# Health and Socio-Economic Studies in Puerto Rico

## IV. PHYSICAL IMPAIRMENTS OF ADULT LIFE AMONG AGRICULTURAL WORKERS*

*By* P. MORALES OTERO *and* MANUEL A. PÉREZ†

*From the Health Division, Puerto Rico Reconstruction Administration, and the School of Tropical Medicine, San Juan, P.R.*

THE STATE of health of individuals engaged in the ordinary pursuits of life is a problem of medical and public health importance. This knowledge can not be gained from the study of actual or suspected cases of communicable diseases, which are dealt with in morbidity statistics, or through observations registered in clinical records, which ordinarily are kept for actually ill persons only, or from the study *a posteriori* of the health of a population by the analysis of deaths and their causes as is done in mortality statistics and in autopsy protocols. To obtain a true picture of the prevalence of defects, diseases or impairments, not ostensibly disabling, it seems essential that fairly representative groups of the population be subjected to complete physical medical examination, which should be performed with certain degree of uniformity by qualified examiners.

The opportunity was offered us to carry out such a study on the rural adult male population, in the workers' camps established by the P.R.R.A. in 1936 and 1937, as a means for the selection of workers best qualified for the grant of farmsteads, and also for agricultural, industrial and educational training centers. As a preliminary step before joining the camps a physical medical examination and the supplementary laboratory examinations were made of every individual, thus affording the opportunity for the statistical study of the data obtained. In order to have a more representative sample of the rural male population of the Island with respect to age, race and geographical distribution, we utilized many similar examinations made on all male adults admitted to the clinics in the rural dispensaries established by the Health Division.

Part of the material gathered through these examinations has been already used in a study of the physical measurements of the workers.[3] The present study contains an analysis of the frequency and prevalence

* Received June 22, 1939.

† The authors wish to express their appreciation to Miss Canda Larrazábal, Mr. Mario Marrero and Mr. F. Rodríguez Vélez for their valuable assistance in the preparation of this paper.

at different ages of physical impairments of adult life among a substantial number of the workers measured, and is the fourth of a series of studies which is being published by us. Two other previous papers of the series deal with the health and socio-economic conditions in the various agricultural regions of the Island.[1, 2]

So far as we are aware, this is the first investigation ever made of the physical impairments of any sizable group of the population of Puerto Rico. During the World War several thousand men were drafted for military service, everyone of whom was given one or more medical physical examinations, but these records were never used for any quantitative study of the physical fitness of the men drafted. However, the report of the Adjutant General[4] published in 1924 revealed that a very large proportion of the men were rejected as physically or mentally unfit.

Works on the physical impairments of adult life are not numerous in the medical literature. In the United States, Dublin, Fisk and Kopf[5] made the first important study of this kind on some 17,000 of the records obtained since 1921 by the Life Extension Institute. The study of these authors deals with hygienic and dietetic habits, personal and family history in relation to present condition, frequency of impairments, posture, build and weight, etc. Other studies of importance are those made by Love and Davenport[6] on the physical examination records of Army recruits during the World War and by Britten and Thompson[7] on the results of physical examinations of 10,000 industrial workers by medical officers of the United States Public Health Service. In 1930 Sydenstricker and Britten began the publication of a series of papers on the physical impairments of adult life as a result of the statistical study of medical examinations by the Life Extension Institute of 100,924 white male life insurance policyholders. Three papers of this series dealing with the general results of the study,[8] prevalence of impairments at different ages[9] and physical impairments and occupational class[10] have been frequently consulted during the preparation of this paper, though it is not intended here to compare in detail our data with those of the aforementioned studies, as aside from other differences which are liable to occur in so dissimilar communities as the United States and Puerto Rico, the data used in the present study pertain solely to agricultural workers. In the quoted studies heterogeneous groups of population were examined. In some, for example the Army data, all classes of society were represented; in others, as in the case in the Life Extension Institute's data, the examinations were limited to a highly selected group, those able to pay for a life insurance policy. In all cases, it is most probable that the examinees were in a higher cultural and economic level than the Puerto

Rican agricultural laborer. However, although the figures in general are not comparable, the similarity in trend and behavior of the two sets of data is apparent.

The data for the present study were recorded on special blanks provided for the purpose, adaptations of the official form used for medical examinations in the United States National Guard. The records were filled out in triplicate; the original and one of the copies were sent to the central office of the Health Division, the original to be used by the Statistical Section. The examining physician kept on file the third copy. As soon as these records reached the Statistical Section they were carefully examined, coded, and made ready for mechanical tabulation, utilizing punch cards specially designed for the purpose. If omissions, inconsistencies or ambiguities were found, the necessary information was obtained from the corresponding examining physician.

The laboratory examinations were performed at the Biological Laboratory of the Insular Department of Health, and the data pertaining to each one of them were likewise transferred to punch cards for mechanical tabulation. No urinalysis tests were made. The physical and the laboratory examination records pertaining to each individual were placed together and serial identification numbers were used for them after the data contained in such records had been properly checked.

The examinations here analyzed were performed by forty-one physicians in charge of the camps and dispensaries in which they were performed. The number of physicians thus appears to be sufficiently large to represent average ability among the medical profession in the Island, and probably gives assurance that differences in diagnostic standards have been in some degree offset. On the average, each physician performed 217 examinations.

Written instructions as to the form of carrying out the examinations were issued to assure certain uniformity in the collection of the data. For the preparation of these instructions the Manual of Standards of Physical Qualifications for Entrance into the National Guard[11] and Sergent's[12] text on clinical technique and semeiology were consulted. Special pains were taken to impress upon the examiners the necessity of recording the results of the examinations with clarity and in detailed form, with ample opportunity to state their findings even if space were not provided for in the official blank used.

A fact that should at all times be borne in mind is that the examinations were performed by general practitioners as a matter of routine in their work and not by specialists in the various branches of the medical profession. Thus the examinations at most give a general picture of the

health conditions of the examinees and under no circumstances may be regarded as perfect. Some of the workers were reexamined to check doubtful signs or conditions found, and many were given a second general examination upon dismissal, but only the first, or entrance, examinations have been considered here.

