useful comparisons over a period of time.

One advantage of field surveys that may seem very obvious, but is nevertheless of basic importance, is that they permit the assembly of the most relevant data. These include not only the fundamental demographic information and impressions of community attitudes to mental illness but also first-hand clinical information. The last is important since the mere analysis of hospital records must rely on diagnoses by psychiatrists whose terms of reference may vary widely. Even within a well-run mental hospital the diagnosis of schizophrenia may be made on differing criteria by different individuals (Pasamanick, Dinitz & Lefton, 1959). Such variations may be traced not only to a lack of standard nomenclature but also to differences in the orientation and training of psychiatrists and to changes in fashion in diagnosis. Thus, Bockner & Coltart (1961) have shown that some recent cases of general
paralysis of the insane have been misdiagnosed, presumably because of
the conviction that this was an extinct disease.

PREVALENCE AND INCIDENCE RATES

The need for careful definition of clinical criteria and for uniformity
in classification and design of studies is demonstrated by the wide range
of prevalence rates¹ yielded by surveys conducted in a single country,
the USA (Plunkett & Gordon, 1960), (Table 1). The range is so wide as
to render the table virtually meaningless. It is interesting to note in
this table the great difference in prevalence rates between earlier and
later surveys. There is a range from 16.7 to 60.5 per 1000 in surveys carried
out up to 1950; in the later ones the range is from 53 to 333 per 1000.
It is difficult to imagine that this really reflects a post-war increase in
mental illness of such an order, even though during this period the sur-
vival rate of most classes of mentally ill patients had increased. The
most likely explanation is that the definition of mental disorder has
been widened to include manifestations previously ignored. This
hypothesis receives support from a similar table compiled by Lin (1953),
grouping surveys from all parts of the world undertaken before 1950
(Table 2). In every survey but one shown in this table the prevalence
rates for mental disorder fall within the range 6.8-69.4 per 1000, which
is very close to the range 16.7-60.5 reported in the first half of Table 1.

Several factors contribute to the difficulty of comparing figures for
prevalence or incidence.

Diversity of scope of studies

It is evident that prevalence figures obtained from surveys designed
to assess community needs for psychiatric facilities are not necessarily
comparable with those derived from investigations into problems of
etiology. While the former need only be concerned with cases of severe
mental disturbance, the latter must be based on a thorough enumeration
of all psychiatric manifestations and their correlation with variable
factors. Even surveys made to plan therapeutic services will differ in
scope, depending on the type of facility in question, i.e., whether this
be a mental hospital, clinic or out-patient department.

¹ Special care should be taken in using the terms "incidence" and "prevalence" which have,
unfortunately, been too loosely applied in the literature of mental illness. Prevalence is defined as the
number of cases of disease present in a population at a given time; incidence is the number of new cases
occurring within a specified period (Kraemer, 1957). Prevalence depends on the rates of inception of
a disease, recovery and recurrence, and on the mortality among its victims (Reis, 1960). Incidence
measures the rate at which new cases are added to the total of sick persons, and is dependent on the
balance between resistance of the population and those stresses—biological, cultural and psycholo-
gical—that evoke mental disorder.
<table>
<thead>
<tr>
<th></th>
<th>Investigator</th>
<th>Date of investigation</th>
<th>Total mental disorders</th>
<th>Psychoses</th>
<th>Neuroses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nassau County</td>
<td>Rosanoff (1917)</td>
<td>1916</td>
<td>36.4(^a)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eastern Health District</td>
<td>Cohen &amp; Fairbank, (1938a, 1938b) Cohen et al. (1939a, 1939b)</td>
<td>1933</td>
<td>44.5(^b)</td>
<td>8.18(^b) (over 15)</td>
<td>2.0(^b)</td>
</tr>
<tr>
<td>Eastern Health District</td>
<td>Lenkau et al. (1941, 1942a, 1942b, 1943)</td>
<td>1936</td>
<td>60.5(^a)</td>
<td>6.6(^b) (over 10)</td>
<td>10.7(^b)</td>
</tr>
<tr>
<td>Tennessee</td>
<td>Roth &amp; Luton (1943)</td>
<td>1935-1938</td>
<td>46.7(^a)</td>
<td>4.9(^a)</td>
<td>3.6(^a)</td>
</tr>
<tr>
<td>Hutterite communities</td>
<td>Eaton &amp; Weil (1955)</td>
<td>1950</td>
<td>16.7(^e)</td>
<td>4.7(^e) (15 and over)</td>
<td>11.5(^e)</td>
</tr>
<tr>
<td>New Jersey</td>
<td>Trussell &amp; Elinson (1959)</td>
<td>1951-1955</td>
<td>138.0(^a)</td>
<td>2.0(^a)</td>
<td></td>
</tr>
<tr>
<td>Baltimore</td>
<td>Commission on Chronic Illness (1957)</td>
<td>1953-1955</td>
<td>108.6(^a)</td>
<td>4.3(^a) (over 16)</td>
<td>52.6(^a)</td>
</tr>
<tr>
<td>Salt Lake City</td>
<td>Cole et al. (1957)</td>
<td>approx. 1955</td>
<td>333.0(^a) (over 16)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Syracuse</td>
<td>Bellin &amp; Hardt (1958)</td>
<td>1955</td>
<td>232.0(^a) (65 and over)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Syracuse</td>
<td>Downing &amp; Gruenberg (1957)</td>
<td>1955</td>
<td>53.0(^a) (65 and over)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Midtown</td>
<td>Srole et al. (1962)</td>
<td>1952-1958</td>
<td>233.0(^a) (20 to 59)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\(^a\) After Pikett & Gordon (1960).
\(^b\) Rates calculated by Pikett & Gordon.
\(^c\) One-day rate (day of examination or interview considered equivalent to a single day).
\(^d\) One-year rate.
\(^e\) Three-month rate.
**TABLE 2. SUMMARY OF PSYCHIATRIC DATA IN VARIOUS COUNTRIES**

<table>
<thead>
<tr>
<th>Investigator</th>
<th>Date of investigation</th>
<th>Type of area</th>
<th>Intensity of investigation</th>
<th>Population studied</th>
<th>Mental disorders</th>
<th>Psychoses</th>
</tr>
</thead>
<tbody>
<tr>
<td>China Formosa</td>
<td>1946-48</td>
<td>Rural Small town Urban</td>
<td>III</td>
<td>19,931</td>
<td>214</td>
<td>10.8</td>
</tr>
<tr>
<td>Germany Thuringia</td>
<td>1929</td>
<td>Rural</td>
<td>II</td>
<td>37,561</td>
<td>479</td>
<td>12.8</td>
</tr>
<tr>
<td>Bavaria</td>
<td>1930-31</td>
<td>Rural</td>
<td>III</td>
<td>8,628</td>
<td>517</td>
<td>59.9</td>
</tr>
<tr>
<td>Denmark Bornholm</td>
<td>1935</td>
<td>Rural</td>
<td>II (III)§</td>
<td>45,930</td>
<td>716</td>
<td>15.6</td>
</tr>
<tr>
<td>Sweden</td>
<td>1944</td>
<td>Rural</td>
<td>II</td>
<td>8,736</td>
<td>397</td>
<td>45.4</td>
</tr>
<tr>
<td>Norway West coast village</td>
<td>1944</td>
<td>Rural</td>
<td>III</td>
<td>1,325</td>
<td>259</td>
<td>195.5</td>
</tr>
<tr>
<td>Finland</td>
<td>1936</td>
<td>Rural</td>
<td>II</td>
<td>418,472</td>
<td>3,026</td>
<td>7.2</td>
</tr>
<tr>
<td>USA Baltimore</td>
<td>1936</td>
<td>Urban</td>
<td>I</td>
<td>55,129</td>
<td>3,337</td>
<td>60.5</td>
</tr>
<tr>
<td>Tennessee</td>
<td>1938</td>
<td>Rural</td>
<td>II</td>
<td>24,804</td>
<td>1,721</td>
<td>69.4</td>
</tr>
<tr>
<td>Japan Hachijo Island</td>
<td>1940</td>
<td>Rural</td>
<td>II</td>
<td>8,330</td>
<td>65</td>
<td>6.8</td>
</tr>
<tr>
<td>Komoro</td>
<td>1941</td>
<td>Small town</td>
<td>III</td>
<td>5,207</td>
<td>138</td>
<td>26.5</td>
</tr>
<tr>
<td>Tokyo</td>
<td>1941</td>
<td>Urban</td>
<td>III</td>
<td>2,712</td>
<td>82</td>
<td>30.8</td>
</tr>
</tbody>
</table>

* After Lin (1955).

§ The investigations have been divided into three classes of intensity: I. The method of investigation consists of perusal of written records from institutions and agencies. II. The method consists of perusal of written records, reports from the people, and psychiatric interviews of the mentally ill. III. This method, the most intensive, consists of I and II, plus census investigation of the whole population.

§ In this study, one of the villages was investigated intensively by home visits.
Different "case" criteria

A "case" in a medical study refers to a particular instance of disease to be included in the field of investigation, the selection being made in accordance with the specific aspect of the pathological phenomenon—symptom, syndrome, disease, or group of diseases—which is to be examined, and with the degree of impairment. One example (Dunham, 1959) will suffice to show the wide divergence that may exist in defining "case". "Dr Redlich, following the New Haven survey on social class and mental illness, defined a 'case' as any person under treatment; Dr Gildea, in relation to a project dealing with disturbed children, saw a 'case' as anyone so defined by teachers; Dr Galdston, in a more theoretical vein, spoke of a 'case' as one who fails to achieve his normal goals; and Dr Gruenberg discussed the problem over a wide range, from a person certified by a psychiatrist to have a mental disorder to a person who arrives at a self-judgment that he should seek psychiatric treatment."

It is difficult not only to obtain uniformity of definition but also to apply agreed case-finding definitions consistently within a single survey. Inconsistency in case-finding frequently occurs, even among workers in the same team and even in an individual worker over a period of time. The very nature of mental disorder, involving as it does medical, psychological and social aspects of human behaviour, makes the conceptual difficulties of definition difficult to overcome. A WHO Expert Committee on Mental Health (1960) has suggested an operational definition of a case, namely "a manifest disturbance of mental functioning, specific enough in clinical character to be consistently recognizable as conforming to a clearly defined standard pattern and severe enough to cause loss of working or social capacity, or both, of a degree which can be specified in terms of absence from work or the taking of legal or other social action ". Although this definition has not yet been tested in an actual survey, so that its usefulness remains to be seen, its elaboration by joint consultation is of great merit. Progress in the epidemiology of mental disorder depends upon comparability of results and this can only be achieved through a uniform design of surveys.

Lack of uniformity in classification

This has been a source of perpetual frustration in psychiatric investigation. There are three major reasons for the present-day confusion in the classification of mental disorder: a disparity in concepts of mental illness, depending on whether the orientation is primarily medical, psychological or social; a diversity of etiological theories; and a paucity of objective measurements for abnormal psychological manifestations.
Most of the classifications of mental disorder in common use are a mixture of ill-defined concepts which—although stated in terms of specific diseases or diagnoses—really consist of descriptions of pathological states at various levels. Szasz (1959) states: "This is as though in the periodic table of elements we would find coal, steel, petroleum interspersed among items such as helium, sulfur and carbon". However, a subcommittee of the WHO Expert Committee on Health Statistics is now engaged in revising the section of the International Classification of Diseases covering mental disorder of all kinds, and it is hoped that a workable and acceptable classification will be available within a few years.

Lack of uniform classification of demographic data

Not only the lack of systematic classification of mental illness, but also difficulties in classifying demographic data seriously impair the comparability of psychiatric studies. It is understandable that definitions of social status vary greatly from one society to another. To compare the incidence of mental disorder in relation to social class in different societies requires special care, particularly as the stresses experienced by each social group may vary markedly against different backgrounds. Even within the same society the standardization of demographic criteria is subject to considerable observer-error. When a study covers a long period of time, as in the use of hospital or census records or in longitudinal surveys, it is always possible that the criteria may have altered or that the social background itself has changed. This aspect requires special consideration when dealing with a rapidly developing or highly mobile society.

Diversity of methodology

The differences in method employed in various studies constitute a prime cause of disparity in results. The validity of a specific study is greatly affected by the selection and size of the sample. The comparison of prevalence figures based on different methods of sampling requires careful attention, particularly when the samples are of different orders of magnitude.

The sources of psychiatric information and the intensity of study also affect the case-finding coverage and the general accuracy of the investigation. Data obtained from hospital, welfare or census records cannot be directly compared with data collected in personal interviews of a population sample by professionally trained investigators. Even in the field type of investigation any variation in the degree of contact made with the population materially affects the results. When there
are many investigators in a study, observer-error is greater and the results obtained after cross-validation, both in case-finding and diagnosis, may be significantly different from those of studies not subject to such checking.

