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Comparative study of physical impairments in 850 psychiatric patients and in other population groups

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COMPARATIVE STUDY OF PHYSICAL IMPAIRMENTS IN 850
PSYCHIATRIC PATIENTS AND IN OTHER POPULATION GROUPS

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Senior Thesis

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COMPARATIVE STUDY OF PHYSICAL IMPAIRMENTS IN 850
PSYCHIATRIC PATIENTS AND IN OTHER POPULATION GROUPS

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INTRODUCTION

During the period extending from June 11, 1935 to August 25, 1935, complete physical and neurological examinations were done on eight hundred fifty patients in the Hastings State Hospital, Ingleside, Nebraska. The work was done entirely by H. D. Kuper and myself, acting as Junior Internes at the Hospital during that summer, under the direction of Superintendent J. C. Nielsen, who was desirous of having a check-up survey made of the physical condition of as many of the patients as time would permit.

As will be readily seen from the results obtained, such a survey was very timely in many respects. A great many of the patients, particularly those who had been in the Institution since the early 1890's, had never had a physical examination of any kind, as long as they had been there. (Until recent years, mental hospitals in Nebraska were nothing more than custodial institutions.) Naturally, a great many findings were made of such pathology as is amenable to treatment, thereby bringing attention to such, to make those patients more comfortable, improve their usefulness to the Hospital, possibly improve the mental condition of some, and, which is very important, caused isolation of those patients found to be tuberculous to prevent further spread. These, of

course, are the great values of periodic health examinations of any group of persons.

Since the male patients as a whole are less prone to complain than the females, and the female wards have assigned to them most of the Registered Nurses employed, therefore getting better care daily, it was thought advisable to examine the males first. Consequently, the eight hundred fifty patients examined represent seventeen male wards, and only one female ward of thirty-two patients. The actual work of making examinations was stopped at this point, because it was desired to have some tangible record of the findings put under one cover for rapid reference for therapeutic and statistical activities. So the remaining time from August 25th to September 5th was spent in placing the 850 records in alphabetical order as to names of patients, and listing those patients coming under each physical finding.

This "index" was such, that, for example, instead of searching through the files for all patients found to have chest pathology, the Staff Physician could look in the "index" under "Chest Pathology" and find every patient listed there, in alphabetical order, in whom there were positive chest findings. Then he could go to the files and determine just what the positive finding was, and take the necessary steps for more certain diagnosis of the condition. In this way, a good many patients who had ground parole, who were working in the kitchens, and

were otherwise mixing with the other patients, were found by x-ray and sputum examination to have active tuberculosis, after we had found and reported positive physical signs in the chest.

The "index" makes possible a statistical study whereby the percentage-incidence can be determined of any of the physical impairments found in the 850 patients examined, and that number of patients should make up a sufficiently large group (being over one-half of the total Ingleside population) to be a fairly good cross section of the Institution. With these figures available, it was thought it might be of interest to compare the incidence of various impairments in the Mental Hospital, where the life of a large number of the patients is almost ideally vegetative, with the same impairments in various groups of the general population, subject to worry, high-pressure living, improper diet, industrial hazards, etc.

Sydenstricker (13, 14) takes up studies of impairments from a standpoint of comparison with death rates, especially to point out the fallacies of relying upon mortality figures as an index to the health of a population. He asks: "What is ill health? To say that ill health is 'a deviation from normal health' is to merely indulge in one of those impressive but unsatisfying dictionary definitions. For, how much of morbidity itself is 'normal' reaction, in the process of natural adjustment to environment? How many impairments and conditions,

commonly denoted as disease, are merely signs of 'normal' wearing out of human clocks, some of whom are set by heredity to run a longer time than others? When is death itself 'normal'--- at three-score years and ten, or at the century mark, or even at Methuselah's reputed age? How long a time, in fact, did Methuselah take to die in?" So he concedes at the outset that health or ill health is a relative thing, measurable at present only by some assumed standards with which we are all more or less familiar, even if not in strict agreement upon.

We all should agree with Sydenstricker that no criterion can be very exact, for several reasons, one of which is that physicians, upon whom we depend for most of our data do not invariably agree in their diagnoses. Yet it is reasonably certain that the statistical picture, if not taken in too much detail, will not be without considerable accuracy, and certainly much interest.

The present indices of ill health set forth are:

(1) Death rates-- specific for sex, age and cause; or life expectancy tables.

(2) Morbidity rates-- among persons of given sex and age, either upon frequency over a period of time, or upon prevalence at an instant of time.

(3) Physical impairment rates among persons of given sex and age for specific impairments as ascertained by examination or repeated observation.

It is unfortunate that problems of public health are set forth in lethal terms, because of the universality of

the use of death rates as an index of illness. For example, in worthy attempts to ascertain the prevalence of tuberculosis or cancer, statisticians have classified deaths under that title when the attending physician reports it on the death certificate as merely contributory to the actual cause as he observed it. In addition, a mistaken idea has developed in and from public health work; namely, that a low death rate indicates low ill health incidence. What really matters more to public health and the physicians, in their scientific searching for causes and conditions, and in their preventive work, is not deaths but ill health.

The Army draft examinations, the Life Extension Institute surveys, and other similar studies have revealed the fact that a large proportion of our adult male population, at ages when they should be at fullest vigor, have serious impairments. At present, Collins (3) and Sydenstricker believe, insufficient work under similar and uniform conditions has been done to make accurate comparisons of various groups of the population as to differences in incidence of defects among the groups, and why they exist; but that already done has been sufficient to let us know that such defects do exist. This is about all (and we agree with the authors) the data available at the present time can tell us. In fact, Collins says that really useful sickness records are still non-existent (1935).

To further illustrate his point of contention, Syden-

stricker points out that an exceedingly unhealthful region may exhibit a relatively low mortality, as, for example, a heavily infested hookworm locality or a region abounding in malaria. Pellagra may be widely prevalent in a community without perceptibly affecting its general death rate, or even increasing materially the number of deaths from the disease itself. Instances of the same sort could be multiplied. The ill health that is manifested in symptoms, in discomfort, in lessened vigor and efficiency, even in illness and suffering, is not reflected in the death rate, except for certain diseases, for any purpose practicable in preventive work.

Of far greater importance to the sanitarian than the life table or the list of causes of death is a view of the health situation as depicted by records of the occurrence of sickness and its causes.

Such a view of the health--- as contrasted with the death--- situation is not an impossible dream. While their significance may not yet be fully recognized, a successful series of attempts has recently been made to collect records of disease incidence and prevalence in addition to and wholly apart from the notification of communicable diseases for administrative purposes. Within the natural limitations of the methods employed these efforts have been rewarded with considerable success. Continuous sickness records for industrial employees, school children, and other groups are yielding a knowledge of the incidence of certain diseases that hitherto had not been possible

from mortality statistics or from statistics of notifiable diseases. Sickness surveys have made a similar contribution to the knowledge of disease prevalence. Physical examinations of many groups, some of them on a large scale, have revealed conditions before not recognized nor even imagined. The various investigators agree that these beginnings in morbidity data already have done more than bring to light conditions previously not adequately known; they have given glimpses of what the sanitarian has long wanted to see--- a picture of the public-health situation as a whole, drawn in proper perspective and painted in true colors.

It was found that there are so many angles from which the subject has been studied in the general population, even in the relatively limited amount of work that has been published on the subject, that it is difficult to pick out truly comparable data. However, this paper will have accomplished a great deal if it gives no other information than that of pointing out the need for universal periodic health examinations in the United States, both in institutions and in the general population; the need for a more uniform method of tabulating results; and the fact that morbidity rates of a population are a more accurate indication of its state of health than are death rates.

METHODS OF EXAMINATION AT INGLESIDE

Of prime importance in evaluating the results of any mass health examination is the uniformity of method of examination and of interpreting findings. This question of uniformity appears in all the literature where reports are made on great numbers of physical examinations, done by a large number of physicians. The difficulty is seen even in the United States Army Reports of defects found in drafted recruits, where not only differences in findings existed among the individual men making the examinations, but where some of the mobilization camps were found to be much more strict in their findings, and rejected more men for defects than did others.

In this matter of uniformity, we feel that our report of the group of 850 patients is especially of value, because only two men made all the examinations, working together in the same ward at the same time, each examining an entire patient by himself, and calling on the other for consultation on any finding about which he was not certain.

All equipment necessary for complete physical and neurological examination was supplied for us in duplicate, so that each could examine a separate patient, taking two at a time. An attendant was detailed to set up the equipment each day, weigh each patient, clerk, clean the rectal gloves at the end of each day, supply clean linens and gowns daily, and move the equipment to the next ward as one was finished. All patients on a ward were examined before moving to the next, and on each ward we were given

a quiet room in which to work.