We feel that the greatest value of the data presented in this study is quantitative rather than qualitative. For the first time in the medical history of the country a sufficiently large number of physical examina-

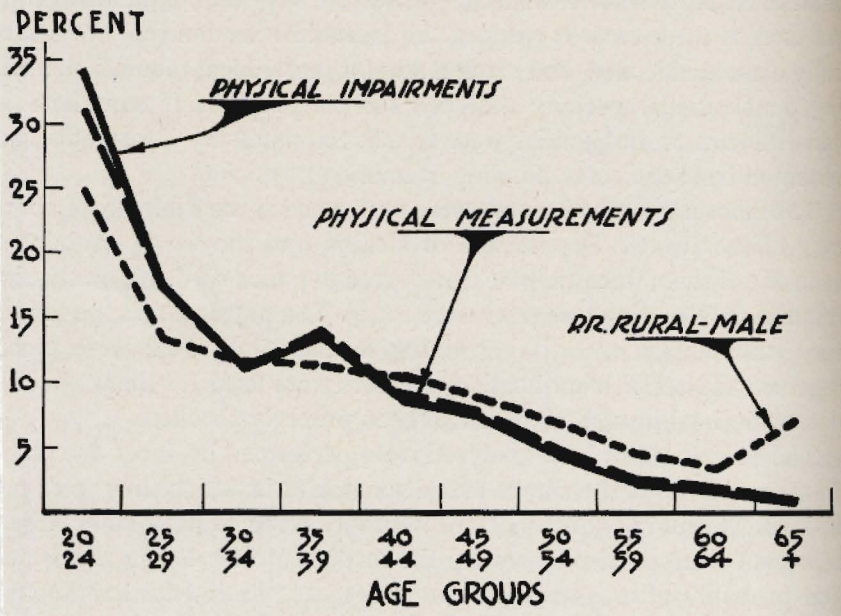


FIG. 1A. Percentage Age Distribution of the Rural Male Population of Puerto Rico and of the Individuals Included in the Physical Measurements Study and in the Present Study.

tions of a representative group of the population, covering the most productive periods of life, has been compiled and statistically analyzed. No matter what the deficiencies and limitations of this material, it gives a fair indication of the state of health of the farm laborer, the most numerous class of the Puerto Rican population.

In the study of physical measurements 15,493 individuals were measured, of which 39.3% were measured at the camps and 60.7% at the dispensaries. The present study includes only 8,898 or 59.1% of these individuals, for the following reasons: (1) in order to have as complete examinations as possible, only those workers on whom any laboratory examination was performed were selected; workers not having any

laboratory examination whatsoever were excluded from the sample, and (2) all examinations pertaining to workers from 15 to 19 years of age were omitted because their number was too small to be representative of the rural male population of that age.

To be sure that this procedure did not result in a selection of the workers in other respects, we compared (1) the age; (2) color and (3) geographical distributions of the individuals thus selected with those

TABLE I

*Percentage Age Distribution*

*(1) Of the Rural Male Population of Puerto Rico 20 Yrs. of Age and Over (1935);*
*(2) Of the Workers Measured in the Physical Measurements Study;*
*(3) Of the Workers Examined in the Present Study, and Percentage that (2) and (3) are of (1).*

| AGE GROUPS | *Rural male population* (1) | *Workers measured* (2) | *Workers physically examined* (3) | *Per cent of rural male population* | |
|---|---|---|---|---|---|
| | | | | *Workers measured* | *Workers physically examined* |
| TOTAL | 100.0 | 100.0 | 100.0 | 5.4 | 3.2 |
| 20–24 | 24.6 | 31.0 | 34.0 | 6.8 | 4.4 |
| 25–29 | 13.3 | 17.1 | 17.5 | 6.9 | 4.2 |
| 30–34 | 11.5 | 11.4 | 11.0 | 5.3 | 3.0 |
| 35–39 | 11.1 | 14.0 | 13.3 | 6.7 | 3.8 |
| 40–44 | 10.3 | 9.0 | 8.6 | 4.7 | 2.6 |
| 45–49 | 8.5 | 7.7 | 7.2 | 4.9 | 2.7 |
| 50–54 | 6.3 | 4.8 | 4.2 | 4.1 | 2.1 |
| 55–59 | 4.3 | 2.6 | 2.1 | 3.2 | 1.6 |
| 60–64 | 3.2 | 1.6 | 1.4 | 2.7 | 1.4 |
| 65 over | 6.8 | 1.0 | .7 | .8 | .3 |

of the individuals included in the physical measurements' study and with those of the rural male population 20 years of age and over.

1. In Table 1 and Figure 1A the percentage age distribution of these three groups of population is given. It may be observed that although the age distribution of the individuals of the physical measurements study is identical with that of the individuals in the present study, the distribution in both groups is somewhat different to that of the total rural male population 20 years of age and over: there are more people in ages 20 to 29 years and less people in ages above 40 years than in the rural male population 20 years and over. Having regard to the dif-

ferences in prevalence of certain diseases and impairments at different ages, this might have a bearing if we want to generalize our findings to apply them to the rural adult male population at large. But inasmuch as the groups appearing *in excess* are the younger groups in which presumably there are less impairments, and the groups *in defect* are the older groups in which presumably there are more impairments, the effect of these differences in age distribution would at any rate be to minimize rather than to magnify the results. The total rate of impairments obtained is so high that it is not believed that the inequalities in age distribution have much importance.

2. The colored workers are under-represented in the sample, with 16.5% of all examinations, whereas the Census gives 21.3% of colored

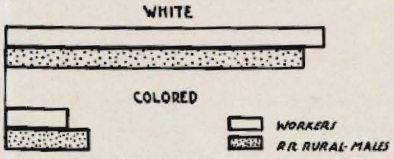


FIG. 1B. Color Distribution of the Individuals Included in the Present Study as Compared with the Rural Male Population of Puerto Rico of the same Age.

males in the rural male population 20 years of age and over (Figure 1B). Since there was no definite standard to make a rigid classification of the workers by race, not much importance is attributed to this difference in color distribution.

3. *All the municipalities of Puerto Rico except Guaynabo and Culebra are represented in this study. Forty-eight municipalities having more than fifty examinations each make up 95% of the entire group.* For this classification the usual place of abode of the examinees and not the place where they were examined was considered.

Since the workers examined at the camps constitute a selected group in the sense that they are younger, taller and heavier than the workers examined at the dispensaries, as was seen in the physical measurements study,[3] it was considered convenient to make a separate analysis of both groups assuming that the results obtained would be rather different. This assumption was fully confirmed when the final tabulations were made. Therefore, the results for the frequency of impairments are presented for the total number of men examined and separately for those examined at the camps and at the dispensaries. For the analysis of the prevalence of impairments at different ages, however, only the total number of examinations has been considered.

We have grouped all the impairments reported in ten main groups which cover the principal human organs or groups of organs. Group

XI corresponds to the infectious and parasitic diseases which were diagnosed as the result of positive laboratory examinations. These examinations have been kept apart because of their objective character and also because the causative agents of these affections are exogenous to the human body and, therefore, do not originate in any of the human organs.

The impairments have been grouped thus:

I. Eye diseases or defects
II. Ear, nose, throat
III. Gastrointestinal system
IV. Skin affections
V. Bones, joints and muscles
VI. Cardiovascular system
VII. Respiratory system
VIII. Lymphatic system
IX. Nervous system
X. Genitourinary system
XI. Infectious and parasitic diseases

Though the sample is large enough to give a fair indication of prevailing conditions in the main groups and in the principal classifications, the numbers in some of the minor sub-classifications are too small to impart great significance to the findings. Moreover, in some of the group classifications the number of impairments observed is rather small, as for instance in the groups of disorders of the respiratory and nervous systems.