Differences in statistical manipulation of data

Difficulties arising from the statistical interpretation of data may occur in the following areas: ambiguous use of the terms prevalence and incidence; lack of differentiation between different kinds of prevalence rate; and differences in computing morbidity risks for each type of mental disorder. Reference has already been made to the ambiguous use of the term "incidence" in current epidemiology; and it should be noted that very little research has been specifically designed to detect the true incidence of mental disorder in the general population, apart from studies on suicide and certain well-defined mental deficiencies and psychoses. Attempts have been made to convert prevalence into incidence rates by the use of various devices; in Weinberg's formula the morbidity risk is computed by dividing the total number of cases of the disease at the time of census by an adjusted population figure based on the number of persons in the population who survive the period of life when the disease usually develops. This method has, however, been subjected to severe criticism by Gruenberg and by Kramer (1961); the latter advocates the modified life-table method developed by Frost (1941).

Since there already exists an important body of literature dealing with prevalence studies based on hospital and social agency records, no further discussion of the subject will be attempted here.

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The purpose of this chapter is to review the various types of population morbidity survey. First the broadest, nation-wide surveys will be considered, then those of defined regions. These are the surveys whose main aims, through comprehensive coverage or random sampling, are to discover prevalence and incidence rates. Next, surveys will be described the scope of which is progressively narrower, their emphasis being directed towards associations of possible etiological significance; they include longitudinal and other studies of smaller population groups and investigations of families and twins. In this way it is hoped to show the full extent of the problem faced by the epidemiologist of mental disorder.

RANDOM SAMPLING OF ENTIRE POPULATIONS

A number of countries—the United Kingdom, the USA, Canada, Denmark, Ceylon and Japan—have undertaken morbidity surveys of large samples of their populations. In Ceylon, the survey was designed to measure disabling morbidity existing on a particular day; in Denmark it covered a period of 3 years. The results of these surveys carry little conviction in relation to psychiatric morbidity for they were largely conducted by lay interviewers relying to a considerable extent on the respondent's own diagnosis. Thus the Danish criterion was that "a person is ill if he thinks he is ill" (Denmark, 1960). Nevertheless, such surveys provide a useful, if crude, picture of the relative importance of different groups of disorders within a community.

The Japanese survey of 1954 was specifically designed to collect the psychiatric data necessary to the formulation of a national mental health programme (Japan, Ministry of Health and Welfare, 1959). The material was obtained through census investigation of every household in a hundred areas randomly selected from 3690 welfare administration districts; 23,993 persons, including those in mental hospitals
at the time, were studied in all. After some pilot studies to improve the questionnaires and standardize techniques, independent surveys were conducted in each area on a nation-wide basis. The first phase consisted in the use of household questionnaires to obtain information on name, sex, date of birth, marital status, occupation, monthly expenditure per head, etc. Reports on suspected mental cases were secured from civic officials, health and welfare officers, and police. Psychiatric evaluation studies followed in which every member of each family was interviewed. The reports compiled by local psychiatrists on persons suspected of mental disorder were then sent to a central review board for confirmation. The broad classification of disorders employed distinguished between the major psychoses, convulsive disorders, mental deficiency and other forms of psychiatric disturbance. The survey revealed 355 cases of severe mental disorder, amounting to 1.5% of the population investigated. Mental deficiency (158 cases) schizophrenia (55) and convulsive disorders (34) formed over 70% of the total.

It is clear that this form of survey, which can hope to detect only the severer cases, will provide no more than a rough estimate of the psychiatric needs of the community, and that mainly in terms of the requisite hospital facilities. Further, since such large-scale surveys call for a large number of investigators—if the data are to be collected rapidly to ensure uniformity of the time factor—there is a great need for cross-validation of diagnoses and ratings. Administratively, these surveys demand strong central direction, considerable funds, and efficient existing administrative machinery.

COMPREHENSIVE HOUSEHOLD SURVEYS IN DEFINED DISTRICTS

This type of prevalence survey—often referred to as a census survey—consists of a study of the entire population of a geographically defined district chosen either as representative of the national population or because certain specific characteristics mark it out for investigation, for instance its being a population isolate. A number of such studies have been carried out since the pioneering work of Brugger (1931, 1933) and are regarded as “perhaps the most successful prevalence surveys in practice” (Reid, 1960).

The Taiwan study of Lin (1953) belongs to the first category of surveys, those covering populations similar to the national population. It was conducted between 1946 and 1948 and included all Taiwanese of Chinese descent in 3 sample areas: a rural district including 5 villages,

1 Strömgren, 1938; Uchimura et al., 1940; Lenzkian, Tietze & Cooper, 1941; Kalis, 1942; Akimoto et al., 1942; Tsunenaga, 1942; Roth & Luton, 1943; Sjögren, 1948; Brenner, 1951; Brora, 1953; Lin, 1953; Larssos & Sjögren, 1954; Eaton & Weil, 1955; Essen-Möller (1956).
a small town, and a section of a large city. Altogether, 19,931 persons were studied. The investigation of each area lasted approximately a year and fell into 3 stages. In the first stage information was collected regarding members of the community suspected of mental abnormality. This information was obtained from census registers and police records covering a thirty-year period, and also from elders, officials, general practitioners and school teachers. At the same time information was collected on the size of each family and the age, sex, education, occupation and social class of its members. The second stage concentrated on obtaining detailed personal histories of suspect cases from families or neighbours, and an effort was made at this time to discover any mental cases not previously reported. The last stage of the survey consisted of household visits by small psychiatric teams who interviewed every inhabitant and carried out more detailed examinations of suspect cases. All persons diagnosed as mentally disordered were then referred to the chief investigator for confirmation of the diagnosis.

It was found that this method of initial approach through a few specific enquiries, rather than by launching directly into the final stage, minimized resistance to the investigation in the community; excellent co-operation was, in fact, obtained. Altogether 214 persons—10.8 per 1000 population—were diagnosed as mentally disordered. The prevalence of all forms of mental disorder varied little between the three communities. These findings challenged the prevailing conception that Chinese society was free of mental illness and showed the problem to be of the same order of magnitude as in other societies. The rate for psychosis in general was 3.8 per 1000, made up of schizophrenia (2.1) and manic-depressive illness (0.7) for the greater part. Among non-psychotic disorders mental deficiency accounted for 3.4 cases per 1000, psychoneuroses 1.2, and epilepsy 1.3, with very low rates for psychopathy and alcoholism. The highest prevalence rates were found in the middle age groups. The rate for senile psychosis, calculated for the population over 60, was 10.7 per 1000. A significant difference was observed in the distribution of disorders between persons living in central urban areas of high population density and in peripheral or suburban areas. There was a higher concentration of schizophrenics and neurotics in the former and of epileptics and mental defectives in the latter.

The prevalence rates obtained from surveys such as this are very useful in planning services for the particular areas studied; but it is difficult to extrapolate from them a prevalence rate for the country as a whole since the communities studied may not be truly representative. On the other hand, in this type of survey a closer inspection of likely etiological factors is possible than in surveys conducted on a larger scale, and this may suggest hypotheses about causative and precipitating
factors that can be tested later in specifically designed studies. Most comprehensive area studies have included in their objectives the uncovering of etiologically significant factors. A number, mostly in northern European countries, have concentrated on genetic aspects and have accordingly chosen to study isolated communities.

An example of the latter is the study by Hallgren & Sjögren (1959) of a Swedish rural population. In addition to a psychiatric investigation of a general population of 25,000, the parents and siblings of every schizophrenic and low-grade mental defective were studied. These included 1790 persons from 231 families housing schizophrenics and 1541 persons from 215 families of mental defectives. In the schizophrenic group 7% of the siblings were found to suffer from schizophrenia, compared with 1.6% of the general population. Among the parents the aggregate morbidity rate for all psychoses, 8.6%, was notably higher than the corresponding rate of 5% in the population at large. The rate of 1% quoted for schizophrenia among the parents of schizophrenics was not regarded as substantiated. The morbidity rate for schizophrenia and for non-psychotic mental disorders among the siblings of schizophrenics was significantly higher in families where one parent was affected by psychosis or severe personality disorder than in families where neither parent was affected. The authors concluded that "specific genetic factors are of importance for the manifestation of schizophrenia".

The same inference was drawn with regard to low-grade mental deficiency in the light of the following findings: 8.4% of siblings were found to be mentally subnormal compared to 0.9% of the general population; the morbidity rate of 2.5% for low-grade deficiency among the parents was significantly higher than the rate of 0.5-0.6% in the general population.

The New Haven study (Hollingshead & Redlich, 1958; Myers & Roberts, 1959) affords an example of a survey designed to test 5 clearly formulated hypotheses about the relationship between social class and mental illness:

1. The prevalence of treated mental illness is related to an individual's position within the class structure.

2. The types of psychiatric disorders diagnosed are related to the class structure.

3. The nature of the treatment given by psychiatrists depends on the patient's position in the class structure.

4. Social and psychodynamic factors in the development of psychiatric disorder are correlates of social class.

5. Social mobility is associated with the development of psychiatric disturbance.
The research fell into two parts: a survey of treated psychiatric disorders designed to test the first 3 hypotheses, and a controlled study of 50 patients to examine hypotheses 4 and 5. The data were collected from the New Haven urban community (1930 population: 250,000) the social structure of which had been under study for a long period so that much information was already available. In the first phase of the research, a psychiatric census enumerated all persons receiving treatment on 1 December 1950, collected their medical and social histories, selected and interviewed a 5% random sample of the community as a control group, and established criteria for the social classification of patients and controls. The findings of this census supported the first 3 hypotheses: (1) the lower the social class, the greater was the proportion of treated patients in the population; (2) there was a marked inverse relationship between the prevalence of neurosis and that of psychosis by social class—the lower the class, the lower the rates for most types of neurosis and the higher the psychosis rate; (3) the higher the social class, the higher was the percentage of patients treated privately or in private hospitals; psychotherapy was largely the prerogative of the upper social groups.

The second phase of the research consisted of a more intensive clinical study complementing the epidemiological approach and focusing attention on specific problems uncovered by the latter. This controlled case study was based on 50 adult white patients from two non-adjacent social strata (III and V) and from two diagnostic groups (schizophrenia and psychoneurosis). External stresses were found to differ in classes III and V. Social mobility was markedly associated with the development of psychiatric illness in class III, but not in class V where adverse economic conditions and isolation from community institutions prevailed. Lower-class patients felt rejected and trapped by adverse circumstances while class III patients appeared more sensitive to internal threats and conflicts. The symptom patterns of the illnesses themselves differed significantly in the two classes. Because of the smallness of the sample, and because of its disparity and highly selective nature, the authors recommended that their results should be regarded mainly as hypotheses for future research.

RANDOM SAMPLING OF DEFINED DISTRICTS

The study of a random sample of the population of a defined district has the advantage over the census method that it permits a more intensive clinical and social enquiry. It offers excellent prospects of yielding information on social and demographic factors significant to the etiology of mental illness and also permits objective assessment of the prevalence
of mental disorder in the community. Therefore an increasing number of recent epidemiological investigations have employed this method (Leighton, Rennie, Pasamanick, Mandelbrote, Gruenberg).

An example of this type of study is the "Midtown" survey of Rennie et al. (1957). The district investigated was a central residential area of New York with a population of 172,000, 99% white, including every variety of social and economic grouping. The investigation fell into three parts. An intensive sociological, anthropological and demographic analysis of the community was first undertaken. Then a case-finding operation traced all residents who were known patients of mental hospitals, clinics or private therapists on a given day, so giving a measure of the extent of psychopathology under treatment on a one-day prevalence basis. The third stage was a sample survey operation. From among the 110,000 persons in the 20-59 age-group a random sample of 1660 were given a 2-hour interview during which a very complete history was taken. Two psychiatrists made independent evaluations of each individual.

The most striking finding emerging from this survey was the significant degree of correlation between social status and the prevalence and severity of mental disorder. Such disorder was most frequent in the lower social classes, 13% of whom showed traits regarded as psychotic as against only 4% of the upper class. The findings were similar for neurotic traits—20% and 11% respectively—and for personality defects—15% and 5%. On the other hand, simple neurotic types were commoner in the upper classes (43%) than in the lower (25%). Anxiety was manifested in roughly 75% of all classes of the population. The degree of disturbance varied significantly with social status: 28% of the lower class were found to be severely disturbed, 18% of the middle class, and 9% of the upper class. This relationship was reversed with regard to the proportion of the severely disturbed receiving therapy: only 1% from the lower class and 4% of the middle class as against 20% of the upper class.

The prevalence rates found in this study closely resemble those reported by Leighton (1956). She estimated that 37% of the adult population of the small town studied had, at some time during their lives, shown severe impairment, and she therefore suggested that this was the figure on which psychiatric planning should be based. "On the other hand, if the interest were chiefly to determine correlations between the occurrence of psychiatric symptoms and various sociocultural factors, then it would be appropriate to disregard impairment and pay attention only to the presence or absence of significant symptoms. In this case the figure to be used would be 65 per cent."

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1 See also Srole et al. (1962).
These figures are a great deal higher than those arrived at in the Baltimore study of Pasamanick et al. (1957), the main aim of which was to determine the prevalence of chronic disease and its variation with social and economic status. Excluding all patients in institutions these workers concluded that, on a conservative estimate, approximately 10% of an urban population are, at any given time, mentally ill.