An average of about one hour was spent on each patient. The more mentally deteriorated patients cooperated very poorly, and this is believed to be one rather serious source of error, especially from the standpoint of missing pathology, but on the whole, the examinations were considered quite satisfactory. The following is the plan of examination followed:

Date _____ PHYSICAL EXAMINATION Dr. _____

GENERAL APPEARANCE Development, nutrition, race, sex, age, height, weight, habitus (asthenic, athletic, pyknic, dysplastic), station (ambulatory or recumbent), and a general statement as to whether the patient appears physically well or ill (temperature if elevated).

INTEGUMENTARY SYSTEM Skin: temperature, texture, moisture, elasticity, scars, eruptions, contusions, lacerations, pigmentations, ulcerations, etc. Nails: ridging, pitting, curving, color. Subcutaneous tissue: amount, distribution, tumors, hemorrhage, edema. Mammae: size, tenderness, masses, retraction of nipples, secretion, etc.

SKELETAL SYSTEM Skull: size, shape, symmetry, condition of bones, exostoses, depressions, etc. Vertebral column: deformity, mobility, tenderness, pain on movement. Long Bones: size, symmetry, deformity, tenderness, lesions, etc. Joints: swelling, tenderness, mobility, redness, pain on movement, deformity.

RESPIRATORY SYSTEM Nose: obstruction, discharge from anterior or posterior nares, deviated or perforated septum, epistaxis, etc. Larynx, trachea, thorax: type, deformity, local retraction or bulging, Pottenger's signs, etc. Lungs: type and character of respiration, rate, freedom of expansion of the two sides, tactile and vocal fremitus, local tenderness, friction rubs, resonance, lung borders, diaphragmatic excursion, vocal, tussive and voice sounds, rales or other adventitious sounds.

CARDIOVASCULAR SYSTEM Heart: apex beat, P.M.I., abnormal pulsations, shocks, thrills, friction rubs, area of cardiac dullness, enlargement, heart

sounds, intensity of A-2 and P-2, rhythm, murmurs (area best heard, pitch, time, quality, transmission). Peripheral arteries: thickness of walls, beading, tortuosity, pulse (rate, rhythm, volume, quality, blood pressure). Peripheral veins: abnormal pulsations, varicosities, etc. Capillaries: abnormal pulsations, telangiectases, hemangiomas. Lymph glands and vessels: local enlargement of glands, engorgement of vessels, lymphangitis, edema, etc.

GASTROINTESTINAL SYSTEM Mouth: condition of and lesions of lips, of lips, buccal mucosa, gums, teeth, tongue, palate and uvula. Pharynx: inflammation, lesions, etc. Tonsils: sepsis, hypertrophy, surgery, etc. Abdomen: shape, surface markings, bulging, tenderness, muscular spasticity, distention, viscerae (size, shape, position, consistency, mobility, tenderness), masses. Anus: hemorrhoids, fissures, fistulae, etc.

GENITOURINARY SYSTEM Kidneys: bulging, redness or tenderness in lumbar areas, spasticity of muscles on affected side, size, shape, mobility, tenderness and position as determined by abdominal palpation. Ureters: tenderness along course, flexion of thigh on affected side. Bladder: distention, tenderness, incontinence. Male genitalia: note abnormalities of penis, scrotum, epididymus, inguinal rings, prostate and seminal vesicles. Female genitalia: note abnormalities of labia, clitoris, Bartholin's glands, vagina, pelvic floor, cervix uteri, uterus and adnexia, particularly as to discharge, tenderness, masses, etc.

ENDOCRINE SYSTEM Note physical signs and symptoms indicative of the classical syndromes of dysfunction of the pituitary, thyroid, thymus, adrenals, and gonads.

NEUROMUSCULAR SYSTEM Cranial Nerves: olfactory--sense of smell; optic--acuity of vision, visual fields, ophthalmoscopic (note the condition of the disc, veins, arteries and retinae in general, hemorrhage, exudation, separation, etc.); oculomotor, trochlear and abducens--ptosis, strabismus, nystagmus, pupillary reflexes (size of pupils, inequality, irregularity, accommodation to L & A, consensual reflex); trigeminal--motor root (muscles of mastication, palate and masseter reflex); sensory root (face, buccal and nasal mucosa, conjunctivae and cornea, taste); facial--muscles of expression; auditory--acuity of hearing, Rinne's, Weber's and Schwabach's tests, otoscopic; glossopharyngeal, vagus and spinal accessory--paresis or paralysis (phonation, articulation, deglutition, palate and uvula); hypoglossal--chewing, swallowing and speaking, deviation on protrusion, tremors. Reflexes: superficial--plantar, cremasteric, inguinal, abdominals, corneal and pharyngeal; deep--patellar, achilles, periosteal, radial, biceps, triceps, Hoffman. Motor Apparatus: clonic convulsions or spasms, tonic con-

vulsions or spasms, contractions, fibrillary twitchings, tremors, choreic or athetoid movements, associated movements, forced movements, catatonia, myotonia, ataxia, asynergia, apraxia, Romberg's test, trophic disturbances (atrophy, hypertrophy, pseudohypertrophy, skin and joint disturbances). Sensory Apparatus: tactile, pain, pressure, thermal, muscular and joint sensibility; vibratory, movement and position sensibility; stereognostic sensibility. Paresthesias, hyperesthesias, reflex radiation of pain. Autonomic Apparatus: disturbances of vaso-motor control, sphincter control, sexual control and certain visceral phenomena.

PHYSICAL DIAGNOSES Made from a summary of positive findings in the above.

Each patient's findings were written according to the above plan before beginning the examination of the next patient, and at the end of each day the reports were sent to be typed for the files.

RESULTS OF EXAMINATIONS

Based upon the total of 850 patients examined, the more important physical findings and their incidence in per cent of total number of patients examined were as follows:

	Patients with no positive findings----	3.9%	
<u>GENERAL APPEARANCE & INTEGUMENTARY SYSTEM</u>			
Acne Rosacea----	0.23%	Ichthyosis----	0.47%
Acne Vulgaris----	4.4%	Keloid----	0.47%
Cachexia----	3.3%	Leukoplakia----	0.58%
Epithelioma----	0.11%		
Favus----	0.35%		
<u>SKELETAL SYSTEM</u>			
Arthropathy----	13%	Dorsum Rotundum----	9.7%
Hallux Valgus----	13%	Thorax deformity----	2%
Hammer Toes----	1.6%	Web Toes----	0.35%
Scoliosis----	6.7%		
<u>RESPIRATORY SYSTEM</u>			
Chest Pathology----	11.8%	Deviated septum----	4.4%
Pulm. T.B. (to 3/23/36)--	7.5%	Hoarseness----	0.7%
Bronchitis----	1.4%	Nasal Catarrh----	5.4%
<u>CARDIOVASCULAR SYSTEM</u>			
Aortic v. lesion----	0.94%	Pulmonic v. lesion----	0.23%
Arteriosclerosis----	41.7%	Tachycardia (over 100)--	4.8%
Cardiac Arrhythmia----	7.7%	Varicose Veins----	10%
Cardiac Enlargement--	15.4%	Vasc. Hypertension----	22.8%
Mitral Insufficiency--	14%	Vasc. Hypotension----	2.1%
Mitral Stenosis----	0.35%		

GASTROINTESTINAL SYSTEM

Palpable Abdominal Mass--0.7%	Hernia, Dir. Abdom.--0.23%
Abdominal Tenderness---1.5%	Hernia, Epigastric--0.11%
Dental Caries----28.1%	Hernia, Umbilical--0.35%
Fissure in Ano----0.58%	Jaundice----0.11%
Gallbladder Pathology--0.82%	Pyorrhea----22.6%
Hemorrhoids----18.7%	Rectal Carcinoma---0.23%
Hepatic Enlargement---1%	Rectal Fistula----0.11%
Hernia, dir. inguin.---2.1%	Rectal Prolapse----0.35%
Hernia, indir. ing.---5.3%	Tonsils, Enlarged--9%
Diastasis Recti---0.11%	

GENITOURINARY SYSTEM

Anorchism & Cryptorchism---1.3% (of 818 males)	" " "
Atrophy of testis---7%	" " "
Epididymal tumor---0.82%	" " "
Epididymitis---0.58%	" " "
Hydrocele---2.34%	" " "
Hypospadias---0.35%	" " "
Phimosis---0.58%	" " "
Prostatic Hypertrophy, benign-21.6%"	" " "
Prostatic Hypertrophy, malignant (?)--0.82%"	" " "
Prostatitis---0.94%	" " "
Varicocele---1.6%	" " "

ENDOCRINE SYSTEM

Acromegaly---0.35%	Hypothyroidism---1%
Goitre, Non-toxic---5.6%	Obesity---5%
Goitre, Toxic---2.1%	Obesity with Cardiovascular disease---3.6%