The impairments were coded specifically as they appeared in the records, but all synonymous or equivalent terms were afterwards grouped for the final tabulations.* The data within each classification were grouped as much as possible because it was considered that in this way more strength was given to the final results. For this reason, the number of impairments classified as "other" in all the groups is relatively small, except perhaps in the groups of impairments of the nervous and genitourinary systems.

In Table 2 the frequency of impairments for the total number of individuals in each group and separately for those examined at the camps and at the dispensaries is presented. Table 3 gives the age prevalence of impairments for the total number of individuals examined, regardless of the place of examination. The data in both tables will be discussed simultaneously considering each group and the principal classifications therein separately.

The frequency and age prevalence rates in the most important classifications will be presented also in graphic form (Figures 3-9).

---

* In this grouping and in the subsequent interpretation of the results we were fortunate in obtaining the assistance of Dr. Juan A. Pons, to whom we are greatly indebted.

TABLE 2

*Frequency of Impairments Among Workers Examined at the Camps and at the Rural Dispensaries*

| NATURE OF IMPAIRMENT, DISEASE OR SYMPTOM | TOTAL | | CAMPS | | DISPENSARIES | |
|---|---|---|---|---|---|---|
| | *Workers* | *Per cent* | *Workers* | *Per cent* | *Workers* | *Per cent* |
| Workers examined | 8,898 | 100.0 | 4,810 | 100.0 | 4,088 | 100.0 |
| Workers with impairments | 8,714 | 97.9 | 4,695 | 97.6 | 4,019 | 98.3 |
| *Eye Diseases or Defects* | | | | | | |
| Workers with impairments | 2,642 | 29.7 | 1,102 | 22.9 | 1,540 | 37.7 |
| Defective vision and errors of refraction | 1,631 | 18.3 | 767 | 15.9 | 864 | 21.1 |
| Diseases of external eye or eyelids | 1,496 | 16.8 | 481 | 10.0 | 1,015 | 24.8 |
| Cataracts | 174 | 2.0 | 42 | 0.9 | 132 | 3.2 |
| Strabismus | 60 | 0.7 | 39 | 0.8 | 21 | 0.5 |
| Other conditions | 9 | 0.1 | 2 | (1) | 7 | 0.2 |
| *Ear, Nose and Throat* | | | | | | |
| Workers with impairments | 2,552 | 28.7 | 1,327 | 27.6 | 1,225 | 30.0 |
| Defective hearing | 113 | 1.3 | 37 | 0.8 | 76 | 1.8 |
| Wax in ear | 452 | 5.1 | 305 | 6.3 | 147 | 3.6 |
| Otitis media | 40 | 0.4 | 8 | 0.2 | 32 | 0.8 |
| Other diseases of the ear | 12 | 0.1 | 7 | 0.1 | 5 | 0.1 |
| Deviation of septum | 369 | 4.1 | 245 | 5.1 | 124 | 3.0 |
| Hypertrophic turbinates | 105 | 1.2 | 17 | 0.4 | 88 | 2.2 |
| Coryza | 24 | 0.3 | 17 | 0.4 | 7 | 0.2 |
| Polypus | 13 | 0.1 | 3 | 0.1 | 10 | 0.2 |
| Other diseases of the nose | 9 | 0.1 | 5 | 0.1 | 4 | 0.1 |
| Enlarged, cryptic, buried tonsils | 1,407 | 15.8 | 830 | 17.2 | 577 | 14.1 |
| Nasopharyngitis | 438 | 4.9 | 142 | 3.0 | 296 | 7.2 |
| Other diseases of the throat | 12 | 0.1 | 10 | 0.2 | 2 | (1) |
| *Gastrointestinal System* | | | | | | |
| Workers with impairments | 7,621 | 85.6 | 4,059 | 84.4 | 3,562 | 87.1 |
| Carious teeth | 3,730 | 41.9 | 2,164 | 45.0 | 1,566 | 38.3 |
| Missing teeth | 5,626 | 63.2 | 2,869 | 59.6 | 2,757 | 67.4 |
| Pyorrhea and gingivitis | 3,963 | 44.5 | 1,767 | 36.7 | 2,196 | 53.7 |
| Stomatitis | 56 | 0.6 | 44 | 0.9 | 12 | 0.3 |
| Abscess | 18 | 0.2 | 14 | 0.3 | 4 | 0.1 |
| Other diseases of the mouth and gums | 42 | 0.5 | 13 | 0.3 | 29 | 0.7 |
| Constipation | 188 | 2.1 | 34 | 0.7 | 154 | 3.8 |
| Gastric disturbances | 478 | 5.4 | 111 | 2.3 | 367 | 9.0 |