Some caution is necessary in evaluating surveys based on random samples of the population, for severe mental illness is rare in most communities and it is difficult, using this method, to collect a sample large enough for valid statistical manipulation. The very high prevalence rates for minor disorders reported in the Midtown survey suggest that it may be advisable, in this intensive form of study, to guard against the over-reporting of symptoms and cases, or at least to align the criteria used with those of other surveys. Further, prevalence rates derived from this type of survey are not necessarily applicable to populations outside the area studied, or to the country as a whole.

LONGITUDINAL STUDIES

The three types of cross-sectional survey described chiefly yield prevalence rates. But, in view of the chronic nature of most mental disorders, the longitudinal study of a population over a number of years will give a clearer picture of the rate at which a disorder develops and its duration. Such a study also provides better opportunities for studying causative factors at different life stages.

The classical works of Klemperer (1933) in Germany and Fremming (1947) in Denmark give some indications of the value as well as the limitations of longitudinal studies. In Fremming's study of an original cohort of 5500 persons born between 1883 and 1887 in Bornholm—an isolated island of static population—information was obtained from many sources: civil registers, doctors, teachers, relatives and neighbours. Personal calls were also made on individuals. A prevalence rate was found of 11 per 1000 population for psychoses in general, and of 5.7 per 1000 for oligophrenia. The expectancy rates for the major psychoses agreed with the figures derived from the same population by other methods and also with German estimates based on census studies.

The value of such studies lies in the historical perspective they provide of the individual in his social and cultural environment. Their practical limitations cannot, however, be overlooked. Fremming was exceptionally successful in tracing no less than 92% of his original cohort after 50 years; this was due to the selection of a remote island community for study. Klemperer could only trace 271 persons of his
original population of 1000 selected from the registers of München between 1881 and 1890. Difficulties arising from death, change of name, and change of address through urbanization or migration may account for the dearth of such projects in the past, and the increasing social and geographic mobility of populations makes it still more difficult to trace the cohorts, although this is counterbalanced in part by an improvement in record-keeping techniques.

Prospective longitudinal studies 1 of a general population may be regarded as an ideal method for obtaining epidemiological data on mental disorder, provided the sample remains reasonably stable and the research design constant throughout the whole period. One great advantage of prospective studies is that they permit the collection of accurate and objective information on uniform material, independent of histories based on personal recollection. Moreover, they diminish the risk that the observer may interpret past histories in the light of the hypothesis the study is designed to test. Prospective studies of this type can provide accurate information not only on the onset and evolution of mental illness but also on the little-explored question of spontaneous recovery. In other words, this type of study may clarify the natural history of mental disorder. A well-designed prospective study can yield the true incidence rate of a disease as well as an estimate of the risk of developing a given disease when a particular characteristic is present (Lilienfeld, 1957). Since the sample is under observation over a period, a better understanding is possible of the relative roles of predisposition and environmental factors in determining the onset of mental disorder. The time-lag between the onset of an illness and its discovery by the community can also be observed more accurately. A greater awareness of social changes and community attitudes in their relation to mental disorder becomes possible.

A prospective enquiry reported recently by Douglas (1960) on premature children shows a number of refinements. All the children included in this study were born during a particular week in 1946. Excluding multiple births, there were 675 legitimate singly born babies weighing 2.5 kg or less at birth for whom information about home conditions was available, and each was matched with a control child weighing more than 2.5 kg at birth selected from the remaining 12,000 legitimate single births during the same week. The selection was made on the basis of sex, position in the family, maternal age, social group, and degree of crowding in the home. The preliminary findings were that premature children (a) made consistently lower scores than the controls in 8 tests

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1 Reid (1960) describes a prospective enquiry as one in which "individuals who are presumably well are classified according to certain personal qualities or previous experiences and then followed up over a considerable period of time."
of mental ability and scholastic achievement (4 given at 8 years and 4 at 11 years); (b) were the subject of more adverse comment by teachers in respect of attitude to work, concentration and discipline; (c) were less than half as likely to gain grammar-school places in the "eleven-plus" examination. All these differences are largely explicable by the fact that premature birth is associated not only with poor living conditions but also—at each social level—with lower standards of care and a lack of maternal interest in education.

One remarkable prospective survey is the Terman Gifted Group Study. This is not strictly an epidemiological survey of mental illness but a large-scale investigation of the physical, mental and personality traits of a group of exceptionally gifted children who are being followed up to discover what kind of adults such children become. The study began in 1921 with 1500 children aged 11, of whom 95% were still being actively studied 37 years later. The findings so far indicate that gifted individuals do not greatly differ from the general population in their liability to mental illness. The psychiatric section of the enquiry suffers from some lack of stringency; but the whole project is remarkable as "a study of man that will encompass the span of the subjects' lives, not just those of the researchers" (Terman & Oden, 1959).

The prospective longitudinal study has another advantage: it is easy to change research methods, or the emphasis on data to be collected, as the investigation proceeds and as findings take shape that make changes appear necessary. There is the danger, however, that this flexibility may lead, with the passage of time and changes in research staff, to a shift in criteria that may destroy the stability of method essential to success in such work. A few important projects of this kind have been planned, or are actually in progress, in certain centres. For instance, the National Institute of Mental Health of the United States has embarked on an ambitious prospective study of how abnormalities during pregnancy affect the children. This study covers 14 large hospitals and will call for histories and follow-up studies in 50,000 pregnancies over the next 11 years. Pasamanick has also begun a prospective study on the consequences to the child of specific abnormalities during the mother's pregnancy.

Despite the great expense and heavy staff requirements, the number of prospective longitudinal studies in large research centres is increasing, and this represents a major trend in epidemiological investigation of mental disorder. A prospective study of a general population, though

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1 This selection examination is taken at the age of eleven or over by British children wishing to obtain grammar-school places.
2 This study brought out an important point regarding the use of controls in social and medical studies. In spite of careful matching of the premature and control pairs for paternal occupation there were, in fact, marked social differences which increased with time. The important point emerges that a control group which is satisfactory at the beginning of a longitudinal enquiry may not remain so at the end of the study.
theoretically the ideal type of survey, is an enormous undertaking. Studies of random samples over a limited period, or repeated surveys at regular intervals (Hagnell, 1959; Lin, 1961), should therefore be considered as alternatives; these reduce the practical difficulties and may yield findings comparable to those of prospective life-span studies.

COLLABORATIVE RESEARCH

The recent growth of joint research between different workers and research centres holds considerable promise for the future. It stems from the effort to provide comparable data based on uniformity of definition and method, the lack of which has so far been the greatest limiting factor in the development of psychiatric epidemiology.

An example of such collaborative research is provided by the Nigeria-Cornell epidemiological study, which is still at the planning stage (Lambo & Leighton 1; Lambo, 1960). A population of approximately 20,000 persons in 110 villages of the Aro-Abeokuta area of Nigeria will be studied for the prevalence of mental illness, with especial reference to the effects of social and cultural disintegration. The method will resemble that of the Stirling County study carried out by one of the principal investigators, but careful thought has been given to overcoming the obstacles arising from applying this approach to the study of a population of a completely different background. After a preliminary anthropological investigation, the first task is to establish the definition of a case in the community and the criteria for symptoms, degree of impairment, and social and cultural disintegration. Psychiatric diagnoses will be standardized with those employed in Stirling County. This initiation of comparable research projects in culturally contrasted communities is a very significant step. The operational definitions of psychiatric, social and cultural concepts will be put to the test; and in participating the Nigerian staff will acquire the techniques of research work from their more experienced counterparts.

However, the difficulties besetting this kind of undertaking must not be minimized. Language presents a formidable problem which cannot be solved satisfactorily by the use of interpreters. The very presence of the white man may cause considerable emotional difficulties and so complicate the diagnostic criteria. Moreover, previous investigators have reported a tendency among Africans to give the type of answer they think the investigator wants. For all these reasons it is clear that the training of local staff should always form part of such research programmes.

Collaboration in epidemiological studies between the research centres of advanced countries is also important, particularly in improving research techniques and in standardizing psychiatric criteria and social and cultural terminology. Among recent work of this kind is an experiment being undertaken by Canada, the United Kingdom and the USA which are exchanging hospital records for the agreed coding of diagnoses and comparison of results.

**COMBINED MEDICAL AND PSYCHIATRIC SURVEYS**

Collaboration of a multidisciplinary nature has also produced good results. This is exemplified in the Baltimore survey of chronic disease which has already been referred to. The objectives of this investigation were of a broad medical and social nature, and not specifically psychiatric, although the survey yielded prevalence rates for psychoses, psycho-neuroses and psychosomatic disorders in the subsample of patients examined; the distribution of these disorders by sex, age and degree of impairment has been analysed in a preliminary report (Pasamanick et al., 1957).

The chief aim of this survey was to determine the prevalence of chronic disease and its variation with social and economic status. As a first step lay interviewers visited a random sample of 12,000 inhabitants of Baltimore in a household survey. Persons under long-term medical care were excluded. The second stage was a clinical evaluation of 800 persons with substantially disabling health conditions. This evaluation was conducted by a panel of physicians who turned over to a psychiatrist every record containing any material suggestive of mental illness. It was concluded, conservatively, that at any given time 10% of an urban population are mentally ill. Psychoneurosis was 12 times, and psychosomatic disorder 8 times, as common as psychosis; and both psychoneurosis and psychosomatic disorder were commoner in women than in men. Psychosis increased precipitously with age. Psychoneuroses were almost uniformly distributed in the age-groups over 15 years but were found in only 0.1% of persons below this age. The psychosomatic disorders exhibited an entirely different pattern of distribution; no cases were reported in persons under 15 or over 65, and there were significantly more cases in the 15-34 than in the 35-64 age-group.

The advantages of this combined medical and social approach lie in the availability of medical records, which help to give a clearer clinical picture of suspected mental disorder, and in the opportunities for studying relevant psychosomatic factors.

A form of combined enquiry of more restricted scope is that conducted by Parnell (1951) on Oxford University students. The Colleges of the
University were asked to supply information about undergraduate mortality, and about morbidity severe enough to cause the loss of at least one term of residence between the beginning of 1947 and the end of 1949. Accident and suicide proved to be the main causes of death, and tuberculosis and mental illness the chief reasons for prolonged absence from college. It was estimated that, each year, approximately 1% of the undergraduate population of Oxford suffered from some serious form of mental illness; yet two-thirds of those who lost a term’s residence from this cause were able to resume their university course. The suicide rate was found to be abnormally high, 11 times as great as that of the corresponding age-group in the whole population and 17 times that of the same age-group in the armed Forces. The undergraduate suicide rate was also higher than the rate for this age-group in social classes I and II alone, from which classes they were largely recruited. This study, though possibly lacking in stringency, sets a question important for future research: are students particularly susceptible to mental illness? If so, is this due to selection processes in the recruitment of undergraduates or is it the outcome of mental and physical circumstances peculiar to university life? Research into these problems is being pursued at Oxford (Parnell, 1957, 1958) and elsewhere (Still, 1954; Malleson, 1954; Rook, 1959; Carpenter, 1959; Funkenstein, 1959).

STUDIES OF POPULATION SUBGROUPS

The use of a student population for the study of factors in the etiology of mental disorder has much to recommend it since it is possible to eliminate some of the usual variables in such an investigation. The population is broadly homogeneous in age, education and living conditions. The existence of a student health service makes it easy to collect the relevant sociological data and the students themselves are usually co-operative. Many other forms of investigation of selected population subgroups are possible, however. Such characteristics as age, ethnic group, culture, occupation, education, religion, social class, migrancy and urbanization have been the common features of different groups chosen for study.

One example of such a study is the survey of neurosis in factory workers by Russell Fraser (1947). This investigation, conducted in 1942-44, was planned to determine the extent and distribution of illness in general, and of neurosis in particular, among engineering workers. A random sample of 3083 workers from 13 factories employing over 30,000 workers in all was studied, each individual being examined for 1½ hours by one of the three investigating psychiatrists. It was found that 10% of this sample had suffered disabling neurotic illness
and a further 10% minor forms of neurosis during the course of 6 months. The figures for women were slightly higher than those for men. Neurosis was responsible for between a quarter and a third of all absences from work due to illness, and was as common in skilled as in unskilled workers and among the higher as among the lower paid employees. Lack of social contact was the circumstance most often associated with neurotic illness. Other factors associated with an undue incidence of illness were excessive working hours, unsatisfactory home conditions, monotonous work and poor lighting.

In any study of large populations, subgroups may be conspicuous in which hospital admission rates appear to differ significantly from the mean; and closer investigation of such groups may uncover characteristics constantly linked with these abnormal rates and pointing towards causal factors. A research programme recently initiated in Oxford is such a study.² Two areas of approximately 8000 inhabitants each, where experience over the previous 4 years had shown considerable differences in the rates of referral and hospital admission for schizophrenia, have been chosen for epidemiological survey. One house in five is to be visited, all members of the family including adult lodgers being interviewed. The prevalence of the main categories of psychiatric disorder will be ascertained in relation to such sociological factors as social mobility or rigidity, social class, family cohesion, interpersonal relations and unemployment. Information will also be obtained on the factors determining the referral of patients and the success with which patients manage in the community. Later the scope of the study will be expanded to cover two other areas—one urban, the other rural—so as to investigate any differences of prevalence rates in relation to industrialization, urbanization and migrancy. A follow-up study of the factors influencing the social readaptation of discharged schizophrenic patients, and of the effects of their discharge on family and community, also come within the range of this study.