NEUROMUSCULAR SYSTEM

Arcus Senilis---8.9%	Hordeolum---0.11%
Vasomotor Instability--1.1	Hyperopia---2.3%
Blindness---1.6%	Myatropy---0.94%
Cataract, Hypermature-0.11	Myopia---2.8%
Cataract, Immature---6.1%	Optic Atrophy---2.34%
Cataract, Mature---0.35%	Papilledema---0.47%
Choroiditis, diffuse-0.7%	Peripheral Nerve Lesion---0.82%
Choroiditis, Juxtapap-0.47	Pterygium---5.1%
C.N.S. Changes, organic-21%	Staphyloma---0.58%
Conjunctivitis---0.7%	Strabismus:
Corneal Opacities--1.17%	Convergent Alternating--1.3%
Dacryocystitis---0.35%	Divergent Alternating---1.17%
Deafness---18.7%	Internal (non-alt.)-----0.82%
Detached Retina---0.11%	Paralytic-----0.47%

The above list of findings is by no means all the findings made, but merely the more important ones. For the purpose of making a comparative study, it was deemed advisable to use only pulmonary and cardiovascular impairments. Even with only these two general divisions, it was found

difficult to find thoroughly comparable figures per se; the principal difficulties being in finding comparable age groups and finding actual definite percentages of incidence of the impairments in each, and the same actual impairments to compare in many cases. To illustrate, the U. S. Army reports of the defects found in the drafted men give the annual rates per thousand, all of which had to be made comparable by multiplying by the time over which the work was done, or 2.75 years, and converting to per cent. Also, they give three separate lists: (1) defects in rejected men, (2) discharges for disability, and (3) hospital admissions. The latter two groups very probably overlap considerably. However, a few tables of total values given may be used with considerable accuracy, and comparisons made on percentage of incidence in comparable age groups.

The average age of the patients examined at Ingleside was 49.8 years. Distribution ran as follows:

Under 20----	4	50-54----	98
20-24----	22	55-59----	99
25-29----	42	60-64----	79
30-34----	73	65-69----	80
35-39----	60	70-74----	52
40-44----	76	75-79----	33
45-49--	103	80-up----	29
Total---		850	

Tables I, II and III give the results obtained at Ingleside, from three angles of consideration; the actual number of each impairment in each age group, the percentage of each of the total, and the percentage of each of the age group in which it lies. The latter consideration is of little value in age groups with a very small number of patients.

TABLE I--PULMONARY AND CARDIOVASCULAR IMPAIRMENTS BY AGE GROUPS

Examinations made from June 11, 1935 to August 25, 1935, Hastings State Hospital, Ingle-
side, Nebraska. 818 males, 32 females. ABSOLUTE NUMBERS

Impairment	Age Groups														TOTAL
	15+	20+	25-9	30-4	35-9	40-4	45-9	50-4	55-9	60-4	65-9	70-4	75-9	80+	
Ages	4	22	42	73	60	76	103	98	99	79	80	52	33	29	850
All patients	4	22	42	73	60	76	103	98	99	79	80	52	33	29	850
Pulm. T. B.	-	6	11	10	9	3	6	2	7	3	6	-	1	-	64
Other lung path.	-	-	-	1	-	3	5	5	6	3	4	3	2	-	32
Poss. lung. path.	1	2	4	4	5	12	15	12	14	3	7	10	1	5	96
Bronchitis	-	-	1	1	1	1	4	1	-	2	1	-	-	-	12
Aortic v. les.	-	-	-	-	-	1	-	1	2	-	3	-	1	-	8
Arterioscleros.	-	-	-	2	6	20	30	44	52	48	57	42	25	29	355
Card. arhythmia	1	1	1	-	2	4	3	2	8	8	12	10	2	12	66
Card. enlargem't	-	1	-	2	6	4	6	12	26	20	23	10	9	12	131
Mitral insuff.	-	2	2	3	6	14	15	17	14	15	14	9	3	5	119
Mitral sten.	-	-	-	-	-	1	-	2	-	-	-	-	-	-	3
Pulm. v. les.	-	-	-	-	-	-	-	-	-	-	1	-	1	-	2
Tachycardia	-	1	1	3	3	6	5	4	7	3	4	2	-	2	41
Varicose veins	-	-	-	2	2	7	9	10	10	16	14	7	5	3	85
Hypertension	-	-	2	5	6	11	7	20	33	25	41	22	14	8	194
Hypotension	-	-	1	5	-	-	-	2	2	5	1	1	-	1	18
Obesity	-	-	1	1	-	3	1	4	8	10	6	3	4	2	43
" ♂ cardiov. dis.	-	-	-	1	-	2	1	1	4	7	6	3	4	2	31
" ♂ hypertens.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	23

"Pulmonary T. B." means all patients who have been proven by x-ray and sputum examinations to have the disease, up to March 23, 1936. The work of x-ray and sputum checks is still in progress, so others in "Other lung pathology" and "Possible lung pathology" very probably are actively tuberculous.

TABLE II--PULMONARY AND CARDIOVASCULAR IMPAIRMENTS BY AGE GROUPS
 Examinations made from June 11, 1935 to August 25, 1935, Hastings State Hospital, Ingle-
 side, Nebraska. 818 males, 32 females. PERCENTAGES OF AGE GROUPS

Impairment	Age Groups														TOTAL
	15+	20+	25-9	30-4	35-9	40-4	45-9	50-4	55-9	60-4	65-9	70-4	75-9	80+	
Ages	4	22	42	73	60	76	103	98	99	79	80	52	33	29	850
Pulm.T.B.	-	27	26.0	14.0	15.0	4.0	5.8	2.0	7.0	3.8	7.5	-	3.0	-	7.5
Other lung path	-	-	-	1.4	-	4.0	4.8	5.1	6.0	3.8	5.0	5.7	6.0	-	3.7
Poss.lung path.25.	9.	9.5	5.4	8.3	16.0	14.5	12.2	14.0	3.8	8.7	19.2	3.0	17.	11.3	
Bronchitis	-	-	2.3	1.4	1.7	1.3	3.8	1.0	-	2.5	1.2	-	-	-	1.4
Aortic v.les.	-	-	-	-	-	1.3	-	1.0	2.0	-	3.7	-	3.0	-	0.9
Arterioscleros.	-	-	-	2.7	10.0	26.0	29.0	44.8	52.5	60.7	71.0	80.0	75.7	100	41.7
Card.arythmia 25.	5.	2.3	-	3.3	5.2	2.9	2.0	8.0	10.1	15.0	19.2	6.0	41	7.7	
Card.enlargem't	-	5.	-	2.7	10.0	5.2	5.8	12.2	26.2	25.0	28.7	19.2	27.2	41	15.4
Mitral insuff.	-	9	4.7	4.1	10.0	18.4	14.5	17.3	14.0	19.0	17.5	17.3	9.0	17	14.0
Mitral sten.	-	-	-	-	-	1.3	-	2.0	-	-	-	-	-	-	0.3
Pulm.v.les.	-	-	-	-	-	-	-	-	-	-	1.2	-	3.0	-	0.2
Tachycardia	-	5.	2.3	4.1	5.0	8.0	4.8	4.1	7.0	3.8	5.0	3.8	-	7	4.8
Varicose veins	-	-	-	2.7	3.3	9.2	8.7	10.2	10.0	20.2	17.5	13.4	15.1	10	10.0
Hypertension	-	-	4.7	6.8	10.0	14.4	6.8	20.2	33.4	31.6	51.2	42.3	42.4	28	22.8
Hypotension	-	-	2.3	6.8	-	-	-	2.0	2.0	6.3	1.2	1.9	-	3	2.1
Obesity	-	-	2.3	1.4	-	4.0	0.9	4.1	8.0	12.6	7.5	5.7	12.1	7	5.0
" ♂ cardiovas.dis.	-	-	-	1.4	-	2.6	0.9	1.0	4.0	8.8	7.5	5.7	12.1	7	3.6
" ♂ hypertens.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2.7

TABLE III--PULMONARY AND CARDIOVASCULAR IMPAIRMENTS BY AGE GROUPS
 Examinations made from June 11, 1935 to August 25, 1935, Hastings State Hospital, Ingle-
 side, Nebraska. 818 males, 32 females. PERCENTAGES OF TOTAL