TABLE 2 *(Continued)*

| NATURE OF IMPAIRMENT, DISEASE OR SYMPTOM | TOTAL | | CAMPS | | DISPENSARIES | |
|---|---|---|---|---|---|---|
| | *Workers* | *Per cent* | *Workers* | *Per cent* | *Workers* | *Per cent* |
| Distention of abdomen | 816 | 9.2 | 446 | 9.3 | 370 | 9.0 |
| Hemorrhoids | 54 | 0.6 | 2 | (1) | 52 | 1.3 |
| Jaundice | 18 | 0.2 | — | — | 18 | 0.4 |
| Pain in stomach | 33 | 0.4 | 1 | (1) | 32 | 0.8 |
| Other conditions | 9 | 0.1 | — | — | 9 | 0.2 |
| *Skin Affections* | | | | | | |
| Workers with impairments | 1,401 | 15.7 | 525 | 10.9 | 876 | 21.4 |
| Dermatitis | 828 | 9.3 | 279 | 5.8 | 549 | 13.4 |
| Scabies | 229 | 2.6 | 94 | 2.0 | 135 | 3.3 |
| Furuncles | 185 | 2.1 | 60 | 1.2 | 125 | 3.0 |
| Ulcers | 112 | 1.2 | 43 | 0.9 | 69 | 1.7 |
| Other conditions | 81 | 0.9 | 64 | 1.3 | 17 | 0.4 |
| *Bones, Joints and Muscles* | | | | | | |
| Workers with impairments | 2,727 | 30.6 | 1,267 | 26.3 | 1,460 | 35.7 |
| Pes Planus | 2,250 | 25.3 | 1,068 | 22.2 | 1,182 | 28.9 |
| 1st. degree | 679 | 7.6 | 316 | 6.6 | 363 | 8.9 |
| 2nd.degree | 1,571 | 17.6 | 752 | 15.6 | 819 | 20.0 |
| Ankylosis | 183 | 2.0 | 73 | 1.5 | 110 | 2.7 |
| Limbs, deformity of | 230 | 2.6 | 106 | 2.2 | 124 | 3.0 |
| Spinal deformities | 69 | 0.8 | 43 | 0.9 | 26 | 0.6 |
| Chest, deformity of | 49 | 0.6 | 7 | 0.1 | 42 | 1.0 |
| Fractures and dislocations (old) | 57 | 0.6 | 18 | 0.4 | 39 | 1.0 |
| Arthritis | 39 | 0.4 | 3 | 0.1 | 36 | 0.9 |
| Other conditions | 43 | 0.5 | 13 | 0.3 | 30 | 0.7 |
| *Cardiovascular System* | | | | | | |
| Workers with impairments | 1,936 | 21.8 | 939 | 19.5 | 997 | 24.4 |
| Cardiac murmurs | 382 | 4.3 | 141 | 2.9 | 241 | 5.9 |
| Hypertrophic heart | 69 | 0.8 | 7 | 0.1 | 62 | 1.5 |
| Slow pulse (under 58) | 142 | 1.6 | 77 | 1.6 | 65 | 1.6 |
| Rapid pulse (over 90) | 556 | 6.2 | 375 | 7.8 | 181 | 4.4 |
| Irregular rhythm | 132 | 1.5 | 61 | 1.3 | 71 | 1.7 |
| Arterial thickening (slight, moderate, marked) | 908 | 10.2 | 370 | 7.7 | 538 | 13.2 |
| Phlebosclerosis | 13 | 0.1 | 12 | 0.2 | 1 | (1) |
| Varicose veins | 198 | 2.2 | 86 | 1.8 | 112 | 2.7 |
| Other conditions | 13 | 0.1 | 8 | 0.2 | 5 | 0.1 |

TABLE 2 *(Continued)*

| NATURE OF IMPAIRMENT, DISEASE OR SYMPTOM | TOTAL | | CAMPS | | DISPENSARIES | |
|---|---|---|---|---|---|---|
| | *Workers* | *Per cent* | *Workers* | *Per cent* | *Workers* | *Per cent* |
| *Respiratory System* | | | | | | |
| Workers with impairments | 501 | 5.6 | 153 | 3.2 | 348 | 8.5 |
| Bronchitis | 436 | 4.9 | 136 | 2.8 | 300 | 7.3 |
| Asthma | 27 | 0.3 | 3 | 0.1 | 24 | 0.6 |
| Emphysema | 8 | 0.1 | — | — | 8 | 0.2 |
| Other conditions | 31 | 0.3 | 15 | 0.3 | 16 | 0.4 |
| *Nervous System* | | | | | | |
| Workers with impairments | 149 | 1.7 | 58 | 1.2 | 91 | 2.2 |
| Insomnia | 57 | 0.6 | 1 | (1) | 56 | 1.4 |
| Epilepsy | 17 | 0.2 | 2 | (1) | 15 | 0.4 |
| Neurasthenia | 35 | 0.4 | 28 | 0.6 | 7 | 0.2 |
| Paralysis, hemiplegia | 7 | 0.1 | 2 | (1) | 5 | 0.1 |
| Other conditions | 37 | 0.4 | 29 | 0.6 | 8 | 0.2 |
| *Lymphatic System* | | | | | | |
| Workers with impairments | 1,723 | 19.4 | 442 | 9.2 | 1,281 | 31.3 |
| Adenitis of cervical glands | 21 | 0.2 | 11 | 0.2 | 10 | 0.2 |
| Adenitis, all others | 1,693 | 19.0 | 425 | 8.8 | 1,268 | 31.0 |
| Other conditions | 10 | 0.1 | 7 | 0.1 | 3 | 0.1 |
| *Genitourinary System* | | | | | | |
| Workers with impairments | 1,006 | 11.3 | 375 | 7.8 | 631 | 15.4 |
| Phimosis | 244 | 2.7 | 38 | 0.8 | 206 | 5.0 |
| Orchitis (including enlarged testicles) | 78 | 0.9 | 31 | 0.6 | 47 | 1.1 |
| Hernia | 313 | 3.5 | 124 | 2.6 | 189 | 4.6 |
| Varicocele | 158 | 1.8 | 71 | 1.5 | 87 | 2.1 |
| Hydrocele | 130 | 1.5 | 66 | 1.4 | 64 | 1.6 |
| Urethritis | 18 | 0.2 | 2 | (1) | 16 | 0.4 |
| Epididymitis | 17 | 0.2 | 10 | 0.2 | 7 | 0.2 |
| Other conditions | 117 | 1.3 | 51 | 1.1 | 66 | 1.6 |
| *Infectious and Parasitic Diseases* | | (2) | | (2) | | (2) |
| Workers with positive samples | 6,898 | 77.5 | 3,722 | 77.4 | 3,176 | 77.7 |
| Syphilis | 342 | 5.4 | 222 | 5.5 | 120 | 5.2 |
| Malaria | 116 | 2.4 | 69 | 2.0 | 47 | 3.0 |
| Intestinal parasites (Any) | 6,751 | 89.1 | 3,626 | 88.8 | 3,125 | 89.4 |

TABLE 2 *(Continued)*

| NATURE OF IMPAIRMENT, DISEASE OR SYMPTOM | TOTAL | | CAMPS | | DISPENSARIES | |
|---|---|---|---|---|---|---|
| | *Workers* | *Per cent* | *Workers* | *Per cent* | *Workers* | *Per cent* |
| Mixed infestation | 3,129 | 41.3 | 1,791 | 43.8 | 1,338 | 38.3 |
| Uncinaria | 6,160 | 81.3 | 3,293 | 80.6 | 2,867 | 82.0 |
| Ascaris | 821 | 10.8 | 365 | 8.9 | 456 | 13.0 |
| Trichuris | 3,263 | 43.0 | 1,941 | 47.5 | 1,322 | 37.8 |
| Schistosoma | 16 | 0.2 | 10 | 0.2 | 6 | 0.2 |
| Other intestinal parasites | 10 | 0.1 | 8 | 0.2 | 2 | 0.1 |
| Filaria | 4 | 0.5 | 4 | 0.5 | — | — |
| T B Sputum | 12 | 9.8 | — | — | 12 | 9.8 |
| Gonococcus | 2 | 25.0 | — | — | 2 | 25.0 |

(1) Less than one tenth of one per cent.
(2) These percentages have been derived from the number of positive samples of the total examined in each class.

TOTAL DEFECTIVE WORKERS

In total, 8,898 physical examinations pertaining to the same number of individuals have been analyzed in the present study. Of these, 4,810 or 54.1% correspond to workers examined at the camps and 4,088 or 45.9% to workers examined at the dispensaries. The total number of workers with impairments is 8,714 or 97.9% of the workers examined. In the camps, 4,695 or 97.6% and in the dispensaries 4,019 or 98.3% of the workers were found with impairments.