The study of the Hutterite community by Eaton & Weil (1955) was designed to test the hypothesis that the social organization of this closely-knit sect, living in agricultural settlements in the USA and Canada, might lend them some immunity to mental disorder. In fact, the investigation showed this belief to be unfounded. Nevertheless, the distribution of diagnoses was in marked contrast with that obtaining in the surrounding population in that there was an exceptional preponderance of depressive psychosis over schizophrenia. It might be thought that the traditions of this sect protected its members from the latter while exposing them to the former: but a genetic explanation of this

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uncommon distribution of psychoses is also possible since the 8500 persons of this community are all descended from only 101 couples who originally migrated to the USA from Russia in the 1870's.

Böök (1953) studied another highly inbred population in an isolated area of northern Sweden. In this community, however, the morbidity risk for schizophrenia was as high as 2-3% and manic-depressive psychoses were rare. Another study emphasizing the contribution of heredity to mental disease is that of a Swiss village undertaken by Wieser (1954). There were a number of cases of schizophrenia and oligophrenia, all of which—with one exception—were in persons descended from a single couple who married in the early 17th century.

It is clear that these narrower and more intensive surveys are more appropriate to the study of possible etiological factors than to questions of prevalence and incidence. Methods specifically adapted to the elucidation of etiological factors in mental illness—such as studies of patient cohorts, of families and twins—will be discussed in the following chapter.
THE ETIOLOGY AND EVOLUTION
OF MENTAL ILLNESS

Epidemiological investigations frequently uncover factors that are not only of possible etiological significance but also affect the natural course and development of mental illness; both these aspects are considered in this chapter. It will be necessary at times to refer to studies that are clinical or experimental rather than epidemiological, for a discussion confined to the latter would result in a lack of balance; the clinical, laboratory and epidemiological approaches are complementary.

A few major areas can be defined where the epidemiological method has been most actively applied. These are the study of: (1) genetic factors, including twin and family studies; (2) somatic factors (pre-natal influences); (3) psychosocial factors; (4) factors affecting the course and outcome of mental disorder. The first three of these are concerned with etiology rather than outcome and clearly the topics overlap. Thus, twin studies are considered under the heading of genetic factors; but, as uniovular twins share the same maternal circulation, such studies might also be considered in relation to pre-natal influences. Again, most twins share a similar environment and this might be considered as a precipitating psychosocial factor.

GENETIC FACTORS

Family studies

Narrowing the focus of enquiry from the community to the family group permits a more precise formulation of the influence of heredity on behaviour. Such studies tend to show greater consistency of results than investigations of a broader social and environmental nature. Thus, for schizophrenia a large number of surveys indicate that the morbid risk, i.e., the risk of becoming manifestly ill for all individuals surviving the period during which the disease may appear, is 1% for the population as a whole; 7-15% for the siblings of schizophrenics; 7-16% for children with one schizophrenic parent; 40% (Elsässer, 1952) or even 68%
(Kallmann, 1959) for children with two schizophrenic parents; and 5-10% for the parents of schizophrenic children (Böök, 1960).

Elsässer’s findings are particularly striking. Where both parents are schizophrenic there is a high incidence of schizophrenia, and of schizophrenia alone, in the children. Where both parents are manic-depressive, there is a high incidence of endogenous psychoses in the children: predominantly, but not exclusively, manic-depressive. When a manic-depressive marries a schizophrenic the two psychoses are about equally represented in the children. These conclusions were derived from a study of nearly 700 Rhineland couples in which both partners had been found abnormal. The course and outcome of the psychoses suffered by the children of these families were no more malignant than usual. Kallmann & Sander (1948) have also pointed out that a poor family history of mental disorder does not indicate an unfavourable prognosis.

Given the frequency of schizophrenia in the children of schizophrenics, the marriage and fertility rates of the latter become issues of immediate importance in community mental health programmes and marriage counselling. To a certain extent the findings are still of a conflicting nature. An excellent discussion of the subject is to be found in Lewis (1958). The surveys of Essen-Möller (1935), Kallmann (1938), Böök (1953), and others suggested that both the marriage and fertility rates of schizophrenics, and of the siblings of schizophrenics, are markedly below those of the general population. Ødegaard (1960), however, in an analysis of 34 233 first admissions to psychiatric hospitals in Norway between 1936 and 1955, found that the schizophrenics had a significantly larger number of children. In a small sample of patients seen 8 years after discharge the pattern of marriage and fertility was found to be almost normal, but the reproduction rate of the whole group was reduced because it also included chronic patients under permanent custodial care.

Family studies have been concerned not only with the genetic aspects of mental illness but also with environmental causes. Wahl (1954), analysing hospital records, found that 24% of schizophrenics were orphans as compared with 6% of the general population, and that the schizophrenics were orphaned at earlier ages. Parental loss is discussed as a causative factor without, however, due regard for the fact that schizophrenics often have mentally disturbed parents with a mortality above average. The association may therefore reflect genetic rather than environmental factors and this omission is typical of such studies. Most genetic investigations have lacked satisfactory techniques of environmental or psychological analysis and the converse is often true of environmental studies. Although both heredity and environment play a part in determining behaviour, little has been done to relate the two spheres of enquiry.
Twin studies

However, in the study of pairs of twins Nature has provided what Slater & Shields (1953) describe as "the opportunity of observing a controlled experiment" in which the roles of heredity and environment may be more clearly differentiated. The study of monozygotic twins provides a measure of the maximum effect of heredity since they share the same genetic structure. Dizygotic pairs provide a good control series because, although no more closely related genetically than ordinary siblings, their prenatal and usually their postnatal environment is much more alike.

The validity of these studies is open to serious doubts. Among the more important are uncertainty in the diagnosis of zygosity (Slater & Shields, 1953; Gregory, 1960) and the preferential reporting of concordant identical twins (Neel & Schull, 1954). "Because identical twins look alike, tend to have a similar prepsychotic personality (not entirely on genetic grounds), attract great interest if they are concordant, and are likely to be found in the same hospital within six months to a year of each other, they tend to blind the genetically oriented with the splendour of their sameness" (Jackson, 1960). The traditional approach in twin studies has been to compare concordance rates for mental disorder in pairs of monozygotic and dizygotic twins, and so to parcel out the respective shares of heredity and environment in the causation of psychiatric disorder. Gregory (1960), for instance, has stated that genetic factors are 2-4 times more important than environmental factors in the genesis of schizophrenia, his argument deriving from the observation that concordance rates for monozygotic pairs vary from 66% to 91% but for dizygotic twins only from 3% to 17%.

In Kallmann's (1953) series of 286 monozygotic twin pairs there was no pair in which one twin suffered from schizophrenia and the other from affective psychosis; this would strongly support the view that these are genetically distinct conditions had not Kuhn (quoted by Jackson, 1960) and Slater (1947) reported several cases where one identical twin was schizophrenic and the other manic-depressive. Among other striking findings from twin studies is that of Kallmann (1952) on 40 monozygotic and 45 dizygotic pairs of male twins in which at least one member of each pair was homosexual. There was 100% concordance among the monozygotic twins, who all claimed to have developed their homosexual habits independently of the other twin. The concordance among dizygotic pairs varied between 11% and 42% according to the definition of homosexuality adopted. The results of this study have not, however, been confirmed.

Compared with the data on schizophrenia, the information available on manic-depressive psychosis from twin studies is scanty. While the
general average frequency of manic-depressive psychosis is 0.4%, the concordance rates for dizygotic and monozygotic twins range from 26.3% to 95.7% (Kallmann, 1959).

Rosenthal (1959) has made a new approach, confining his investigation to monozygotic twins, and scrutinizing the case histories of 37 pairs published by Slater & Shields (1953) to test three hypotheses:

1. that typical or process schizophrenia is commoner among concordant pairs, and atypical or reactive schizophrenia among discordant pairs, of monozygotic twins;

2. that the illness is more severe in concordant than in discordant pairs;

3. that schizophrenic illness is commoner in the families of concordant than of discordant pairs.

Owing to the rarity of cases of reactive-type schizophrenia among twin pairs studied, the first hypothesis did not lend itself to conclusive testing. A significant finding, however, was the almost complete absence of schizophrenia in the families of discordant twin pairs, though it occurred in some 60% of families of concordant pairs. In the affected twin of discordant male pairs, schizophrenia tended to have a later age of onset and a more favourable course than in discordant male pairs; in the former, the disease tended to be of paranoid type, in the latter catatonic. The twin who remained well in the discordant male pairs tended to have a better pre-morbid adjustment than the concordant twins. It was concluded that, from the biogenetic aspect, this analysis differentiates at least two broad groups of schizophrenics. In one the genetic contribution is absent or minimal, in the other it is probably considerable. Jackson (1960) goes further and would substitute a psychodynamic for a genetic account for the increased concordance for schizophrenia in twins. He argues that the family environment itself may drive twins into a close, yet mutually hostile and dependent, situation. “The identity problem of the schizophrenic, most often stressed by psychodynamically oriented writers, could find no better nidus than in the intertwining of twin identities, in the ego fusion that in one sense doubles the ego (because the other is felt as part of the self) and in another sense halves it (because the self is felt as part of the other).”

A very extensive twin study of epilepsy was carried out by Conrad (1937). He traced every twin in the entire institutionalized population of epileptics in Germany and found a concordance rate of 67% in the monozygotics; for idiopathic epileptics alone the concordance rose to 86%. Other studies have demonstrated the operation of genetic factors with equal clarity. Ounsted (1952), investigating the family
history of 337 epileptic children, found a positive family history of convulsive disorder in 39% of cases. Lennox, Gibbs & Gibbs (1939, 1940, 1945) found, moreover, that some 55% of the parents of epileptics showed electroencephalographic anomalies similar to those of the children. It would seem that Ounsted’s suggestion that predisposition to epilepsy is quantitative in nature is well-grounded. He quotes Russell: “It is simpler to think of all people as epileptics, and regard the matter as one of threshold.”

**Genetic factors and intelligence**

Psychological investigation shows that a continuous scale applies to intelligence, with idiocy and genius at either end of the scale, and with pathological variants at the lower limit. Fraser Roberts (1952) has concentrated on the genetic differences between the two kinds of defective—the feeble-minded, representing the tail of the distribution curve of the normal, and idiots, who are qualitatively different from the normal and whose defect, if inherited, is of single-gene causation. He found a stronger correlation between the I.Q.’s of the feeble-minded and of their siblings than between those of idiots or imbeciles and their siblings. Further investigations (Lewis, 1961), besides strengthening the genetic assumption, suggested differences in the social background of the two kinds of defective, that of the imbecile group resembling the background of the general population, whereas that of the feeble-minded was well below it in respect of paternal occupation, maternal fertility and home conditions.

However, a few genetically-determined conditions have been identified among idiots with an I.Q. below 45. These include amaurotic idiocy, phenylketonuria and galactosaemia, all due to biochemical deficiencies transmitted through a single recessive gene. More is known of the genetics of phenylketonuria than of any other form of mental deficiency. Characteristic of this disease is the excretion of phenylpyruvic acid in the urine, shown by Fölling (1934) and Penrose (1946) to be caused by the absence of enzymes capable of splitting phenylalanine, and this finding has brought the possibility of treatment (Woolf, Griffiths & Moncrieff, 1955). Jervis (1939) collected data on 125 families and showed that autosomal recessivity could be regarded as proven.

A major contribution to the problem of mongolism has recently come from human cell culture cytogenetics. Lejeune, Gautier & Turpin (1959), Jacobs et al. (1959), Böök, Fraccaro & Lindsten (1959) found that the number of diploid chromosomes in mongols is 47 instead of 46. The possibility that other forms of mental defect may also be associated with chromosomal aberrations is now being explored.
Little is at present known about the effects of irradiation on the human germ-plasm. These may extend over many generations and require for their elucidation longitudinal studies on a scale transcending the normal life-span. Less ambitiously, a long-term study might be undertaken of cohorts of children whose mothers were irradiated during pregnancy. There is evidence drawn from Hiroshima and Nagasaki that large doses of ionizing radiation during pregnancy are associated with a high risk of microcephaly and mental retardation in the child (Plummer, 1952; Yamazaki, Wright & Wright, 1954). This irradiation is one of the exogenous factors to be discussed in the following section.

SOMATIC FACTORS: PRENATAL AND PARANATAL INFLUENCES

Most studies of the somatic factors affecting mental health have been clinical or laboratory investigations. There have, however, been a number of epidemiological studies that have revealed interesting associations between organic neuropsychiatric conditions and certain physical and biological factors affecting the nervous system directly or indirectly: infections, nutritional deficiencies, traumata, toxins. Some of these studies will be reviewed in the following section, largely in connexion with foetal damage, on which most of the work has been done. A good review of the research into prenatal and paranatal influences on child development can be found in MacMahon & Sawa (1961) and an exhaustive treatment of the whole question of birth injuries in Schwartz (1961).