Impairment	Age Groups														TOTAL
	Ages	15+	20+	25-9	30-4	35-9	40-4	45-9	50-4	55-9	60-4	65-9	70-4	75-9	
All Patients	4	22	42	73	60	76	103	98	99	79	80	52	33	29	850
Pulm.T.B.	-	.7	1.3	1.2	1.0	0.3	0.7	0.2	0.8	0.3	0.7	-	0.1	-	7.5
Other lung path	-	-	-	0.1	-	0.3	0.6	0.6	0.7	0.3	0.5	0.3	0.2	-	3.7
Poss.lung path.	.1	.2	0.5	0.5	0.6	1.4	1.7	1.4	1.6	0.3	0.8	1.2	0.1	.6	11.3
Bronchitis	-	-	0.1	0.1	0.1	0.1	0.5	0.1	-	0.2	0.1	-	-	-	1.4
Aortic v.les.	-	-	-	-	-	0.1	-	0.1	0.2	-	0.3	-	0.1	-	0.9
Arterioscleros.	-	-	-	0.2	0.7	2.3	3.5	5.1	6.1	5.6	6.7	4.9	2.9	3.4	41.7
Card.arythmia	.1	.1	0.1	-	0.2	0.5	0.3	0.2	0.9	0.9	1.4	1.2	0.2	1.4	7.7
Card.enlargem't	-	.1	-	0.2	0.7	0.5	0.7	1.4	3.0	2.3	2.7	1.2	1.0	1.4	15.4
Mitral insuff.	-	.2	0.2	0.3	0.7	1.6	1.7	2.0	1.6	1.7	1.6	1.0	0.3	.6	14.0
Mitral sten.	-	-	-	-	-	0.1	-	0.2	-	-	-	-	-	-	0.3
Pulm.v.les.	-	-	-	-	-	-	-	-	-	-	0.1	-	0.1	-	0.2
Tachycardia	-	.1	0.1	0.3	0.3	0.7	0.6	0.5	0.8	0.3	0.5	0.2	-	.2	4.8
Varicose veins	-	-	-	0.2	0.2	0.8	1.0	1.2	1.2	1.8	1.6	0.8	0.6	.3	10.0
Hypertension	-	-	0.2	0.6	0.7	1.3	0.8	2.3	3.8	2.9	4.7	2.5	1.6	.9	22.8
Hypotension	-	-	0.1	0.6	-	-	-	0.2	0.2	0.6	0.1	0.1	-	.1	2.1
Obesity	-	-	0.1	0.1	-	0.3	0.1	0.5	0.9	1.2	0.7	0.3	0.5	.2	5.0
" c̄ cardiovas.dis.	-	-	-	0.1	-	0.2	0.1	0.1	0.5	0.8	0.7	0.3	0.5	.2	3.6
" c̄ hypertens.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2.7

REVIEW OF OTHER WORK DONE, WITH COMPARISONS

United States Army

The most extensive work reported in the literature is that in connection with the physical examinations of the men drafted for service in the World War. The results are given in the various reports of the Surgeon General, compiled by Davenport and Love (4, 9, 10, 11). The initial selective draft of 1917 upon the male population of military age to meet the emergencies of the World War gave the first opportunity in half a century to make a census of the physical constitution of the people of the United States.

Out of about 10,000,000 males registered, ages 21-30 years, 2,510,000 were examined at local boards, and about 730,000, or 29.1% were rejected on physical grounds. After December 15, 1917 3,208,446 were examined physically by local boards, up to September 11, 1918. Out of these two groups during the period down to May, 1918, approximately a million men were sent to mobilization camps, and any physical defects found in them were recorded.

The severity of the physical examination standards varied during the period. It became more liberal from July, 1917 to February, 1918, and for the remainder of the period under consideration it returned to previous rigor. Also, the percentage of rejections at mobilization camps shows a fluctuation between the different camps. This was due largely to a variation in the ideals of the physical examination boards at the various camps. Of recruits from

the same part of the country, Camp Meade rejected only 0.82%, whereas Camp Devens rejected 8.65%, etc. Despite this large fluctuation in the percentage of rejections at the various camps, the authors state that it is possible to show that the incidence of particular defects and diseases in different sections of the country is very different. The strikingly high incidence of goitre, for example, in the regions of the Great Lakes and the Northwest was pointed out very clearly.

The above mentioned 10,000,000 males registered by June 5, 1917, of 21-30 years of age coming under the selective-service law, made up about 20% of the total male population of the country. Of this first draft 1,057,363 were certified for military service up to May, 1918. Let it be borne in mind that it is the findings on men sent to the mobilization camps, after being passed by the local boards, that are reported here, so that a more or less roughly selected group was examined at the camps, and the report is therefore not a true picture of the population taken at random. For the purpose of examining recruits, each state was divided into districts, one to each county, except in cities of over 30,000 population, which latter were divided into a district for each 30,000 population. Thus 4,557 local boards were formed. Each board was composed of three members, one of whom was a physician appointed by the governor of the state. In many cases the physician did all the physical examining, in others he was aided by other

physicians. The physician's findings were considered final in rejecting a man on physical grounds, and, as stated, 29.1% of the 2,510,000 examined by local boards were so rejected.

The following are figures given for the draft group named above, in findings comparable to the Ingleside defects under discussion:

Impairment	Drafted Men		Ingleside	
	Total	%	Total	%
Valvular Disease of Heart	7,157	7.19	132	15.5
Cardiac Enlargement	526	0.53	131	15.4
Cardiac Arrhythmia & Tachycard.	604	0.61	107	12.5
Varicose Veins	1,428	1.44	85	10.0
Pulmonary Tuberculosis	4,911	4.94	64	7.5

The overwhelmingly higher incidence in the Ingleside group apparent in this comparison can be explained on the basis of age. The first four impairments listed are largely diseases of more advanced years, which the Ingleside group represents, while tuberculosis, pre-eminently a disease of youth, shows figures more nearly alike. The drafted men represent a group taken from the entire United States, both urban and rural, whereas the Ingleside patients all come from rural communities entirely. The work compiled by Love and Davenport shows a rather marked difference in incidence of defects in men from urban districts as contrasted to those from rural parts of the country. So let us compare the percentages found in the rural drafted men, and those in the Ingleside patients belonging to the same age group as the drafted men:

	Drafted Men Total Rural %	Ingleside, % ages 20-30
Pulmonary Tuberculosis-----	5.09	19.1
Aortic Valve Lesion-----	0.43	0.0
Cardiac Arrhythmia-----	0.11	2.1
Cardiac Enlargement-----	0.57	0.7
Mitral Insufficiency-----	4.61	3.5
Mitral Stenosis-----	1.59	0.0
Pulmonic Lesions-----	0.03	0.0
Tachycardia-----	0.47	1.4
Varicose Veins-----	1.33	1.4
Overweight-----	0.18	0.7

A factor in causing the Ingleside figures in the above to appear large in some instances is the relatively small number of patients in the age group of 20-30 years. Then, too, when one remembers that the drafted men figures are not truly of the general male population of that age, because of the "weeding out" that was done by local boards before the study was made, those figures should be lower than would be found in the population at large. The very much higher incidence of pulmonary tuberculosis found in the hospital can also be explained, it is believed, on the basis that over 60% of the patients are deteriorated schizophrenics, who spend most of their time sitting in a stooped position, giving very poor ventilation to their lungs, have extremely unhygienic personal habits and must be constantly kept from eating out of each other's tray, etc. A fair number of active cases of tuberculosis had been "at large" about the institution for years, contacting others, and it is very difficult to keep many of the known tuberculars in bed for proper treatment. On the other hand, the patients are not exposed to dampness and cold, lowering the chances for rheumatic fever to gain a

foothold, and causing a lower incidence of valvular lesions of the heart.

The Army statisticians found that apparently the incidence of pulmonary tuberculosis as detected at the mobilization camps was more than one-third greater in rural districts than in cities. It does not, they say, necessarily follow that pulmonary tuberculosis is present in larger proportion in the rural than in the city population, for the men examined represented a population from which the tuberculosis had already been subtracted by the local boards. The result may well be accounted for on the assumption that the local boards of rural districts were less efficient in detecting and eliminating tuberculosis than were the local boards of the cities. On this matter, a consideration of all rejections in ratio to number of men examined may be had. These ratios are, city to rural, 47.65 to 49.63 respectively. There is consequently an excess of 1.89 in the rural districts, or, as compared with the ratio from the cities, an excess of about 4 per cent. It may be concluded, therefore, that either examiners at the local boards in the rural districts were relatively less efficient in detecting tuberculosis in the recruits than in detecting other defects, or else that there is a real excess of active pulmonary tuberculosis in the young men 20 to 30 years of age, in the rural districts.

The authors present a very interesting graph, showing

the order of frequency of the various diseases and defects found in the first million drafted recruits. Pes planus comes highest in the list, at 17.7%, and myocarditis lowest at 0.018%. The conditions in which we are interested ranged in this graph as follows:

- 8. Valvular heart disease (7.19)
- 11. Pulmonary tuberculosis (4.94)
- 22. Varicose veins (1.44)
- 33. Cardiac hypertrophy (0.53)
- 40. Myocarditis (0.018)

A summary of the conclusions on the findings in the first million drafted men, in such findings as pertain to pulmonary and cardiovascular systems, is given by the writers:

1. "In those states in which the local boards referred most cases of suspected tuberculosis to medical advisory boards was the smallest proportion of rejections for tuberculosis at the camp.