The total number of impairments is 42,363, of which the workers in the camps had 20,394 and the workers in the dispensaries 21,969. Therefore, the average number of impairments per worker examined is 4.9 for the total, 4.3 for the camp workers, and 5.5 for the workers examined at the dispensaries.

The impairments are distributed as shown in Figure 2. The highest proportion, 35.5%, is found in the gastrointestinal group, followed by the infectious and parasitic group of diseases with 25.4%. Next in order are the diseases and defects of the eyes with 8%; the diseases of the ear, nose and throat with 7.1%; defects or impairments of the bones, joints and muscles, 6.9%; diseases, defects or conditions of the cardiovascular system, 5.7%; diseases or conditions of the lymphatic system, 4.1%; of the skin, 3.4%; of the genitourinary system, 2.5%; and, finally, the diseases, defects or conditions of the respiratory and nervous systems with 1.2% and 0.4% respectively.

Since it is reasonable to assume that a number of impairments were

TABLE 3

*Percentage of workers with impairments in specified age groups*

| NATURE OF IMPAIRMENT, DISEASE OR SYMPTOM | *Total* | AGE GROUPS | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | *20–24* | *25–29* | *30–34* | *35–39* | *40–44* | *45–49* | *50 & over* |
| Workers with impairments (Total) | 97.9 | 96.8 | 97.9 | 97.5 | 98.6 | 99.1 | 99.7 | 99.5 |
| *Eye Diseases or Defects* | | | | | | | | |
| Workers with impairments | 29.7 | 16.1 | 23.2 | 28.9 | 24.3 | 42.1 | 48.8 | 62.7 |
| Defective vision and errors of refraction | 18.3 | 9.9 | 12.5 | 14.1 | 19.5 | 25.8 | 30.6 | 50.1 |
| Diseases of external eye or eyelid | 16.8 | 7.4 | 12.6 | 18.0 | 21.6 | 24.8 | 30.8 | 34.1 |
| Cataracts | 2.0 | .2 | .2 | .4 | .6 | 2.0 | 6.2 | 12.9 |
| Strabismus | .7 | .6 | 1.1 | .8 | .4 | .8 | .3 | .7 |
| Other conditions | .1 | (1) | .2 | .2 | — | — | .2 | .3 |
| *Ear, Nose and Throat* | | | | | | | | |
| Workers with impairments | 28.7 | 31.4 | 28.7 | 28.5 | 28.3 | 26.4 | 24.2 | 24.7 |
| Defective hearing | 1.3 | .5 | .7 | .6 | 1.9 | 1.8 | 2.6 | 3.7 |
| Wax in ear | 5.1 | 5.0 | 4.4 | 5.8 | 5.3 | 5.4 | 4.7 | 5.5 |
| Otitis media | .4 | .3 | .4 | .7 | .5 | .4 | .8 | .7 |
| Other diseases of the ears | .1 | .1 | .2 | — | .3 | — | .2 | .1 |
| Deviation of septum | 4.1 | 3.4 | 3.8 | 4.8 | 5.8 | 4.4 | 3.4 | 4.7 |
| Hypertrophic turbinates | 1.2 | .6 | 1.2 | 1.4 | 1.2 | 1.2 | 3.3 | 1.2 |
| Coryza | .3 | .2 | .4 | .3 | .2 | .3 | .3 | .3 |
| Polypus | .1 | .1 | .1 | .1 | .3 | .3 | — | .1 |
| Other diseases of the nose | .1 | .1 | .1 | .1 | .3 | — | .2 | — |
| Enlarged, cryptic, buried tonsils | 15.8 | 21.9 | 16.4 | 14.3 | 12.4 | 11.4 | 8.6 | 8.1 |
| Nasopharyngitis | 4.9 | 4.9 | 5.5 | 5.8 | 4.2 | 5.2 | 3.9 | 4.4 |
| Other diseases of the throat | .1 | .2 | .1 | .1 | — | — | .3 | — |
| *Gastrointestinal System* | | | | | | | | |
| Workers with impairments | 85.6 | 76.0 | 84.0 | 87.7 | 92.6 | 93.5 | 96.4 | 96.9 |
| Carious teeth | 41.9 | 43.7 | 44.6 | 44.8 | 42.4 | 35.4 | 37.8 | 34.5 |
| Missing teeth | 63.2 | 49.4 | 60.7 | 66.6 | 72.9 | 74.2 | 76.2 | 82.3 |
| Pyorrhea and gingivitis | 44.5 | 25.0 | 36.9 | 49.6 | 58.5 | 64.2 | 65.6 | 72.5 |
| Stomatitis | .6 | .2 | .5 | .9 | .8 | .9 | .9 | 1.3 |
| Abscess | .2 | .1 | .2 | .1 | .2 | .3 | .6 | — |
| Other diseases of the mouth and gums | .5 | .4 | .7 | .6 | .2 | .6 | .5 | .4 |
| Constipation | 2.1 | 1.0 | 1.1 | 1.8 | 2.5 | 3.1 | 3.9 | 6.0 |
| Gastric disturbances | 5.4 | 3.5 | 5.5 | 5.9 | 6.4 | 6.9 | 6.1 | 8.0 |
| Distention of abdomen | 9.2 | 6.8 | 7.3 | 8.2 | 8.7 | 13.6 | 12.6 | 17.1 |