Maternal age

The striking association between mongolism and maternal age has often been noted (Shuttleworth, 1909; Jenkins, 1933; Rosanoff & Handy, 1934; Penrose, 1934; Lahlensun, 1937; Bleyer, 1938; Benda, Dayton & Prouty, 1943; Beall & Stanton, 1945; Engler, 1949). Carter & MacCarthy (1951) found a consistent rise in prevalence of mongoloid children with increase of the mother's age: from zero in the children of mothers under 20, and 0.29 per 1000 in the age-group 20-29, to 26 per 1000 in the children of mothers of 45 or over. Interesting correlations with paternal age have also been shown, in particular in a special group of mongols (Penrose, 1962). Stoller\(^1\), however, in an intensive epidemiological survey of mongoloid children in Victoria, Australia, found their births unevenly distributed in time and space and concluded that this might be related to some kind of maternal infection. Record & McKeown (1949) reported a correlation of hydrocephalus

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\(^1\) Personal communication, 1960.
with maternal age, and a relation between birth order and the occurrence of anencephalus and spina bifida. Although interpretation of these observations depends on further study, they contain clues to the existence of environmental etiological factors, including changes in the anatomical and physiological characteristics of the mother, maternal disease, and a variety of social and economic circumstances.

**Season of birth**

The correlation between the season of birth and intelligence quotient has received much attention. Pintner & Forlano (1943) reported that the lowest average I.Q. was found in persons born in winter and the next lowest among those born in summer. An important contribution is that of Knobloch & Pasamanick (1958) who studied the birth dates of all mentally retarded children admitted to the State school in Columbus, Ohio, from 1913 to 1948. The risk was highest for children born in February (1.5 per 1000) and lowest for those born in August (1.3 per 1000). The risk of admission was also correlated with the average summer temperatures. For those born in January, February and March —for whom the eighth to twelfth weeks of gestation fell in July and August—the risks were higher in years when the temperature was above the median than in years when it was below—1.66 and 1.52 per 1000 respectively as against 1.28 and 1.21. This important discovery needs to be confirmed from other geographical areas, and its possible explanations tested. Somewhat similar findings have been reported for hospitalized psychiatric patients by Tramer (1929) and by Noiting (1939) who note a relative excess of patients born in December, January, February and March. However, Sterling (1960) has strongly criticized the statistical methods and conclusions of Knobloch & Pasamanick, his own investigations among the retarded in Cincinnati having failed to confirm their findings.

Several agents acting during pregnancy or delivery have been found to be associated with manifestations of mental abnormality in the newborn. These associations cannot always be regarded as indicative of causal relations, but only as possible etiological leads to be tested further in the laboratory or the field.

**Immunological reactions**

Vaughan, Allen & Diamond (1950), Claireau (1950) and Hsia et al. (1952), have all called attention to the pathological significance of kernicterus of the new-born. The frequency of this complication of erythroblastosis foetalis varies with the type and severity of the jaundice, and with the efficacy of treatment by exchange transfusion: it ranges
from 12% to 55%. Hsia et al., found that 50% of children with serum bilirubin above 30 mg% developed kernicterus, while children with serum bilirubin of less than 5 mg% were free from this complication. 70% of children affected by this condition die in the first few days of life; the survivors develop neurological lesions and mental retardation. Gever & Day (1950) compared the I.Q. of 68 children who had recovered from erythroblastosis with that of their elder first-born siblings; the averages at the age of 4.5 years were significantly lower than those of the control groups—102.7 as against 114.5. These findings call for confirmation.

**Infection**

**Rubella.** This is another prenatal complication whose etiological relationship with certain congenital malformations, such as cataract, deafness, heart disease and microcephaly, has been subjected to epidemiological research (Brown & Nathan, 1954; Bawner, 1955; Pitt, 1957; Hill et al., 1958). Hill and his colleagues estimated the risks from rubella infection at different stages of pregnancy. The proportion of affected children decreased from one in two when the mother had contracted rubella in the first month of pregnancy to one in four when the disease was contracted in the second month and one in six for the third month. Fifty-one infants of 54 women who contracted the disease in the second and third trimesters were normal; and in only one of the three affected children did the abnormality seem to be attributable to the mother's illness. A recent study (Manson, Logan & Loy, 1960) has shown that the risk that rubella in early pregnancy will cause malformation of the infant is much less than was originally supposed. The sample consisted of 578 women with rubella, in 202 of whom infection had occurred within the first 12 weeks, and 5717 control cases. It was concluded that rubella after the sixteenth week of pregnancy does not affect the foetus; but, of babies surviving until the age of two, 1.8% of those whose mothers had had rubella in the first 12 weeks of pregnancy were mentally defective as against 0.4% in the control series.

**Congenital syphilis.** It is still unknown why mental abnormalities occur in only a small proportion of cases of congenital syphilis, though the clinical importance of this disease is declining rapidly. It is common knowledge that, when neurological signs are present, the frequency of mental retardation is very high; this was confirmed by the cohort studies of Jenkins, Brown & Cisler (1940) and of Hallgren & Hollström (1954). But mental retardation in the absence of neurological signs was also found by the latter workers to be commoner in children with congenital syphilis than among the general population: mental defectives 15.8%
and subnormals 36.7% compared with corresponding figures of 1-2% and 7-9% respectively. Jenkins et al. found a lower average I.Q. among 24 children with congenital syphilis than among their siblings. Research of this kind provides the most satisfactory comparisons for epidemiological purposes, but the results await confirmation. The effects of early treatment of congenital syphilis on subsequent mental development also need to be considered. Kundraitz (1930) and von Kiss & Rajka (1934) noted favourable results among children treated before two years of age, but recent investigators, using a larger sample, could not confirm these findings. So far no evidence has been produced to prove that the effective treatment of syphilitic mothers during pregnancy prevents mental retardation in their offspring (Hallgren & Hollström, 1954).

Sabin & Feldman (1949) reported that the lesions of chorioretinitis and cerebral calcification were found in association in as many as 90% of cases of prenatal toxoplasmosis. MacDonald (1950) observed that in cases of toxoplasmosis in infancy and childhood, antibodies can almost invariably be found in the mother’s blood, indicating a congenital origin. He also found asymptomatic infection in 5% of a sample of adults studied in north-west England. Burkinshaw & Kirman (1953) found no evidence that undifferentiated mental retardation was significantly associated with the disease.

Nutritional deficiencies

Among the nutritional disorders, vitamin and iodine deficiencies have received most attention so far as mental abnormalities are concerned. Harrell, Woodward & Gates (1956) report a controlled trial on two populations, one predominantly negro, the other predominantly white. Pregnant and lactating mothers in each population were placed in one of four treatment groups, which received, over about 4 months, the following supplements to the diet: (a) ascorbic acid, (b) ascorbic acid, thiamine, riboflavin and nicotinamide, (c) thiamine, and (d) a placebo. The results were assessed by testing the I.Q. of the children at 3 and 4 years of age. In the negro population, the offspring of women whose diet had been enriched with vitamins had I.Q.’s significantly higher than children whose mothers were in the placebo group, but no significant differences were noted in respect of particular types of supplement. In the white population there were no significant differences in I.Q. between the offspring of women who had received the placebo and those of women who had received vitamin supplements. Possible reasons for this discrepancy between the two populations include the lower original
dietary baseline in the negro group, a rather longer period of supplementation in that group, and an irregular administration of supplements to the white population. It is obvious that this study only indicates a possibility that prenatal diet influences the mentality of the offspring. More precise research is required to understand the mechanism by which certain vitamin deficiencies may cause congenital malformations in men and animals (Warkany & Nelson, 1940, 1941, 1942; Nelson, 1957). The reported rise in I.Q. in response to improved nutrition in early postnatal life (Kugelmass, Poull & Samuel, 1944) also requires confirmation in carefully controlled trials.

The close geographical association of congenital cretinism and endemic goitre (Eugster, 1938a, 1938b) supports the clinical view that both are the outcome of iodine deficiency. No single case of cretinism was found in Switzerland in goitre-free areas, but prevalence rates for cretinism of 0.6-1.0% were noted in areas where the goitre prevalence exceeded 50%. The fact that the mothers of cretins are themselves nearly always goitrous suggests that cretinism may be due to the physiological effects of goitre in the mother rather than the direct result of iodine deficiency. Early replacement treatment within six months of birth sometimes, but not always, improves the intellectual retardation of cretins (Smith, Blizzard & Wilkins, 1957). Zondek et al. (1961a, 1961b), in a clinical and physiological study of a family with goitrous and non-goitrous cretinism, suggest a possible genetic causation for cretinism. This would require further epidemiological confirmation. (See also Clements, 1960.)

**Background radiation**

An association between background radiation and congenital malformations has been demonstrated by Gentry, Parkhurst & Bulin (1959). They found that congenital malformations, with the exception of mongolism, were commoner (15.1 per 1000 live births) in areas of high natural radioactivity than in others (12.8 per 1000). A WHO Expert Committee on the effects of radiation on human heredity has produced a blue-print for a profitable investigation in such areas as Kerala, in south-west India, where the population is subjected to a level of background radiation many times higher than the average (WHO Expert Committee on Radiation, 1959). WHO is also assisting a comparative study of congenital malformations in different countries under the direction of the Population Genetics Unit of the British Medical Research Council. From the incidence of malformations in large series of births in different areas it is hoped to isolate etiological clues to be followed up subsequently in more intensive studies.
Complications of pregnancy and labour

Many investigations of an epidemiological nature have been carried out on the neuropsychiatric sequelae of prematurity (Roberts & Asher, 1949a and 1949b; Pasamanick, Rogers & Lilienfeld, 1956; Knobloch et al., 1956, 1959; Douglas, 1956, 1960; Drillien, 1958, 1959) and extensive reviews of the literature were made by Alm (1953) and Polani (1958). The major findings were that the premature child has a higher morbidity risk than the full-term child for epilepsy, mental deficiency, mental retardation and behaviour disorder, and exhibits more frequent neurological damage and defects in general. Prematures from uncomplicated pregnancies show less handicap than those from complicated pregnancies; for a given degree of prematurity the firstborn are less retarded than the later-born; and premature children of small mothers are less retarded than those of large mothers. Among adults many physical and social differences were found between individuals who were premature babies and a control group, but not in terms of criminality or alcoholism.

Epidemiological methods have been adopted to study the relation of complications in pregnancy and labour to neuropsychiatric abnormalities in the children. The latter include cerebral palsy (Lilienfeld & Parkhurst, 1951), epilepsy (Pasamanick & Lilienfeld, 1955b), mental retardation (Pasamanick & Lilienfeld, 1955a), and disorders of speech and reading (Pasamanick, Constantinou & Lilienfeld, 1956; Pasamanick & Kawi, 1956). Several important findings have been reported:

1. Children with cerebral palsy, epilepsy, behaviour disorders, and disorders of speech and reading were associated with toxæmia of pregnancy twice as often as the control group. (This did not apply to cases of mental deficiency.)

2. In mothers of children with cerebral palsy, epilepsy and reading disorders—though not in those of children with mental deficiency or behaviour disturbance—a history of placenta praevia and other causes of bleeding during delivery was appreciably commoner than in the control group.

3. The mothers of children with cerebral palsy, mental retardation and speech or reading disorders had more non-puerperal complications than mothers in the control group; the differences were less striking in relation to epilepsy and behaviour disorders.

There is little evidence at present relating undifferentiated mental retardation to abnormal delivery; the association of neurological defect
with difficulty in labour is well known and will not be further discussed here.

Birth complications, in the form of asphyxia and birth trauma, are an obvious cause of neuropsychiatric lesions, but the mechanisms by which these effects are produced still require elucidation. The proportion of cases of cerebral palsy attributable to neonatal asphyxia ranges from 15% (Deaver, 1956) to 70% (Schreiber, 1940). Eastman & DeLeon (1955) studied 96 children with cerebral palsy in comparison with 11,195 normal children. 17% of the palsied children had had asphyxia lasting for more than 4 minutes as against 0.7% of the normal ones; 13% of the palsied children had had asphyxia of at least 6 minutes' duration compared to 0.3% of the normal group. The poor intellectual function of infants who have suffered asphyxia has been reported by Darke (1944) and Campbell, Cheeseman & Kilpatrick (1950). Recent interest has focussed on the neurological and mental consequences of minor asphyxia and of trauma producing gross cerebral haemorrhage. A large-scale research programme, based on detailed cohort studies, is planned in the form of a quantitative study of the relationship of birth trauma, asphyxia and prenatal abnormalities in general to the physical and mental development of infants (Masland, 1958).

It is interesting, in this context, to note Pasamanick's (1961) theory that there exists a "continuum of reproductive insult", partially determined by social and economic circumstance. "Inasmuch as prematurity and complications of pregnancy are associated with fetal and neonatal death, usually on the basis of injury to the brain, there must remain a fraction so injured who do not die; depending upon the degree and location of trauma they go on to develop a series of disorders extending from cerebral palsy, epilepsy, and mental deficiency through all types of behavioral and learning disabilities which are a result of lesser degrees of damage sufficient to disorganize behavioral development and lower thresholds to stress; and further, these abnormalities of pregnancy are associated with certain life experiences, usually socio-economically determined, with the consequence that they themselves and their resulting neuropsychiatric disorders find greater aggregation in the lower strata of our society."