2. "In general, the proportion of men referred to medical advisory boards and who later came to mobilization camps depended in part upon the familiarity of local boards with suspected disorder and in part with the accessibility of the medical advisory boards.

3. "The percentage of men rejected at mobilization camps was 5.0 up to August, 1917, rose to 5.7 by October, fell abruptly to 1.2 in December, rose to 3.0 in February and declined to 2.6 in April-May. Thus, December was characterized by the greatest proportion of men accepted despite defects and the smallest proportion rejected. This month marks the acme of our purpose of securing an

army even by making use of more or less defective men.

4. "The ratio of men rejected differs greatly between the different States.

5. "The variations in proportion of defects associated with the different States was due more to the various ideals of the examiners at camps than to variations in the constitution of the population of the States.

6. "Functional heart diseases were rarely found; of the cases found about 75% were rejected.

7. "Varicose veins in different forms were found in exceptionally great numbers in Minnesota and Wisconsin and the mountainous region of the extreme Northwest. This is probably associated with the tall stature of the Scandinavians who predominate in much of this territory.

8. "Tuberculosis was found in exceptional amount in men from Arizona, New Mexico, Colorado and California. This is explained--many active cases who had gone to these states for cure were included in the draft.

9. "Pulmonary tuberculosis is equally common in men from rural and from urban districts.

10. "There was an excess of nearly 60% in the incidence of mitral insufficiency in recruits from rural districts.

11. "Varicose veins are much commoner in recruits from cities than from rural districts.

12. "Endocarditis and cardiac hypertrophy are commoner in rural than urban districts, and this result is possibly

dependent upon the greater incidence of arthritis.

13. "Valvular heart disease is roughly and inversely correlated with the density of the population."

In the Reports of the Medical Department of the U. S. Army in the World War (9), the discharges for disability are given by age groups, of both officers and enlisted men, total of colored and white in the United States and Europe, between April 1, 1917, and December 31, 1919. This is the only data found in the Army statistics in which the age groups are given (above 21-30) so that a comparison might be made with the figures given in Tables I, II and III. However, the percentages are even lower than found in the drafted recruits, for several reasons: the figures represent for the most part conditions developing after gaining admission to the Army; are only those of sufficient severity to warrant discharge from the Army; and the living conditions of a great many of the men in the group, especially those at the higher age levels, had undoubtedly been uniformly good for many years because of many years of Army life. Nevertheless, let us see how the relative frequency of the causes for discharge from a group representing a mean annual strength of 3,901,186 men during the 2 $\frac{3}{4}$ years, compares with the same conditions found in an instant of time at Ingleside (the numbers refer to rank in list):

TABLE IV--RANK OF FREQUENCY OF FOURTEEN PULMONARY AND
CARDIOVASCULAR IMPAIRMENTS: CAUSES FOR ARMY DISCHARGE
COMPARED WITH SAME DEFECTS FOUND IN INGLESIDE PATIENTS.

Imp'm't	Age Groups																			
	15-20		21-25		26-30		31-35		36-40		41-45		46-50		51-55		56-65		TOTAL	
	A	I	A	I	A	I	A	I	A	I	A	I	A	I	A	I	A	I	A	I
Pul.tb.	1	-	1	-	1	1	1	1	1	1	1	8	1	5	1	10	3	9	1	7
Sus.tb.	10	-	12	-	12	-	11	8	12	-	-	9	-	7	-	6	-	10	12	10
Bronchitis	4	-	5	-	5	4	5	9	3	9	5	11	4	9	4	12	-	11	5	11
Aor.v.les.	5	-	4	-	6	-	6	-	5	-	8	12	5	-	7	13	-	12	4	12
Art'scl.	11	-	10	-	10	-	10	7	7	4	4	1	2	1	3	1	1	1	10	1
Card.aryth	9	1	9	4	9	5	9	-	11	7	-	6	-	10	-	9	-	7	9	6
Card.enl.	7	-	8	3	8	-	8	5	8	5	7	7	7	6	6	4	-	3	8	3
Mit.ins.	2	-	2	2	2	2	2	3	2	2	2	2	3	2	2	3	2	4	2	4
Mit.sten.	3	-	3	-	3	-	4	-	6	-	6	13	8	-	5	11	-	-	3	13
Pul.v.les.	-	-	13	-	13	-	-	-	-	-	-	-	-	-	-	-	-	-	13	14
Tachycard.	6	-	6	5	7	6	7	4	9	6	9	5	-	8	-	8	-	8	7	9
Varicose v.	8	-	7	-	4	-	3	6	4	8	3	4	6	3	8	5	4	5	6	5
Hyperten.	11	-	10	-	10	3	10	2	7	3	4	3	2	4	3	2	1	2	10	2
Obesity	12	-	11	-	11	7	12	10	10	-	10	10	9	11	-	7	-	6	11	8

We see that pulmonary tuberculosis ranks first in both groups up to the age of 40, when it drops to 8th place among the defects studied, in the Ingleside group. The values seen in the "total" may or may not be significant---whether the strain of army life during the War caused tuberculosis to be more active and cause for more discharges or not, is a question well worth considering. The same could probably be said of bronchitis, which is 5th in the number of cases among the army discharges in the above list, while it is well toward the bottom of the list in the Ingleside column. Mitral insufficiency ranks second in frequency in most of the age groups for both, but in the total, hypertension, cardiac enlargement and arteriosclerosis outnumber this defect in the Institution. I believe that the greater average age of the Ingleside patients is alone enough to explain this difference. The condition of arteriosclerosis

was found in Ingleside to outnumber the hypertensions two to one. In the army figures from which the above table was made, arteriosclerosis and hypertension were listed under one heading, hence the same ranking number given to each. If the term "arteriosclerosis and hypertension" means only those enlisted men in whom both were found, the incidence would be low, because the two conditions are not necessarily related, except where a condition of hypertension has been present for a long time (16). Also, since the Army figures used above are discharges for disability, and arteriosclerosis is more or less an idiopathic condition in the later years of life and is not particularly disabling, we have another plausible reason for the seemingly low incidence in the Army group. This viewpoint of defects being disabling may be another reason why mitral stenosis and aortic valve lesions seem to be so prevalent in the Army group, judging from Table IV.

Group of 100,924 Male Policyholders

Sydenstricker (13, 14) and Britten (15) maintain that the prevalent practice in the civilized world today of using mortality rates as an index to disease prevalence is quite wrong. In fact, as far as is known, no information is available in the literature as to whether a corresponding association would be found in the examinations of the physical condition of persons in various economic or broad occupational groups. In the belief that some light could be thrown upon this important question by the large mass of records of medical examinations of insured persons which has been accumulated by the Life Extension

Institute, they attempted an analysis of over 100,000 of these records. The records cover the examinations of 100,924 males, policyholders in more than 40 life-insurance companies, made not to determine whether the persons were eligible for insurance, but for the purpose of a health check on men already having their insurance, and the examinees were assured that the findings would be kept in strictest confidence. The men were divided according to occupation and also according to age.

This study is not exactly reflective of the general U. S. population either, for two main reasons: the persons examined were already a selected group, being policyholders; and they all belong to a middle and upper stratum of economic station. It was found that they could be divided into the following broad occupational groups: Agricultural 4,444, Professional 14,480, Executives, Merchants, Builders, etc. 15,182, Managers, Salesmen, etc. 22,309, Clerks 13,654, and Skilled Trades 16,964. It is fully realized that no very precise meaning can be attached to a comparison of impairment rates in these various broad occupational groups for the reason that a clear-cut economic and social differentiation is not possible from the data at hand. However, in the light of the interesting differences found in British mortality data (1) according to social class, even rough differential rates of impairment among broad occupational groups are worth consideration. If there is difference

in rates between various occupational groups, mental and physical strain of everyday life, as well as industrial hazards, must play some role in the cause of such differences.

For the group of respiratory conditions, the prevalence rates for chronic conditions found on physical examinations were too low to justify any consideration at different ages. An occurrence of slightly higher rates for all conditions, except asthma, in the Skilled Trade group is possibly suggestive and is not consistent with other data.

It is pointed out that in this work physical impairments were recorded by the examiners without giving a definite diagnosis. Thus a diagnosis of heart conditions, such as mitral regurgitation, is not recorded on the examination form. Instead, information is given as to location and character of the murmur. A diagnosis for statistical purposes only was arrived at by the staff of the medical department in the Life Extension Institute. Table V gives the rates of prevalence, all ages, for the various lung and heart conditions so recorded and interpreted, and comparable results at Ingleside.