TABLE 3 *(Continued)*

| NATURE OF IMPAIRMENT, DISEASE OR SYMPTOM | *Total* | AGE GROUPS | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | *20–24* | *25–29* | *30–34* | *35–39* | *40–44* | *45–49* | *50 & over* |
| Hemorrhoids | .6 | .1 | .2 | .2 | .8 | 1.0 | 2.2 | 1.9 |
| Jaundice | .2 | .2 | .2 | .3 | .1 | .1 | .3 | — |
| Pain in stomach | .4 | .1 | .2 | .5 | .4 | 1.0 | .5 | .7 |
| Other conditions | .1 | — | .1 | — | .2 | .1 | .3 | .3 |
| *Skin Affections* | | | | | | | | |
| Workers with impairments | 15.7 | 12.4 | 13.3 | 16.1 | 16.8 | 21.0 | 22.8 | 20.5 |
| Dermatitis | 9.3 | 7.4 | 8.4 | 9.4 | 10.1 | 11.2 | 13.9 | 11.6 |
| Scabies | 2.6 | 2.4 | 2.2 | 2.6 | 2.4 | 4.3 | 2.3 | 2.5 |
| Furuncles | 2.1 | 1.2 | 1.4 | 1.9 | 3.0 | 2.9 | 3.9 | 3.7 |
| Ulcers | 1.2 | .9 | 1.0 | 1.0 | 1.4 | 1.6 | 2.2 | 2.1 |
| Other conditions | .9 | .8 | .7 | 1.3 | .4 | 1.8 | 1.4 | .8 |
| *Bones, Joints and Muscles* | | | | | | | | |
| Workers with impairments | 30.6 | 27.6 | 29.2 | 30.3 | 31.6 | 34.0 | 33.6 | 39.2 |
| Pes Planus | 25.3 | 24.6 | 24.6 | 25.3 | 26.0 | 26.0 | 24.2 | 28.3 |
| 1st. degree | 7.6 | 6.7 | 7.8 | 9.2 | 8.8 | 7.2 | 8.0 | 7.1 |
| 2nd. degree | 17.6 | 17.9 | 16.7 | 16.1 | 17.2 | 18.8 | 16.2 | 21.2 |
| Ankylosis | 2.0 | .7 | 1.1 | 2.8 | 2.1 | 4.2 | 5.0 | 4.0 |
| Limbs, deformity of | 2.6 | 1.8 | 2.6 | 1.6 | 2.2 | 4.3 | 3.8 | 4.7 |
| Spinal deformities | .8 | .7 | .7 | .7 | .5 | 1.2 | .9 | 1.1 |
| Chest, deformity of | .6 | .4 | .2 | .7 | .5 | .8 | .8 | 1.5 |
| Fractures and dislocations | .6 | .4 | .4 | .7 | 1.2 | .5 | .6 | 1.3 |
| Arthritis | .4 | .1 | .2 | .1 | .7 | 1.0 | .8 | 1.3 |
| Other conditions | .5 | .2 | .4 | .5 | .9 | .4 | .6 | 1.2 |
| *Cardiovascular System* | | | | | | | | |
| Workers with impairments | 21.8 | 19.2 | 16.1 | 17.6 | 19.4 | 24.7 | 29.2 | 43.6 |
| Cardiac murmurs | 4.3 | 3.8 | 3.3 | 4.6 | 3.7 | 4.4 | 5.3 | 7.6 |
| Hypertrophic heart | .8 | .3 | .4 | .3 | .3 | .8 | 2.5 | 3.3 |
| Slow pulse (under 58) | 1.6 | 1.3 | 1.7 | 1.0 | 1.7 | 2.0 | 2.2 | 2.3 |
| Rapid pulse (over 90) | 6.2 | 8.1 | 6.1 | 4.9 | 6.3 | 4.7 | 3.8 | 4.5 |
| Irregular rhythm | 1.5 | 1.1 | .9 | 1.2 | .9 | 1.0 | 2.8 | 4.7 |
| Arterial thickening (slight, moderate, marked) | 10.2 | 6.5 | 5.8 | 6.6 | 8.4 | 12.9 | 18.4 | 32.0 |
| Phlebosclerosis | .1 | — | — | — | — | .4 | .3 | 1.1 |
| Varicose veins | 2.2 | .4 | .8 | 1.1 | 2.1 | 3.9 | 5.9 | 9.5 |
| Other conditions | .1 | (1) | — | .4 | .1 | .1 | .3 | .5 |
| *Respiratory System* | | | | | | | | |
| Workers with impairments | 5.6 | 4.6 | 4.4 | 6.4 | 7.1 | 5.9 | 6.2 | 8.1 |

TABLE 3 *(Continued)*

| NATURE OF IMPAIRMENT, DISEASE OR SYMPTOM | *Total* | AGE GROUPS | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | *20–24* | *25–29* | *30–34* | *35–39* | *40–44* | *45–49* | *50 & over* |
| Bronchitis | 4.9 | 4.1 | 3.8 | 5.8 | 6.2 | 4.6 | 6.1 | 6.5 |
| Asthma | .3 | .1 | .1 | .1 | .5 | 1.0 | — | .8 |
| Emphysema | .1 | — | — | — | .1 | .1 | .2 | .7 |
| Other conditions | .3 | .4 | .4 | .5 | .3 | .1 | .2 | .1 |
| *Nervous System* | | | | | | | | |
| Workers with impairments | 1.7 | .8 | 1.2 | 2.1 | 3.0 | 2.0 | 2.0 | 2.9 |
| Insomnia | .6 | .1 | .2 | .7 | 1.7 | .8 | 1.1 | 1.3 |
| Epilepsy | .2 | .1 | .1 | .2 | .6 | .3 | — | .3 |
| Neurasthenia | .4 | .4 | .6 | .5 | .2 | .4 | — | .4 |
| Paralysis, hemiplegia | .1 | (1) | — | — | .2 | .1 | .2 | .1 |
| Other conditions | .4 | .1 | .4 | 1.0 | .2 | .4 | .8 | .8 |
| *Lymphatic System* | | | | | | | | |
| Workers with impairments | 19.4 | 15.6 | 20.3 | 20.4 | 21.8 | 22.2 | 19.1 | 24.5 |
| Adenitis of cervical glands | .2 | .3 | .1 | .1 | .2 | .6 | — | .1 |
| Adenitis, all others | 19.0 | 15.2 | 20.2 | 20.2 | 21.6 | 21.4 | 18.9 | 24.1 |
| Other conditions | .1 | .1 | .1 | .1 | — | .1 | .2 | .3 |
| *Genitourinary System* | | | | | | | | |
| Workers with impairments | 11.3 | 7.2 | 10.0 | 10.7 | 11.9 | 15.8 | 15.0 | 22.4 |
| Phimosis | 2.7 | 2.3 | 2.2 | 3.3 | 2.5 | 3.8 | 2.6 | 4.0 |
| Orchitis (including enlarged testicles) | .9 | .4 | 1.0 | .3 | .9 | 1.7 | 1.2 | 2.0 |
| Hernia | 3.5 | 1.5 | 3.2 | 3.1 | 4.6 | 4.8 | 5.0 | 8.4 |
| Varicocele | 1.8 | 1.3 | 1.4 | 1.8 | 1.8 | 1.4 | 3.0 | 3.9 |
| Hydrocele | 1.5 | .8 | .7 | .7 | 1.4 | 2.9 | 2.6 | 4.5 |
| Urethritis | .2 | .2 | .4 | .2 | — | — | .3 | .3 |
| Epididymitis | .2 | .1 | .3 | .1 | .1 | .5 | .3 | — |
| Other conditions | 1.3 | .9 | 1.2 | 1.4 | 1.1 | 2.1 | 1.4 | 2.5 |
| *Infectious and Parasitic Diseases* | (2) | | | | | | | |
| Workers with positive samples | 77.5 | 78.4 | 77.1 | 77.3 | 76.6 | 79.1 | 75.3 | 77.1 |
| Syphilis | 5.4 | 4.0 | 6.3 | 5.6 | 5.1 | 6.4 | 6.6 | 8.4 |
| Malaria | 2.4 | 2.4 | 2.2 | 2.5 | 2.0 | 2.8 | 1.3 | 3.2 |
| Intestinal parasites (Any) | 89.1 | 92.2 | 88.8 | 88.7 | 86.2 | 87.4 | 87.2 | 85.5 |
| Mixed infestation | 41.3 | 46.4 | 41.0 | 37.0 | 37.5 | 37.6 | 41.6 | 36.5 |
| Uncinaria | 81.3 | 85.7 | 81.8 | 79.9 | 78.1 | 78.3 | 77.4 | 76.2 |
| Ascaris | 10.8 | 11.0 | 10.6 | 9.2 | 10.7 | 10.6 | 12.8 | 11.6 |