PSYCHOSOCIAL FACTORS

Social status

A number of physical variants, such as prematurity, nutritional deficiency and syphilis, are found in association with mental disorder more frequently in lower than in higher social and economic groups. This may be one reason for the differences in social distribution of certain
mental illnesses mentioned in previous chapters. Schizophrenia has often been reported in association with low social and economic status (Faris & Dunham, 1939; Tietze, Lemkau & Cooper, 1941; Clark, 1948, 1949; Hollingshead & Redlich, 1958). In New Haven a census of cases under treatment during a 6-months period revealed that schizophrenia was eleven times more frequent in social class V than in social class I (Hollingshead & Redlich, 1958). In England and Wales, Brooke (1960) found that during 1949-53 “first admission rates for single men aged twenty and over ranged from 16.4 per 10 000 in class I to 68.0 in class V; and for ever-married men from 2.32 to 7.99”.

Various possibilities must be considered when interpreting these findings. Where they are based on hospital records they may mean only that people in class V are more likely to be sent to hospital, yet the variation in admission rates by social class is much smaller for manic-depressive illness. Is there a tendency to diagnose schizophrenia more often in the lower classes and manic-depressive illness in the upper classes? Hollingshead & Redlich (1958) and Kahn, Pollack & Fink (1959) note that patients with similar symptoms may receive different diagnoses depending on their particular social background. If, however, an association between schizophrenia and low social and economic status can be firmly established a variety of hypotheses present themselves. Is there, for instance, a tendency for the schizophrenic to slip down the social scale in the earliest stages of his illness? Morrison (1959) reports an analysis of schizophrenics aged 25-34 by occupation and social class. Their fathers were also classified by status at the time of the patients' births. There was a heavy concentration of patients in class V but the fathers were normally distributed among all social classes; a decline from parental status because of illness seemed to account for the peculiar social distribution of the patients. This hypothesis is not confirmed by Hollingshead & Redlich (1954) who showed that schizophrenics in the middle classes tend, before their illness, to move upward rather than downward in the social scale. Harris et al. (1956) found a significant fall in social class from one generation to the next only for patients whose fathers were in social classes I and II.

Housing and living conditions

Faris & Dunham (1939), discussing the drift hypothesis, found the highest incidence of schizophrenia in the central areas of poor social and economic status in Chicago and the lowest in the affluent residential districts of the periphery. They concluded not that schizoid individuals become increasingly incapable of well-paid employment and so drift into poorer areas but that the social isolation of city centres is itself a
causal factor in the disease. Their findings were confirmed in nine other American cities (Clark, 1949); in Massachusetts (Gerard & Houston, 1953), where the evidence pointed to a high social mobility of schizophrenics rather than to a downward move from a better area; and in Bristol, England (Hare, 1956). The results of this last study suggest that there is little or no association between mental illness and population density, that high rates for schizophrenia are associated with a high proportion of single-person households, and that high rates for manic-depressive and neurotic illness tend to be associated with the more prosperous districts.

A causal relation of environment to the onset of schizophrenia is not, however, the only possible interpretation of these findings. They may equally well be explained as evidence of a process of segregation; schizoid individuals may wish to be free of the emotional ties of family life and tend to move to lodging houses. This is the interpretation of Kohn & Clausen (1955) from their investigation of the degree of isolation in adolescence of a group of schizophrenics, manic-depressives and normal controls in a Maryland survey.

Migration

The tendency of the schizoid to break away from home and country has been proposed as an explanation of the higher rates of mental illness reported among immigrants. Other explanations are that mental illness is provoked by the stresses of migration and its attendant economic difficulties, or that life in a foreign culture increases the risk of illness because of language isolation (Krapf, 1939). Ødegaard (1932) found a higher rate of mental hospital admissions in Norwegians in Minnesota than among Norwegians in Norway; the converse was true, however, of manic-depressive illness. He concluded, as did Malzberg (1940) in New York, that there was a positive pre-emigration selection for schizophrenics, since the excess rate for the disease among immigrants was found in virtually all ethnic and cultural groups, in both sexes and at all ages. The children of immigrants had a hospitalization rate about midway between that of the parental group and that of the native-born. It is interesting, however, that Malzberg, in a later paper (1955), found that when the rates for immigrants were standardized for urban/rural distribution, the excess in the immigrant rates of mental disorder was reduced to 2%.

Srole et al. (1962), in an analysis of their Midtown material (see page 26), argue that it is not transplantation to the American metropolis per se that damages mental health but resettlement in New York from a particular overseas milieu—the lower social and economic strata of
farms, villages and towns. They point out that screening has become so rigorous that it may now be assumed, in opposition to Ødegaaard's views, that "immigrants of the past four decades have been a selected, more homogeneous population in mental health respects, as compared to their non-migrant townspeople".

For any progress to be made in assessing the roles of selection, transplantation, and insecurity in determining rates of mental disorder among migrants it is necessary to distinguish between voluntary and involuntary migration; and this is difficult to do from any analysis of hospital statistics. Pfister-Ammende (1955) studied a population of 16,462 refugees and repatriates living under temporary conditions in Switzerland during 1946-48. Each year 7 per 1000 refugees and 8 per 1000 repatriates were sent to mental hospitals, compared with 1.4 per 1000 of native Swiss residents. It is interesting that in no less than 45% of the refugee group suffering from endogenous psychoses there had been a spell of the disease before migration and in a further 49% there was a similar but doubtful history; only in 6% was there undoubtedly no previous history of instability.

This discussion does scant justice to a subject both intricate and well-documented. The interested reader may also refer to the excellent reviews of previous research in Weinberg's book Migration and belonging (1961) and in Champion's Migration et maladie mentale (1958).

Occupation

The hypothesis of social selection has been tested by Ødegaaard (1956) in different contexts and he has demonstrated great variations in admission rates by social class in Norway. The highest rates occurred in the occupations of lowest social prestige, suggesting that the differences in admission rates were due to recruitment of the less healthy to the less favoured occupations. Highest of all were the rates among merchant seamen, and to ascertain whether this was the outcome of selection or of emotional stress Sundby (1956) examined new entrants to the merchant navy and confirmed the presence of excessive abnormal psychological traits in comparison with controls.

Brooke (1959) also looked into the question of admission rates by social class and found an uneven distribution of risk within several classes. In social class I, all 5 occupational groups had low rates. In class II, farmers and bailiffs and the proprietors and managers of food shops had rates above the national average whereas the rates for managers were below. In class III, where admission rates exceeded the national average, lower rates were found among foremen, passenger vehicle drivers, policemen and firemen. The high rates in class V were
almost entirely among labourers and kitchen hands. Brooke suggests that this may be due to these occupations providing suitable temporary accommodation for the unstable. 

Marital status

Ødegaard (1953) also investigated the selection hypothesis in relation to the over-representation of the unmarried among those admitted to mental hospitals (cf. the figures quoted from Brooke on page 47). He concluded that there was evidence of selection by marriage, and that the single state was not the cause of mental illness but rather was itself the consequence of pre-existing morbid traits. While this may well be true for schizophrenics and those who fall ill in early life it is less convincing for later onset. Among those aged 65 and over in the United Kingdom, the single constitute 12.6% of the population but contribute 55.4% of admissions of persons over that age (Abel-Smith & Titmuss, 1956, quoted by Mayer-Gross, Slater & Roth, 1960). That single life directly increases the risk of mental illness in elderly persons is borne out by Gruenberg's observation (1954) that the rate of hospitalization for senile disorders is highest in areas where a large percentage of the population lives alone. (This may only be a chance association since it was not known whether the hospitalized psychotics had been living alone.) This is a promising field for research and Roth's (1959) plea for "more detailed statistical data on the incidence of the various forms of mental illness in different social settings, classes and occupations" seems fully justified.

Urban and rural life

In a review of admission rates for senile psychosis in Syracuse, USA, Gruenberg et al. (1955) found the rates for urban districts significantly higher than those for the rural areas of the county. Even in the latter the villages had higher rates than their country surroundings. The village with the lowest rate was the one with the highest concentration of foreign-born persons of Italian, German and Polish extraction and a similar finding was made in respect of the urban data. These findings could be equally well explained by a migration of the mentally ill into high-prevalence areas (due possibly to a desire to be near treatment facilities) or by a lower tendency toward hospitalization in rural areas.

In Lin's Taiwan data (see page 22), urban and rural differences have also been reported, with a higher concentration of schizophrenics and neurotics in the central areas of towns and villages and of epileptics and mental defectives in the peripheral areas. This cannot be due to differences in
the tendency to hospitalization since, in Taiwan, hospitalization is in any case infrequent. It may reflect the fact that epileptics and mental defectives or their families (who are often of poor genetic endowment) find occupations best suited to their capabilities, or more congenial living conditions, in these peripheral areas. Another interesting disparity between town and country lies in the sex ratio among alcoholics. Parr (1957) made a survey in England and Wales by means of a questionnaire sent to general practitioners. While the overall sex ratio of male to female alcoholics was 2.2:1, in rural areas the ratio was 5:1. The prevalence rate for alcoholics aged over 15 was 1.1 per 1000, ten times the rate reported by Lin for Taiwan.

Economic insecurity

Many studies have sought to determine whether insecurity is a causal factor in mental illness. Insecurity may be due, for instance, to financial or to war conditions. Bremer (1951) studied a Norwegian fishing village for 5 years, dividing the population into two approximately equal groups: the self-supporting and those on relief or only intermittently employed. Psychosis was equally common in both groups; but neuroses were more frequent among the financially secure, and psychopathy and oligophrenia among the insecure.

Another approach to this problem is through the examination of admission rates in periods of widespread economic depression. According to Komora & Clark (1935) and Dayton (1940) the only noticeable results of the depression of the 1930's in the USA seem to have been an increase in admissions of senile patients; and this probably reflects increased difficulty for caring for them at home, rather than an actual rise in incidence of senile psychosis. In both the USA and England, however, suicide rates for men have been shown to have a strong negative correlation with the indices of economic prosperity and employment (Dublin & Bunzel, 1933; Swinscow, 1951; Sainsbury, 1955).

War

War seems to have no greater effect on admission rates for civilian psychotics than does economic depression. The data for France (Abely, 1944), Belgium (Dellaert, 1943), Britain (Hemphill, 1941; Hopkins, 1943), and Norway (Ødegaard, 1954), all show that mental alienation became less common during the Second World War. There is some evidence, however, of an increase in neuroses and peptic ulcer perforations after bombing (Lewis, 1942; Stewart & Winser, 1942; Fraser, Leslie & Phelps, 1943). But on the whole it would seem that
the incidence of major mental breakdowns in prisoners of war and in inhabitants of concentration camps is below the average (Gottschick, 1950; Murphy, 1961).

The admissions to military hospitals are of only limited epidemiological interest because these cases are not easily related to a parent population (Reid, 1961) and because varying demands for manpower caused corresponding fluctuations in the rates of admission and discharge. Careful studies of the effect of combat stresses on mental health have been made by Hogan (1943) and Reid (1948). The latter author suggests that, among Royal Air Force Bomber Command crews, the immediate effects of operational stress on men predisposed to neurotic illness accounted for more cases of breakdown than did cumulative fatigue. A period of heavy casualties was accompanied by a high incidence of neurotic illness, whereas mere duration of flying had no such effect. Russell Fraser (1947), however, in his neurosis survey among factory workers in wartime (see page 32) found that excessively long working hours were associated with a higher incidence of neurosis.

*Ethnic and cultural factors*

The growing complexity and strain of modern life have frequently been blamed for the supposed rise in incidence of mental disorder. Attention has therefore been directed to those societies whose cultures have been thought to provide some protective value. Yet investigation tends to show that the total incidence of mental illness is no different in such societies, though its symptomatology may differ (cf. the Taiwan and Hutterite surveys, pages 22 and 33). The differences in prevalence and incidence of mental disorder under different cultures have been reviewed by Wittkower & Fried (1959) and by Bowman (1959). It is difficult to summarize or compare their findings, which are drawn from many sources—hospital statistics, field surveys and travellers' tales. Suicide, however, does seem to be a manifestation of mental breakdown closely related to the culture of a society, ill-defined as this term may be. A high rate is reported in Denmark, Japan, Switzerland and white South Africans; it is low in Ireland and non-existent among the Bantu.

Although few statistics of mental disorder are available for the USSR and no psychiatric epidemiological surveys have, to our knowledge, been undertaken there, it is sometimes asserted that the single-mindedness of the Russians in building their country has been a deterrent to mental illness. Certainly, this does not appear to be a conspicuous medical concern there. Kerbikov, quoted by Field (1960), attributes the steady decline of first attendances of schizophrenics at the Moscow neuropsychiatric clinics since 1940 to the "constant rise in the material
standard of living and in the cultural level of Soviet citizens, leading to a general strengthening of their health”. Nevertheless, according to Field, most Soviet authorities believe that the prevalence of psychoses in the Soviet Union does not materially differ from that in other countries, ranging between 3 and 7 per 1000 of the population.