TABLE V--FREQUENCY OF CERTAIN RESPIRATORY AND CARDIOVASCULAR IMPAIRMENTS IN 100,924 MALE POLICYHOLDERS COMPARED TO THOSE IN 850 INGLESIDE PATIENTS--ALL AGES, BROAD OCCUPATIONAL GROUPS

Impairment	Pct. of Persons Examined
Chest Pathology, not proven Tuberculosis:	
Agricultural -----	2.9
Professional -----	4.0
Business -----	4.8
Skilled Trade -----	5.2
INGLESIDE -----	3.7
Tuberculosis:	
Agricultural -----	1.1
Professional -----	1.3
Business -----	1.3
Skilled Trade -----	1.5
INGLESIDE -----	7.5
Tachycardia:	
Agricultural -----	2.7
Professional -----	8.7
Business -----	8.6
Skilled Trade -----	8.7
INGLESIDE -----	4.8
Cardiac Arrhythmia:	
Agricultural -----	4.6
Professional -----	7.1
Business -----	6.7
Skilled Trade -----	6.6
INGLESIDE -----	7.7
Cardiac Enlargement:	
Agricultural -----	2.9
Professional -----	2.5
Business -----	2.2
Skilled Trade -----	2.7
INGLESIDE -----	15.4
Valvular Lesions:	
Agricultural -----	2.1
Professional -----	2.5
Business -----	3.0
Skilled Trade -----	3.0
INGLESIDE -----	15.5
Arterial Thickening:	
Agricultural -----	8.7
Professional -----	20.0
Business -----	22.4
Skilled Trade -----	26.0
INGLESIDE -----	41.7
Varicose Veins:	
Agricultural -----	4.1
Professional -----	5.1
Business -----	6.8
Skilled Trade -----	7.4
INGLESIDE -----	10.0

Although a remarkable uniformity appears in the rates for the various broad occupational groups, it may be noted that the farmer group has lower rates for valvular diseases than any other occupational class. (It was also pointed out that the farmer group has the highest percentage with pulse rates below 58, and the lowest percentage with pulse rates of 90 or more). The authors contend that without further information any comment on the reasons for such marked differences is purely speculative.

It must be borne in mind that the figures given above are for all ages, and that the average age of the insurance group under consideration is somewhere around 30 years, with a decidedly small percentage of the total number of men over 50, whereas, as we have already pointed out, the average age of the Ingleside patients is nearly 50 years, with more patients in the 80's than there were 24 years and under. In the insurance group we find such conditions as cardiac enlargement, valvular lesions, arteriosclerosis and varicose veins rising in frequency to nearly the Ingleside total percentage, in the upper age groups. For example, the authors found that 47% of the men 45 years of age and over (which is as high as their tables specifically give the ages), have arteriosclerosis. By reference to our Tables I, II and III, we find that in the comparable ages at Ingleside (45 years and over), of 573 patients, 327 had arteriosclerosis. This is 57%, and includes, of course, the patients of 80 years and up, in whom 100% had the

condition. So the apparent increase in incidence of arterial thickening in the mental hospital over the insurance group is not so great, when really comparable data are taken into consideration.

Similar findings are true with cardiac enlargement, etc.

The farmer group in the survey of policyholders was found to have the lowest incidence of valvular lesions, and in the earlier age groups, the rate was found to be particularly low, but from 50 years of age and up the rate rises to the same level and even slightly surpasses all but the skilled trade group. The writers suggest that possibly this might show the prevalence to be expected in any group as a normal part of the aging process. If their suggestion is true, the higher incidence of valvular lesions in the total Ingleside group over the insurance group is explained, at least partially.

No age distribution is given by the authors in respect to varicose veins, only the totals as quoted in Table V, so that the slightly higher incidence at Ingleside could not be checked for correction, but it seems logical that the same explanation can be given, namely, that the higher average age of the Hospital group gives higher total incidence of degenerative and wearing-out impairments. No marked differences in the occupational groups were found in respect to varices, which seems to be a rather significant negative finding--that inherent venous weakness and

degeneration with advancing age must be more of an etiological factor in varicosities than is occupation.

It was found that the incidence of enlarged heart and arteriosclerosis was practically the same in all subdivisions of the Business group up to the age of 45, after which the incidence rises rather markedly in those who do the most manual work, over the generally gradual rise in incidence with advancing age in the other occupations of this group.

To summarize, for most conditions, the agricultural group seems to have rates definitely below the average for all 100,924 men examined, with the exceptions notably for teeth, stomach and abdominal conditions, and the genitourinary system. The farmer rates are low for diseases of the eye and ear, nose and throat, heart and pulse, blood vessels, and many miscellaneous conditions. The professional group conforms more nearly to the average for the entire number of men considered. Few conditions were found to have excessive rates, and, on the other hand, there were not very many with particularly low rates. The Business group approximates the average for the entire number considered in nearly every respect. The skilled trade group stood out distinctly from the others in a number of respects. Its rates of impairments were excessively high for eye and ear, teeth, heart and pulse, and many miscellaneous conditions. The desirability of a study of the rates of impairments in the specific occupations

making up this group is suggested. Again, it should be emphasized that one could not expect in this study to find very marked differences between the groups, since the lower social levels are but slightly represented. This last statement, as suggested earlier in this paper, may be a very important factor in explaining the differences seen in the group of psychiatric patients, plus the factors already mentioned of greater average age, poor personal habits, etc., of the mentally ill in the Institution.

16,662 Metropolitan Policyholders

Another study of physical examinations of policyholders is made by Dublin, Fisk, Lyman and Kopf (5). Many timely observations are made, especially in regard to the importance of universal periodic health examination, and to the causes of impairments found.

In support of what has already been said, they say, "Both minor and serious physical defects exist in the general population, and are too often overlooked by the individual, and later result in much personal suffering and needless loss to the community. The results of the Army draft examinations and of industrial employees and of school children show this is truer than is generally realized." They also point out the essentiality of early discovery of impairments for proper correction.

This study deals with a survey of physical impairments of a fairly homogenous group of 16,662 men, policyholders of the Metropolitan Life Insurance Company, examined by the Life Extension Institute in 1921. Special effort is made

to determine etiological relationships. The group is very probably the first portion of the group studied by Sydenstricker and Britten discussed just above.

Up to the time of this study (1925), this group of 16,662 men constituted one of the largest groups ever examined under uniform conditions, apart from the Army draft examinations. Various interrelationships were studied, i. e., hypertension to obesity, diabetes to obesity, etc. The examinations were made by 8,000 medical examiners, and 20% by the medical staff of the Institute in the New York office. There was uniformity throughout, and the findings were treated confidentially. The men were informed that these were not insurance examinations, but merely a check on the health of the policyholder population for statistical purposes, thus all defects were freely disclosed by the men. Also, the examinations were entirely optional, so that those with impairments were more likely to be anxious to come for check-up and advice.

59.5% of the 16,662 were over 34 years of age, as compared with 53.3% who are over 34 in the general run of population in the United States. There was a preponderance of clerical, mercantile and executive pursuits. Also, the Metropolitan being a company whose regulations are such, these were in somewhat better economic condition than the general run of policyholders. On the other hand, being "better off" financially than the general run of men, there

is more reason to believe that this group would be more heavily weighted with physical impairments than the general run, by reason of lack of exercise, stress and strain of business worries, etc.

The chief errors in personal hygiene were reported for this group:

Too high protein diet-----	37.6%
Too little water consumed-----	36.9%
Too much tea and coffee-----	40.7%
Other errors of diet-----	46.6%
Excessive alcohol-----	0.7%
Temperate use of alcohol-----	6.9%
Tobacco excessive-----	33.1%
Tobacco temperate-----	12.3%
Hours of work too long-----	26.4%
Lack of exercise-----	60.8%

Family and personal history were taken, but deemed of little value for this study. The chief physical findings presented an extraordinary picture of the large number of, and gravity of impairments found in people who are up and about, apparently able to carry on a day's work. The findings themselves, (as has been seen in all physical examination surveys), supply good reason for these examinations.

12.9% of all were overweight more than 20% of average. Ingleside showed only 5%, which, using these authors' explanations, could be accounted for in at least two ways: the mental patients originally come mostly from the lower social strata; and in the Institution attention is paid to the patients' diet and regularity of habits. This group showed no material difference in valvular heart lesions, but there was a higher proportion of enlarged hearts and pulses above 90 than in persons with normal

weight.

Blood pressure was high in twice as many overweights as normal weights, while, conversely, the overweights show smaller percentages of arterial thickening. At Ingleside over half (53%) of the obese had hypertension, while only 21% of the normal or underweight patients had high blood pressure. This compares very well with the authors' observations, and shows, it seems, a very definite relation between obesity and hypertension as to cause of the latter.