TABLE 3 *(Continued)*

| NATURE OF IMPAIRMENT, DISEASE OR SYMPTOM | *Total* | AGE GROUPS | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | *20–24* | *25–29* | *30–34* | *35–39* | *40–44* | *45–49* | *50 & over* |
| Trichuris | 43.0 | 47.3 | 43.2 | 41.1 | 39.2 | 40.1 | 43.1 | 38.2 |
| Schistosoma | .2 | .3 | .3 | — | .1 | .1 | .2 | .3 |
| Other intestinal parasites | .1 | (1) | .3 | — | .2 | .1 | .2 | .2 |
| Filaria | .5 | — | 2.1 | — | — | 1.8 | — | — |
| T B Sputum | 9.8 | 17.4 | 4.2 | 13.3 | 8.0 | 7.7 | 16.7 | — |
| Gonococcus | 25.0 | — | 50.0 | 100.0 | — | — | — | — |

(1) Less than one tenth of one per cent.
(2) These percentages have been derived from the number of positive samples of the total examined in each class.

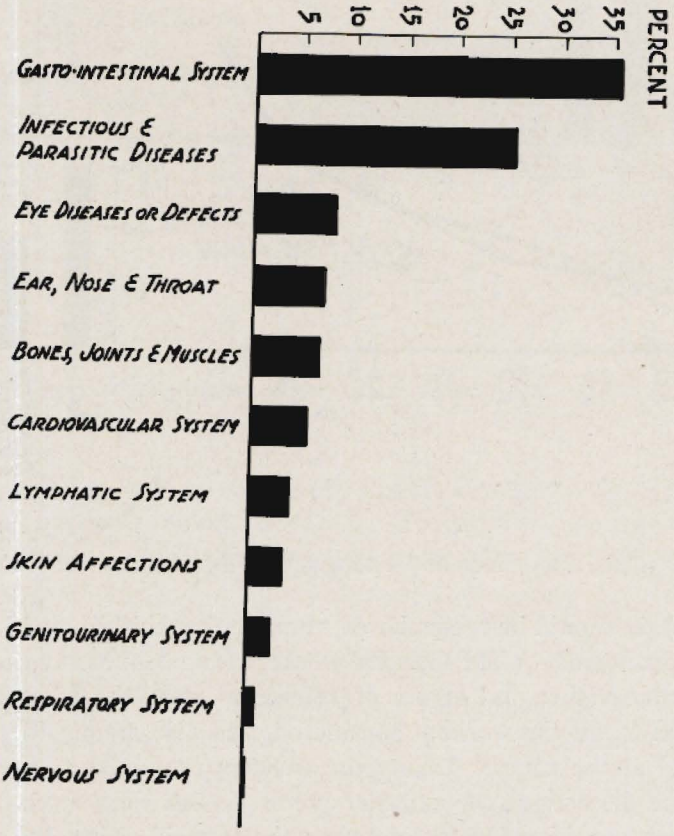


FIG. 2. Percentage Distribution of Impairments by Groups of Impairments.

overlooked, and that those recorded really existed, the number of defective workers as well as the number of impairments found is exceedingly high, even if consideration is given to the fact that the individuals examined belong to the lowest economic and social class in which the prevalence of illness and disease is usually highest. The gravity of the situation from the social and economic point of view is more apparent when we consider that the examinees are the breadwinners in the respective families.

### EYE DISEASES OR DEFECTS

A total of 2,642 workers were found with one or more impairments of the eyes, which is equivalent to 29.7% of the total number of workers examined. The proportion of workers with impairments of the eyes was considerably higher (37.7%) in the dispensaries than in the camps

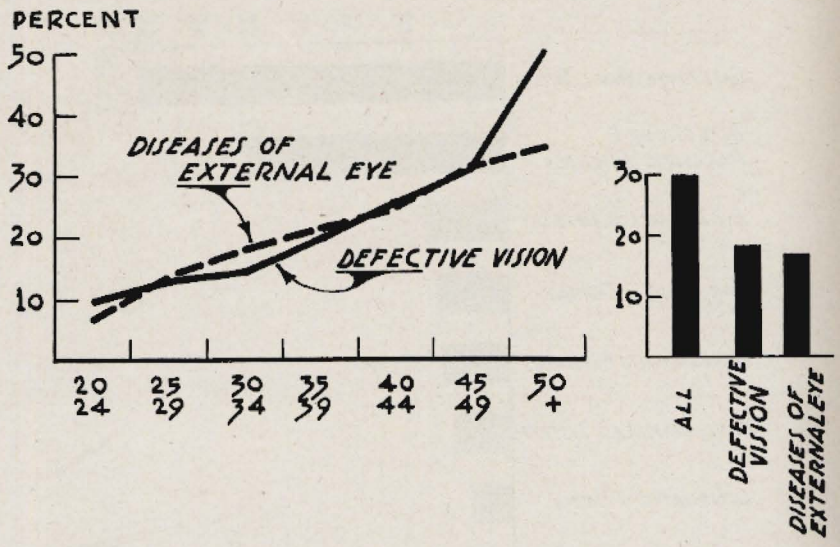


FIG. 3. Age Prevalence and Frequency of Eye Diseases or Defects.

(22.9%). It should be remembered, though, that this group of workers are, on the average, older than the workers examined at the camps.

Defective vision and errors of refraction were the most frequent impairments, all the workers considered, and also among the workers examined at the camps. Among the workers examined at the dispensaries, the diseases of the external eye or eyelids were more frequent. Vision was considered defective when the tests in either eye with the Snellen and Jaeger charts were below the normal. No degrees of acuity were considered.