Certain mental disorders appear to be specific to certain cultures. They include “imu”, “koro”, “latah”, “hsieh-ping”, “wittigo”, “running amok” and the transient psychosis among Africans that is at present an object of study in one or two centres (Lambo, 1960). Lambo concludes from a study of neuropsychiatric problems in Nigeria that “there is, throughout our comparative analysis, a fundamental similarity between the major mental disorders occurring in Africa and those occurring in other parts of the world. Most of the major psychoses and psychoneuroses have been seen. Others have been encountered which seem peculiar to Africa, and the clinical fact remains, and supports the view, that most of these do not fit into the existing nosological framework but are nevertheless susceptible to interpretation in terms of observable cultural factors”. As Carstairs (1959a) points out, however, these local syndromes rarely assume such psychotic intensity as in wittigo and running amok, which may have homicidal consequences. More often, cultural forms affect the content of neurotic disorders. What has clearly emerged from studies of the incidence of mental disorder under different cultural conditions is that the threshold of public tolerance towards mental illness varies greatly, and it is this variation that may be responsible for apparent differences of incidence.

Very much more work on this aspect of social psychiatry is required: for instance, on the possibility of role-stress as a cause of psychiatric disorder in a culture laying great emphasis on primogeniture, and on the effects of certain child-rearing practices or of the social position accorded to old people. Krapf (1953) remarks: “my own observations in the Philippine Islands also show quite clearly that a civilization which offers the ageing a distinguished or even a reasonable social role tends to produce old people of surprisingly good mental health”. An interesting approach to these questions has been made by Green (1960), who has studied child-training in Jamaica and Puerto Rico where economic and geographic similarities are combined with different imposed cultures. The latter produce different areas of strength and areas of conflict in the adults, and similar personality structures are found even in Jamaicans and Puerto Ricans who have migrated.

The differing social roles ascribed to boys and girls may help to account for the fact that, in most countries, rates for mental subnormality are higher in boys; they are expected to play a more active social role and so failure to meet normal requirements is more noticeable than in
girls. There are, of course, other possible explanations of this phenomenon. Males are biologically more vulnerable, as shown by the higher rates for congenital abnormalities, intra-uterine and neonatal death in boys. Girls are readier to acquire the communication skills needed for intellectual development in modern society. In some societies, children considered to be weaklings at birth are more commonly left to die if they are girls than if they are boys.

Family influences

There is no shortage of studies of parental or family influences on mental disorder, but most of the evidence is conflicting. Cumming (1961) concludes that “it is clear that organized study of the area of the family and mental illness is in a state of chaos”. Orlansky (1949) and Sewell (1952) suggest that adult personality is not specifically affected by early experiences and the mode of child training. Thorne (1957), after following the genealogy of two families over four generations, argues that patterns of aggressive and hostile behaviour are learnt. Lidz et al. (1957) claim that for every case of schizophrenia in their sample there was one parent who was an unhospitalized psychotic or serious neurotic, and that the psychotic symptomatology is learnt from this parent. A recent study (Petursson, 1961) of 439 neuropsychiatric patients seen in consultation in Iceland during one year showed that only 11% came from well-integrated family units; and, even in these families, one half of the parents had been chronically ill. This investigator noted the common appearance of the same disorders in parents and children: psychoneurosis in the parents of psychoneurotics, alcoholism in the fathers of alcoholics, depression and schizophrenia in the parents of depressives and schizophrenics.

The effects of maternal deprivation on the child have been the subject of extensive reports (Bowlby, 1952; Douglas & Blomfield, 1958; World Health Organization, 1962). At the moment it is generally held that, although a long period of separation from the mother may under certain conditions cause severe disturbance in a child, it is an overstatement to assert that severe deprivation in early life commonly produces psychopathic or affectionless characters. Maternal deprivation is only one of a whole range of adverse influences that may alter a child's potentialities.

This review of the psychosocial factors associated with mental illness makes no claim to comprehensiveness. Rather, the aim has been to show the kind of etiological information or the pointers to factors of etiological importance that may be yielded by epidemiological survey.
FACTORS AFFECTING THE DURATION OF MENTAL ILLNESS

Psychosocial and somatic factors

The epidemiologist's task is to obtain a picture of the pattern of mental illness within a community. It is therefore necessary for him to study not only factors of etiological significance but also those affecting duration and recovery in mental disorder. In the preceding discussion on relevant psychosocial factors it was noted that patients in different social classes are not only given different diagnoses—depending perhaps on the orientation of the psychiatrist and class differences in the manifestation of symptoms—but also receive different treatments. This affects both the length of their stay in hospital and the frequency of readmission; and this, in turn, affects the total picture of morbidity of mental disease in the community. Thus, it was found in New Haven that patients from higher social classes are more likely to be given psychotherapy; among lower class patients some receive physical treatment but most only custodial care. This appears directly related to two other findings: that lower class patients tend to remain in mental hospitals for longer periods and that they have a higher rate of readmission.

But the pattern of psychiatric treatment varies a great deal from country to country. In the United Kingdom, where treatment is free and available to all, some studies have confirmed the New Haven findings and others have contradicted them. Cooper (1961) in a study of first admissions of 219 male schizophrenics to a mental hospital over a 5-year period, found a significantly higher proportion of long-stay patients in the lower social classes; and the response to treatment, as measured by rate of discharge and clinical state on discharge, was less favourable among the lower classes. Although there was a correlation between social isolation and social class, analysis showed that one could not be invoked to explain the other. In fact, the investigation tended to favour the hypothesis that conditions of social and economic stress were important in the genesis and course of the disease. Carstairs et al. (1955) differ from this view since they found a higher proportion of short-stay patients in social classes IV and V than in class III. Wing, Denham & Munion (1959) noted that patients from unskilled occupations had a prognosis no worse than that of others in terms of hospital stay. Parnell & Skottowe (1959), however, claimed a significant correlation between occupation and length of stay: students and professional men stayed in hospital longest, skilled tradesmen came next, and labourers were discharged in the shortest time. Presumably, this was related to the higher level of intellectual recovery demanded in professional workers.
Physique or body-type in relation to etiology and prognosis in different mental disorders has been investigated by Kretschmer (1936), Sheldon et al. (1940) and many others. Asthenic types showed the highest concentration of schizophrenics and the longest stay in mental hospital, while pyknics were less subject to schizophrenia and were admitted for the shortest periods (Parnell & Skottowe, 1959).

Zubin et al. (1961) examined the relationship in schizophrenia between the prognosis and certain clinical features or behaviour traits existing at the time of hospitalization. Flatness of affect, severe impairment of thought processes, delusions and bizarre mannerisms were all correlated with a poor prognosis while hyperactivity and mental confusion were, in general, of favourable import. Aspects of the pre-morbid history of schizophrenic patients indicative of a good prognosis included a good social and work history, a good prepsychotic personality, normal psychosexual development, and sound interest in the environment. A family history of schizophrenia was correlated with a poor prognosis, while a family history of manic-depressive illness indicated a favourable outcome.

Certain aspects of the onset of illness seem significantly related to prognosis. Most reports indicate that the prognosis is much better if the onset is sudden than if the process is insidious. The existence of precipitating factors is also indicative of a favourable prognosis. Patients who have been ill for less than two years before admission usually do better than others; and most studies associate onset at an early age with a poor outcome, though the findings here are inconclusive.

The duration of illness is one of the most important indices of the outcome in schizophrenia. In many studies the length of stay in hospital has been taken as equivalent to the duration of illness, for lack of other measurement. This is permissible for comparative purposes only when applied to figures from the same hospital or hospitals of similar standards over a short period. Many medical and social factors, other than actual recovery, influence the length of stay in hospital. For instance, the recent enthusiasm for early discharge and rehabilitation has undoubtedly shortened the average length of stay and has even occasionally resulted in premature discharge. The criteria of recovery are also subject to variously determined factors: the clinical state on discharge (absence of symptoms, degree of insight, power of communication), the degree of adjustment to home, work and community in relation to the education, occupation and social class, and the attitude of family and community towards the individual patient and to mental illness in general.

A factor frequently held to be of decisive importance in prognosis has been the family circumstances of patients. According to Cooper (1961) those who had lived in a family group before becoming ill and
returned to such a group after recovery tended to do well. But a recent study in the United Kingdom (Brown, 1959) supports the view that neutral surroundings, where ex-patients meet fewer emotional demands, are more salutary. Perhaps this applies more, however, to schizophrenics, who fared worst with their wives, nearly as badly with parents, and best with distant relatives or strangers; ex-manic-depressives did worst with strangers and best with their wives (Carstairs, 1959b).

**Evaluation of therapy**

New methods of treatment, and in particular the use of psychotropic drugs, challenge the epidemiologist to determine the effect they may have on the course of mental disorder under different social, cultural and economic conditions. Elkes (1961) states: “Although such [pharmacotherapeutic] effects have been consistently reported, the formidable methodological questions which they pose remain far from being approached. Rigor in the assessment of an outcome of treatment of a behaviour disorder subsumes rigor in the description and specification of the condition and its interaction with the social setting in which it takes place”. He goes on to point out that these are among the oldest issues in human biology.

The immediate major tasks for the epidemiologist in the assessment of therapeutic efforts must include (a) the establishment of a base-line of duration and spontaneous recovery in mental disorder so as to assist the objective evaluation of treatment; (b) the improvement of methods of field research into the evaluation of therapy by the application of refined epidemiological techniques.

**Spontaneous recovery.** The figures for spontaneous recovery in mental disorder commonly cited for comparison with the effects of treatment have largely been derived from mental hospital statistics antedating the intensive adoption of physical methods and psychotropic drugs. Fuller (1935), in a follow-up study of different types of mental illness in the New York State hospitals between 1909 and 1928, found that 41% of first admissions had been discharged and not readmitted after 15 years, and 37% of all admissions had not been readmitted after 5 years. For dementia praecox the figures were 30% of first admissions not readmitted by the end of 15 years and 35% of all admissions after 5 years; for manic-depressive psychosis, the corresponding figures were 57% and 66%.

The data cited for neuroses are often taken from Ross’s (1937) study of 1186 hospitalized patients. Altogether, 70% showed improvement by the end of one year but this fell to 40% (34% cured and 6% improved) at the end of 5 years. However, Ross’s figures cannot be
regarded as spontaneous recovery rates since his patients had received a wide variety of psychotherapeutic measures. Denker's figures (1946) also give some approximation to the spontaneous recovery rate in neurotics. He studied the prognosis of 500 consecutive cases taken from life insurance files. These were claims of complete disability for over 3 months due to psychoneurosis. The patients were all treated regularly by family doctors who used sedatives, tonics, suggestion and reassurance, but without systematic psychotherapy. Recovery to a degree permitting return to work was found in 45% in the first year, rising to 71% in the second year and 90% by the end of the fifth year. Instead of grouping all types of psychoneurosis, Wheeler et al. (1950) studied the more defined category of neurocirculatory asthenia in patients not receiving psychiatric treatment. Using well-defined sampling criteria, and evaluating progress after 20 or more years, they studied 173 patients, of whom 60 were interviewed personally. The findings were that 11.7% were quite well; 35% much improved; 38.3% slightly improved, with mild persistent disability; and 15% unchanged or worse, with moderate or severe disability.

The need for a well-defined base-line of spontaneous recovery if modern psychiatric treatment is to be evaluated objectively is obvious. This calls for painstaking and critical study of the natural history of all types of mental illness within the community. One of the best remaining opportunities for this kind of investigation is the regular survey of communities where hospital facilities remain scanty. The study of mental disorder among Malayo-Polynesian aborigines in Taiwan (Rin & Lin, 1962) yielded valuable information in this respect. 11,442 members of 4 tribal groups were studied between 1949 and 1953, the same survey methods and diagnostic criteria being used as in the Chinese study reported at page 22. More than 85% of those in the sample were personally interviewed by one investigator and practically every suspected psychotic patient by the principal investigator. Forty-five patients (3.9 per 1000) were diagnosed as psychotic and none had received any medical or psychiatric treatment. The symptomatology of the mental disorders encountered among these aborigines differed little from that of other ethnic groups, and the major types of psychosis were easily identified. However, certain characteristic clinical features were noted. The great majority of cases (84.5%) had an acute onset and only 15.5% took a chronic course. The duration of the psychotic episode tended to be short: 44.4% recovered within 3 months, 56.2% within 6 months, 65.6% within a year, and 87.5% within 2 years; only 12.5% were ill for more than 2 years. Half the cases had only one psychotic episode and a third had multiple episodes; the remainder ran a chronic course. Very few of these chronic cases suffered severe deterioration, most being
only partially impaired in their social adjustment. Most of the psychotics detected, apart from those acutely ill at the time, were fairly well adjusted socially.

Field research. The literature on treatment in mental disorder has grown enormously in recent years. “Every clinician can cite a study to support his particular view on any given therapy” (Staudt & Zubin, 1957). Foulds (1958) observes that claims for success in treatment are in inverse ratio to the strictness of experimental control. This critical view is not supported by Fox (1961) in his review of the literature during 1957.