The relation of diet (other than excesses leading to obesity), tobacco and alcohol did not seem to show any great effect on blood pressure in users or abstainers. Coffee and tea users showed a slightly higher incidence. Low blood pressure was only slightly, perhaps insignificantly, pronounced among excessive tobacco users.

The findings in this group bear out the findings of others in that arteriosclerosis and hypertension are not always related. The writers call attention to the error of regarding arterial degeneration as wholly a senile disease, rather than a condition or tissue change possibly due to many causes, especially infections in youth.

Other findings with respect to heart and pulse abnormalities were of such less incidence than the Ingleside percentages as has been seen in the foregoing comparative studies.

In regard to the respiratory system, 97.2% were reported normal. Only 0.4% showed suspected or incipient

tuberculosis, while only six cases (0.037%) were found to have the advanced or moderately advanced form. From this finding, if true, there can be no doubt that the 16,662 men represent a highly selected group, even above the total of 100,924 reported by Sydenstricker and Britten, of which these are undoubtedly a part. 1.2% were found to have bronchitis, which compares favorably with the 1.4% found in the Hospital group. A high percentage of the bronchitis cases were excessive tobacco users, which was particularly noted in the Ingleside examinations also.

The conclusions of Dublin, Fisk, et al. are summed up in one sentence: "Due to findings, wider extension of periodic health examinations is indicated, such examinations to be followed by hygienic advice and prompt treatment."

Hagerstown Study

In the autumn of 1921, the Statistical Office of the United States Public Health Service began work that was continued over a period of nearly two and one-half years---a series of repeated observations upon the incidence of illness in a general population group in Hagerstown, Maryland. A record of illness according to cause was secured for a population of between 8,000 and 9,000 persons. The population actually observed for the entire period included about 1,600 families, composed of about 7,200 white persons of all ages and both sexes, living under conditions that in no remarkable way were unusual.

The family was the unit for observation, and, so far as possible, all members actually resident in each family were under observation.

A preliminary house-to-house survey was made, in several sections of the city, in the course of which the population of the section was enumerated and records were made (a) for each individual relating to color, sex, and age, past occurrence of certain contagious diseases and present chronic or acute diseases or ailments, and (b) for each household relating to its general economic status, sanitary conditions, method of excreta disposal, and water and milk supplies. This survey was followed by a series of 16 canvasses, each household being visited by a trained field assistant at intervals of from six to eight weeks. At each visit a history of the incidence of sickness in the family since the previous visit, with a statement of date of onset, duration, extent of disability, attendance of a physician, etc. was taken. All statements were regularly checked upon by systematic reference to weekly absence from school reports, reports of cases treated in various clinics, reports of practicing physicians, reports of visiting nurses, physicians' diagnoses, etc. The cooperation given by the families was very satisfactory and gratifying, and since the families resided in several sections of the city, and composed about one-fourth of its total white population, it is believed that they constituted a fair representation of the groups which appear

to differ with respect to economic status and sanitary environment.

In all, 19,054 illnesses were recorded during the 28 months' period, December 1, 1921 to March 31, 1924. Since 16,840 "years of exposure" were recorded, an annual rate is shown of 1,131.5 per 1,000 population. (A "year of exposure" being the equivalent of one person observed for one year.) During the same period, the annual death rate for the entire white population of Hagerstown, exclusive of non-residents, was 10.6 per 1,000.

Upon the assumption that the illness rate of 1,132 per 1,000 prevailed in the entire population of the city, an incidence of slightly more than 100 cases of illness for each death is indicated.

The cases of illness were divided into ten broad groups, of which the respiratory diseases and diseases of the circulatory system concern us. The diseases included under "respiratory diseases" are: influenza with respiratory complications, pulmonary tuberculosis, diseases of the nasal fossae and annexae, larynx, bronchi, bronchopneumonia, lobar pneumonia, pleurisy, congestion of the lungs, asthma, emphysema, silicosis, etc; and the annual rate was 668.6 cases per 1,000 persons observed. This is over 500 per thousand more than the next most prevalent disorder. The "circulatory diseases" include pericarditis, acute and chronic endocarditis and myo-

carditis, coronary diseases, other diseases of the arteries, diseases of the veins, anomalies of blood pressure, thromboses, etc., and the annual rate was found to be 35.9 cases per 1,000 persons observed. The extremely high incidence of respiratory diseases at once challenges attention. Other studies of disabling sickness among wage-earners (8) have shown their relatively high frequency, but their preponderance among causes of illness in a general population group had not before been so definitely known. Naturally, a large number of the respiratory illnesses were made up of the common cold, so that this study tells us nothing specific as to amount of any one disorder for comparison with Ingleside data.

Showing the utterly unreliable picture that use of mortality data gives of the health of a population, note the reversed differences in the morbidity and mortality figures of the two groups of diseases:

Cause	Annual Rate per 1,000		Per cent	
	Morbid- ity	Mortal- ity	Morbid- ity	Mortal- ity
All Causes -----	1131.5	10.6	100.0	100.0
Respiratory diseases-----	668.6	2.1	59.7	19.6
Circulatory diseases-----	35.9	3.7	3.2	34.7

The death rate at Ingleside, computed for the years 1934 and 1935 was 5.9% per year, or an annual rate of 59 per thousand, from all causes. Deaths from pulmonary diseases ran 9 per 1,000 per year; and from cardiovascular diseases 32.9 per 1,000 per year. The reasons for the height of the death rate are obvious---representing an

colds, influenza, acute bronchitis, etc. was included, over a period of 28 months.

	Number of Defects per Death					
	0	5	10	15	20	25
Respiratory	████████████████████					18.7
Cardiovascular	████████████████████					19.8

Finally, Sydenstricker compares the age curve for illnesses with the age curve for mortality. In his graph, not reproduced here, the mortality curve exhibits the usual high points at the age of infancy and at old age, with the relatively low level in childhood and early adulthood. The morbidity curve, on the other hand, shows no variations of such magnitude. In other words, disease kills chiefly at two periods of life---in infancy and toward the end of the "natural span"---whereas disease, with far less discrimination, causes discomfort, suffering, illness, and disability at every age. Here again, the inadequacy of mortality statistics as an index of health is clearly shown:

Ages	No. illnesses per Death
Under 5 -----	60
5-14 -----	550
15-24 -----	200
25-44 -----	150
45-64 -----	50
65 and over -----	10

TABLE VI--DEATH RATES PER THOUSAND BY AGE GROUPS; UNITED STATES, 1920. (12)

Under 1 -----	96.7
1-4 -----	9.8
5-9 -----	3.0
10-14 -----	2.3
15-19 -----	4.1
20-24 -----	5.7
25-34 -----	6.9
35-44 -----	8.3
45-54 -----	12.2
55-64 -----	23.9
65-74 -----	52.7
75 and over ---	135.1

Study of 8,758 White Families

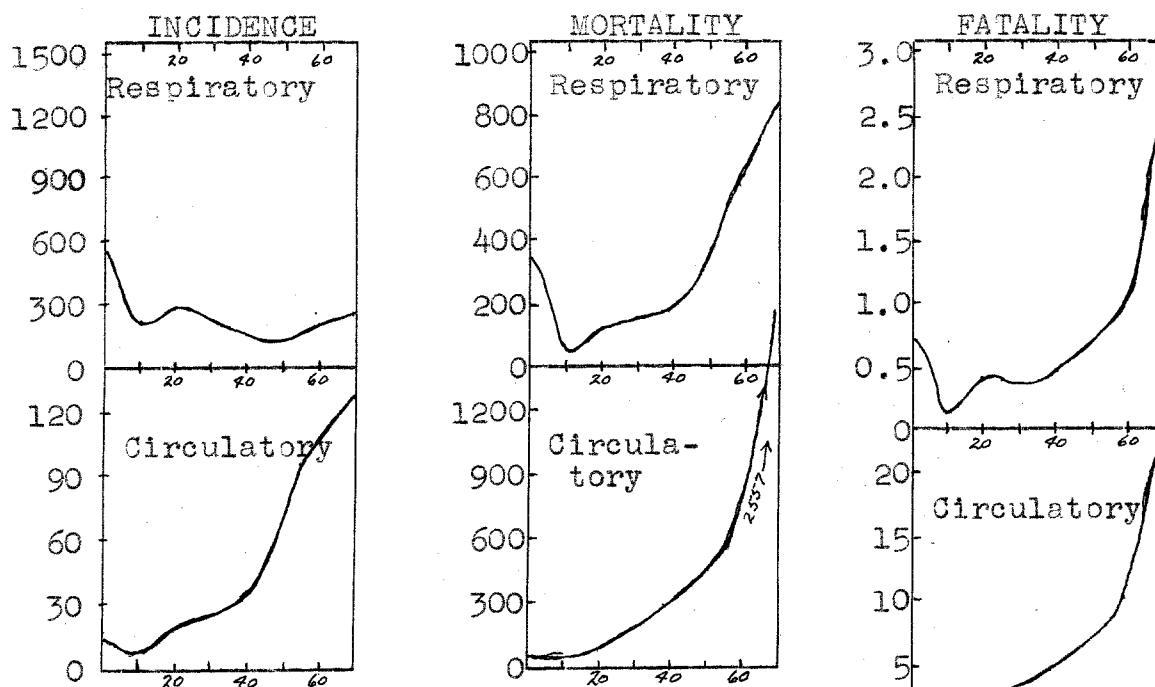
Collins (3) has collected data similar to that from the Hagerstown survey, resulting from canvasses of 8,758 white families living in 130 localities in 18 states, and including 39,185 individuals. Each family was visited at intervals of 2-4 months to obtain a sickness record for one year. This was mostly during the years 1929 and 1930, so for comparison, the mortality data is taken for those years. The following results were obtained in regard to respiratory and cardiovascular diseases:

Disease	Annual Case Rate	Annual Death Rate	Estimated Deaths / 100 cases
Respiratory	32.9%	0.184%	0.56
Circulatory	2.69%	0.239%	8.88

Here again we see a high incidence of respiratory cases because of high incidence of the common cold in the course of one year. Respiratory deaths were largely pneumonia and tuberculosis, which enter into the total of respiratory cases in relatively small numbers. Here again, respiratory diseases, including everything from the common cold to pneumonia and tuberculosis, are the outstanding cause of

illness, constituting 40% of all illnesses, and occurring nearly four times as often as gastrointestinal diseases, which were next in order of frequency. As to death rates, circulatory causes come first, with respiratory a fairly close second. General diseases, including carcinoma, is third.

The graphs sum up Collins' results very concisely:



Scales are so made that the adjusted rate for all ages represents an interval on the vertical scale that corresponds to 20 years on the horizontal scale.

A close study of these graphs gives an explanation to the differences seen in the graphs on pp. 41 and 42, between the Hagerstown group and Ingleside. In advanced age, which Ingleside represents, incidence of respiratory disease falls off and circulatory incidence rises, while the lethal effects of both show a rise.

Mortality Among Social Classes

Britten (1) studies a collection of data in an effort to ascertain the difference in incidence of various causes of death in ten states from which mortality statistics were available. A special comparison of the prevalence and differences thereof in the various social levels was attempted. He found that mortality rates among male industrial and equivalent workers are greatly in excess of those in the higher economic classes (business and professional). These differences are noted among young adults as well as in the older ages, and taken broadly, appear to be associated with complex social, economic and racial distinctions as well as with specific occupational hazards.

Causes of death showing most excessive differences between the classes were tuberculosis (pulmonary), pneumonia and accidents, with rather marked differences also for nephritis, cancer and heart diseases. It has long been known that mortality in England varies with the social class, and since some estimate can be made in the United States, such differences are found to be more marked here.

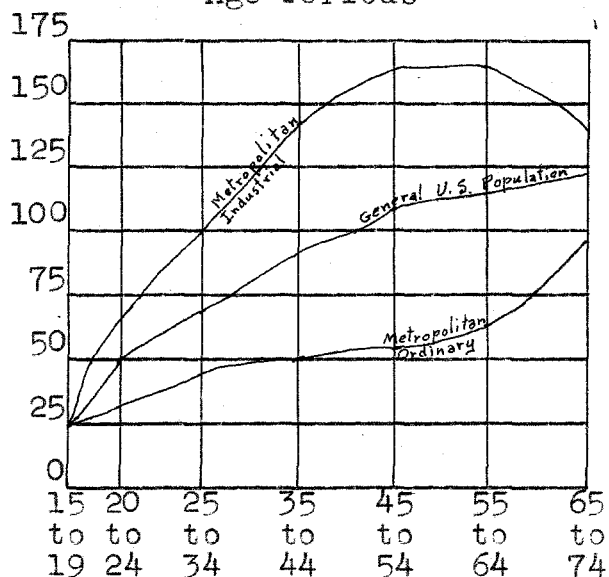
Taking the ratio of American mortality to English for the higher classes as 100, the corresponding ratios for the other classes may be expressed as follows: skilled labor 112; semiskilled 123; and unskilled 140. No doubt high negro mortality in large Northern cities plays some part in this excess over English figures. Three age groups are

taken: 15-24, 25-44, and 45-64; and tendencies are seen to be the same in all three, as regards differences between the classes.

Nothing will be gained by reproducing here the tables given by Britten, to show the differences mentioned. Suffice it to say that there were 26.2 deaths per 100,000 deaths, from pulmonary tuberculosis among professional men in 1930, whilst at the highest end of the list comes the unskilled group, with 184.9 deaths per 100,000 deaths, from tuberculosis. Heart disease showed a range from a low of 177 per 100,000 in the professional group, to 243 in the unskilled. Cerebral hemorrhage, from 48.3 in the upper levels to 58.3 in the unskilled. With such a difference in mortality rates among the various groups of the general population, why should there not be the differences noted in physical impairment rates among the classes, and greatest of all in the class of mentally ill?

Industrial workers show a great increase in death rates from tuberculosis over other groups. Lanza and Vane (8) present evidence to show that the silica dust hazard has a great deal to do with this increase, but since silica workers make up only a little over half a million of the industrial workers, other factors must also be a work, as suggested by Britten.

Tuberculosis Death Rates, 1931
Rates per 100,000--White Males by
Age Periods



While on the mortality phase of the subject, it might be of interest to note what William A. White, Superintendent of Saint Elizabeths Hospital, Washington, D.C., tells us by special correspondence:

"I have your letter of January 28th requesting certain statistical information in regard to the occurrence of various disease entities in the population of this Hospital.

"I regret to inform you that we have not the information you ask for regarding the physical diseases of our patients. The only statistics we have that we can refer to are those of the various mental diseases. With respect to these I may state what I think is not generally known, and that is that the incidence of death is considerably higher for the mentally ill than it is for the corresponding classes as to age and sex in the general registration area of the United States, and that the average age to which these patients live is in direct relation to the malignancy of their mental disorder. In this respect we classify our mental cases as follows: First, the paranoid types of reaction, which live approximately to the same age as the general population; then come the manic-depressive group, which do not live quite as long; the dementia precox group, who die a little younger yet; then the epileptic types of reaction, which are a little shorter lived. Following this there are the various grades of feebleminded, running all

the way from mild degrees to profound idiocy, and the death rate here corresponds to the depth of the mental involvement, so that the idiots die very young indeed, whereas the high grade imbeciles and morons are able to get along quite well for a considerable number of years. This, I think, is a very important factor to bear in mind in dealing with this whole group, because it shows that in spite of our efforts at creating a favorable environment, the differential death rate runs against those who are handicapped by mental disorder."

Findings in 1260 Autopsy Cases

A study of the incidence or distribution of disease in 1260 cases coming to autopsy was made by Freeman (6, 7). The diseases listed are not necessarily the cause of death, but are those found present at autopsy, which may or may not have given positive physical signs in life. Compared with findings in the living Ingleside patients:

	Autopsy cases 1260	Ingleside 850 pts.
Valvular Heart Disease	21.5%	14.6%
Aortic Lesions	2.5%	0.94%
Active Tuberculosis	14.2%	7.5%
Healed Tb. (compared with "suspected" in Ingleside)	24.8%	15.0%

It is unfortunate that Freeman and others have not reported more extensively on this type of work, for a comparison of incidence of disease found at autopsy, where diagnosis is almost certain, to physical findings of disease in any group would serve as a good check upon diagnostic ability physically, as well as give a true picture of incidence of impairments. However, this method is nil from standpoints of treating those affected except to give an idea to examiners of what to look for in checking the health of a group.

CONCLUSIONS

There is an insufficient amount of data in the civilized world today for a true health-check of the population.

There are more serious and disabling impairments among our apparently able-bodied people than is generally realized, and consequently there is need for some method of universal periodic health examination, and of early advice and treatment for defects found.

Mortality rates do not give a true picture of the health of any population.

Mentally ill patients show a higher incidence of physical defects, and a higher death-rate, in relation to the severity of their mental disorder.

The more or less ideal environment in a Psychiatric Hospital, and the vegetative life led by a great many of the patients, has little or no effect on the incidence of Pulmonary and Cardiovascular impairments, nor, apparently on the death rates therefrom.

Uniformity is greatly needed in conducting physical examinations of any large group of persons, from the making of the physical diagnoses, to the recording and tabulation of results for the group.

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