The reported results of psychotherapy range widely between scepticism and enthusiasm and their statistical assessment is difficult. A few studies have been made. Knight (1941), following up 24 patients treated by psychoanalysis, found 4 well, 13 much improved, 4 slightly improved and 3 unchanged or worse. Similar results were reported by Coon & Raymond (1940) in their 20-year study of the results of psychotherapy in 678 psychoneurotics. Wheeler et al. (1950) found no consistent evidence that prolonged psychotherapy—or any other method of treatment—produced strikingly better results in neurocirculatory asthenia than simple reassurance and the passage of time, and this view has been supported by Eysenck (1952).

The lack of a statistically proved difference between treated and untreated populations does not, however, necessarily indicate that psychotherapy is inefficient. Psychotherapy may diminish the severity of symptoms in the worst affected patients, at the same time making worse those who would have done better without treatment. Alternatively, psychotherapy may accentuate the range of symptoms (Lehrman, 1961): those who are only slightly ill are improved, while the more severely ill suffer harm from treatment. In either case the overall statistics would remain unchanged.

The efficacy of another major form of treatment—electroconvulsive therapy—has also been critically assessed. The review of Staudt & Zubin (1957) indicates that most studies report favourable results within the first year but that the improvement rate falls after 5 years towards the 40% improvement rate noted in patients who are untreated or receive non-specific treatment, while the relapse rate is actually higher among the treated groups. De Wet (1957) compared the results of convulsion treatment in 69 schizophrenic Bantu women with the outcome in 50 controls admitted before this method had been introduced. Recoveries within one month amounted to 10% for all ages, types and duration of illness, and to 13% for patients who had been in hospital less than a year. Fifteen months after admission the recovery rates had increased
to 20% and 24% respectively. These results proved to be very little better than in the untreated control group.

These examples illustrate the difficulties inherent in any evaluation of the treatment of mental disorder. Such difficulties appear almost insurmountable; the complication of the situation by the intervention of the therapeutic procedure itself, and the interpersonal relations involved, do not lend themselves easily to objective analysis. And the situation is worsened by the fact that the modes of action of even our most commonly used therapeutic methods remain unknown or hypothetical.

Differences in the type of patient studied and in diagnostic practice, variability in the intensity of treatment and lack of any consistent assessment of its outcome all make it very difficult to compare the reports of treating large groups of patients. In making such comparisons differences in hospital environment—including the physical conditions, the therapeutic atmosphere, and the medical or nursing attention—and in the degree of understanding met with in the family environment must all be considered. Zubin (1953a, 1953b) regards 4 requisites as essential in the evaluation of any form of therapy: a homogeneous group of patients; an untreated but otherwise comparable control group; an adequate follow-up period; and the adoption of agreed and specific criteria for assessing the outcome. Since an untreated control group is difficult to obtain in most societies, the comparison of groups of patients under different treatment may be more profitable than the comparison of treated patients with "controls" erroneously assumed to be untreated.

A study of this type has been made by Ackner, Harris & Oldham (1957) on the effects of insulin therapy in schizophrenia. Patients between 18 and 40 with a psychotic history of under one year were randomly divided—allowing for sex and diagnostic subtype—into two groups receiving either insulin or barbiturates. The former group received standard insulin therapy, with 35-40 comas, and the latter was treated under precisely similar conditions save that unconsciousness was produced by oral barbiturates. The initial diagnosis and the assessment of outcome were made by persons unaware of the treatment given. No significant differences were found in the results after 6 months, which strongly suggests that insulin is not a specific therapeutic agent.

A form of study approximating more closely to a true epidemiological survey rather than to a clinical trial is that of leucotomy in England and Wales made by Tooth & Newton (1961). This was concerned with 10 365 persons who underwent a single operation between 1942 and the end of 1954. At the time of the survey 46% of the patients had been discharged, 45% were still in hospital, and 9% had died in hospital.
The length of stay in hospital between operation and discharge varied considerably in the different diagnostic groups; 49% of those with affective disorders and 50% of those with other diagnostic labels had left hospital within a year of operation as compared with only 20% of schizophrenics. The clinical gradings of 6410 patients, two-thirds of whom were still in hospital, showed that 36% of the men and 44% of the women were greatly improved, while 2% of both sexes were worse. Moreover, 4% of the men and 3% of the women had died, their deaths being wholly or partly attributable to the operation. In all, 21% relapsed after leucotomy, the relapse rate being slightly higher for schizophrenics. Relapse occurred oftener in the younger patients in each diagnostic category; 38% of relapses were in patients under 25 as compared with 15% at 55 and over. Relapse in schizophrenics was commoner in those who had been ill for shorter periods before operation, but was rare among patients in other diagnostic groups operated on within two years of the onset of symptoms. Serious side-effects of leucotomy were recorded in 3.1% of patients, and these effects were commoner after 55; 1.3% of all patients developed persistent epilepsy after operation.

It is outside the scope of this paper to review the increasing number of reports of clinical trials of psychotropic drugs. Some reference may, however, be made to a broader approach to the evaluation of drug therapy. Linn (1959) has attempted to separate the role of the therapeutic milieu from that of the tranquilizing drugs themselves. Nearly all of his 582 patients studied were schizophrenic. He found that patients hospitalized for the first time in 1955-56, whether or not they were treated with these drugs, were more likely to be discharged than patients who had been admitted for the first time before they came into general use around 1953. As there had been no change in admission and release procedures during this time and no substantial changes in diagnostic categories, symptomatology or social histories of patients, it appears likely that the increasingly optimistic expectations of the staff had increased the probability of recovery in all patients, whether or not they were treated with drugs. Linn also suggests that the fact that the optimism of the hospital staff was not shared by the community at large may explain why recently admitted patients have been more likely to return within a year of discharge than patients admitted in earlier years.

This question of the value of early release forms part of the broader problem of treatment factors affecting the outcome of illness, such as the day or night hospital and the sheltered workshop, all of which must be assessed by properly controlled studies. In a review of 1000 patients treated during 3½ years in a day hospital Smith & Cross (1957) found
that 63.2% improved or recovered while 36.8% showed no improvement. To arrive at a more objective evaluation of the day hospital regime a follow-up study was made of 38 neurotic patients, using a matched control group from the in-patient neurosis unit. The attendances for the day hospital patients averaged 36.4, and the treatment period for the in-patients 8.4 weeks. The difference in the proportion of improved to unimproved patients between the day hospital group at 6 months and the same group at 12 months was assessed statistically, and a similar assessment made for the difference between the day hospital group and the in-patient group, both at 12 months. In neither case was the difference significant.

A similar study was undertaken recently by Hunt et al. (1961) in Dutchess County, N. Y., to evaluate a unit newly established for comprehensive care. This unit, which serves only County residents, includes an in-patient service, a day hospital, a night hospital, and aftercare facilities. It is housed in a larger mental hospital providing traditional forms of psychiatric care for patients from a wider area. The efficacy of the unit in reducing the frequency and severity of psychiatric disability is being assessed by testing the following hypotheses:

(a) that there will be fewer instances of long-stay hospitalization for psychosis than would have been the case without the unit;

(b) that relapses in chronic psychosis will be less severe and less frequently associated with social deterioration;

(c) that more County residents who had been long-term inmates of the larger mental hospital before their transfer will be rehabilitated to the point of discharge;

(d) that even long-stay patients unable to leave the unit will be improved or suffer less deterioration.

The questions discussed in this section form what may be termed the second province of modern psychiatric epidemiology. The first province includes the study of prevalence and incidence rates and of the factors influencing the genesis of mental illness. The second province covers the examination, with the tools of the epidemiologist, of the revolution that has occurred in the principles of psychiatric treatment—the gradual replacement of custodial care by modern management in the community framework. The evaluation of treatment—whether this takes the form of drugs, surgery or psychotherapy—is an aspect of this broader question that has yet to be approached systematically.
CONCLUSIONS

The increasing interest in the epidemiology of mental disorder in recent years to which the publications reviewed in this paper bear witness has clarified some of the points at issue. But this achievement is counter-balanced by the larger number of questions still unanswered, and by new and important problems uncovered during these investigations. Though the overall picture may appear discouraging it does not justify pessimism; some progress has been made in response to the challenge presented by the limitations of epidemiological research applied in the psychiatric field. These limitations of concept and method, though serious, are not insurmountable.

Precision of measurement and the establishment of clear causal relations form the essential foundation of all sciences, yet rigorous exactitude and unquestionable proofs may be unobtainable in those biological sciences that rely on observation rather than experiment. This is particularly the case in the study of chronic disease, and even more so in psychiatry. Psychiatry has been called on to meet the requirements of scientific discipline; but the application of techniques derived from the laboratory or from the social sciences may be not only ineffective but even harmful. "Because physical science has high prestige its methods have high prestige, but this has the risk of transmuting methods into ends in themselves, and hence into false gods" (Leighton, 1961). This must be kept in mind when evolving new techniques and evaluating results. The need for successive refinements of theory and practice is obvious, but the operational criteria and the interpretations to which they give rise must be modified as grounds for new generalizations emerge.

Success in epidemiological studies largely depends on the choice of method and sample; this in turn is determined by the aim of the investigation and the available resources. It is essential to decide at the outset whether a survey is primarily for operational purposes—the planning of mental health services and the evaluation of treatment—or whether it is to be of a more academic nature, i.e., for the investigation of factors
affecting the origin and course of mental illness. It is always necessary to avoid undue generalization from the findings of a particular field study. The basic contribution of epidemiology remains within the community observed and findings of universal significance rarely emerge from an individual survey.

The picture of psychiatric morbidity changes with time and place and is particularly labile in rapidly developing societies. The changes in the composition of populations and their patterns of life resulting from modern health measures and technology may render current findings on psychiatric morbidity obsolete within only a few years. No one would accept as a base-line for a developing country the infantile mortality rates of 10-15 years ago, but few authors hesitate to quote figures of psychiatric morbidity that are many years out of date. The time factor is also important in so far as it affects the investigators themselves and the climate of investigation. The hypotheses and other tools at their disposal cannot be divorced from contemporary psychiatry, which—as a part of general medical and social science—is firmly based in the cultural matrix of society. Thus, the genetically orientated studies of Rudin and his colleagues in Germany in the 1920's and 30's reflect the climate of the period in relation to the belief that schizophrenia was an inherited disorder associated with cortical degeneration. The bias with which an investigation is launched may give it a fixed direction that only overwhelming evidence, over a long period, can alter, unavoidable though such bias may be when designing an epidemiological project and interpreting the findings.

In the presentation of conclusions it is essential to append to the basic psychiatric and demographic data clear definitions of the criteria and methods employed. This will enable the reader to draw his own conclusions and may throw some light on questions the investigator himself did not consider—either because of his specialized interests or because recent developments permit different conclusions to be drawn from the same data. Epidemiological studies are costly in time and manpower; and as they cannot easily be repeated the basic data should be preserved for other investigators. An excellent example of this procedure is Rosenthal's (1959) use of Slater's study of twins to derive valuable conclusions on the relative importance of genetic and environmental factors in the etiology of schizophrenia. The clear definition of criteria when presenting basic data will not only facilitate the comparison of results in psychiatric epidemiology but may well stimulate comparative studies on different populations based on agreed operational criteria.

The problem of nosology has long been a stumbling block to the progress of epidemiological research in mental disorder; but it is un-
necessary to await the elaboration of an agreed international classification. The opinion has often been expressed that the same psychiatric terms mean different things to different workers, and that epidemiologists must therefore be wary of drawing conclusions from routinely collected international data. There is much to be learnt even now, however, from international comparisons. “International comparisons (and there do seem to be enough clinical impressions of significant differences to make international comparisons profitable) would be far better served by specific ad hoc studies performed by groups of investigators with relatively homogeneous training and perspectives. Such groups can use private operational definitions and there seems to be no reason why agreement should be reached for all such studies; in fact, there would seem to be advantage in the use of a variety of classificatory variables in different studies” (MacMahon, 1961).

Comparability of psychiatric diagnosis may be achieved in several ways. The exchange of psychiatrists engaged on similar research projects will enable them to define areas of agreement and disagreement. Case records may be used in place of actual patients in validating diagnoses between different studies. The problem may also be tackled in another way. Instead of attaching a firm diagnosis to each patient the physical, psychological and psychiatric findings can be used to isolate symptoms or personality traits that go together, and a label can be applied to such aggregates. This approach has been advocated by some workers who think little of psychiatric diagnosis and may be better suited to psychological rather than to psychiatric investigation; but it may be worth trying to see how much psychiatry can gain from it, even though it implies some reversion to pre-Kraepelinian ideas. The quantitative aspect of morbid psychiatric states—the degree of impairment—also requires attention, an aspect rather neglected in the past.

Attention should also be given to the comparability of social and demographic data in epidemiological studies. Family and social attitudes to the mentally ill, family structure and social mobility should be included among the routine demographic information. Much more precise knowledge about the nature and degree of social stresses and their impact on particular individuals, both inside and outside the family circle, is essential to any proper understanding of the evolution of abnormal behaviour.

ACKNOWLEDGMENT

The authors wish to express their gratitude to friends and colleagues who have contributed much to this paper by commenting on it while in draft form; in particular, the guidance of Dr E. E. Kraepf, who has done so much to give an international impetus to psychiatric epidemiology, has been of the greatest value.
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