As might be expected, the proportion of workers with eye defects or diseases increases with age from 16.1% in the age group 20-24 years to 62.7% in the age group 50 years and over. The same is the case with the workers who showed defective vision and errors of refraction, who increased consistently from 9.9% to 50.1% and with those who suffered from diseases or defects of the external eye or eyelid, who in-

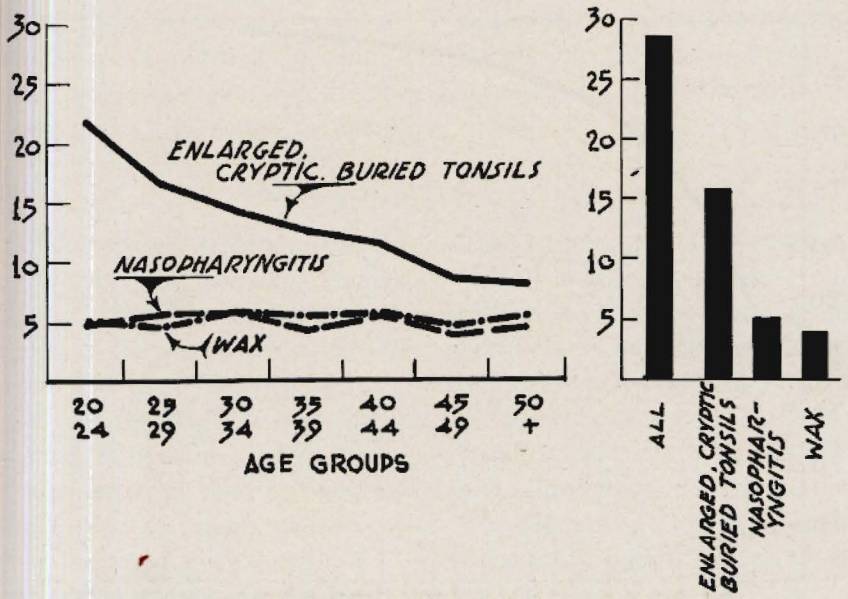


FIG. 4. Age Prevalence and Frequency of Impairments of the Ear, Nose and Throat.

creased in the same form from 7.4% to 34.1% respectively between the lower and upper age limits (Figure 3). The workers showing cataracts increased from 0.2% in the age group 20-24 years to 12.9% in the age group 50 years and over.

### EAR, NOSE AND THROAT

The impairments of the ears, nose and throat have been grouped together, but those corresponding to each of these organs are given also separately. There are 2,552 workers with impairments in this group, or 28.7% of the total number of workers examined. For the workers examined at the camps the incidence is 27.6%, and 30.0% for the workers examined at the dispensaries.

More than half of the workers in the entire group had enlarged or

diseased tonsils, which is the most frequent impairment in this group. Other relatively common impairments are nasopharingitis which is reported in 4.9% of the total number of workers and in 7.2% of the workers examined at the dispensaries, deviation of septum which was present in 4.1% of the workers, and wax in the external auditory canal which was found in 5.1% of the examinees.

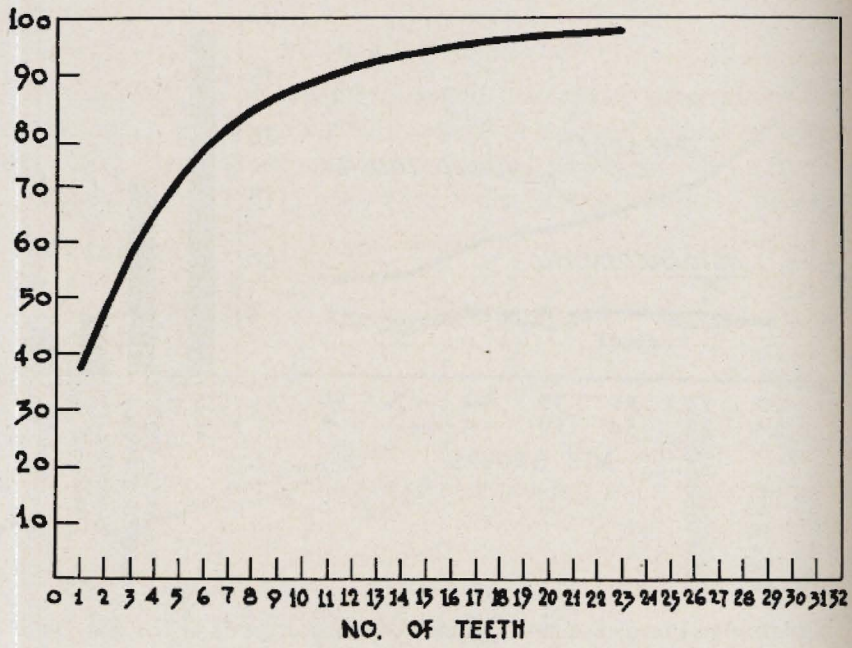


FIG. 5. Percentage of Workers with Missing Teeth.

Hearing was tested simply by speaking to the examinee in a low tone of voice at varying distances from 1 to 20 feet. Hearing was considered defective if the examiner's voice was not heard at less than 15 feet. The number of individuals found with defective hearing (113 or 1.3%) is too small to justify any further discussion of the subject. It is possible that if audiometer or other accurate tests had been made, the proportion of examinees showing defective hearing would have been higher.

There is a marked downward trend in the age prevalence of impairments in this group which, in the main, is caused by the sub-group of enlarged or diseased tonsils which are more frequent in the younger ages (Figure 4). The incidence of tonsil impairments decreases consistently with age from 21.9% in the age group 20-24 years to 8.1% in the age group 50 years and over. If this sub-group is eliminated the

curve for the rest of the impairments has an upward trend, steeper in the early ages. This is in accordance with observations previously made by Collins and Sydenstricker[13] in an epidemiological and statistical study of tonsillitis and confirmed by Sydenstricker and Britten[9] afterwards. It is interesting to note that these authors attribute part of the decline with age to the removal of tonsils, a factor which probably plays no part among the population group studied by us.

Defective hearing increases with age but since the numbers in this sub-group are so small the condition does not affect the general trend of the curve for the group as a whole. The curves for nasopharingitis and "wax in ear" are rather stationary.

### GASTRO-INTESTINAL SYSTEM

The diseases, defects or disorders of the gastro-intestinal system are by far the most frequent impairment found in this population group. Of the 8,898 men examined, 7,621 or 85.6% had one or more impairments of the gastro-intestinal tract, regardless of intestinal parasitism which has been included in the infectious and parasitic group of diseases. In the workers examined at the dispensaries the proportion of workers with some kind of gastro-intestinal impairment is 87.1%.

Carious teeth, missing teeth and pyorrhea and gingivitis are the outstanding impairments in this group. The highest rate of incidence is given by missing teeth with 63.2% for the total, 59.6% for the camps and 67.4% for the dispensaries.

The distribution of missing teeth among the workers may be arbitrarily grouped as follows (Figure 5):

1. In 36.5% of the examinees no teeth were missing.
2. In 49.5% of the examinees from one to eight teeth were missing.
3. In 14% of the examinees nine or more teeth were missing.

Undoubtedly as a result of the lack of economic resources, dentistry work to mend these defects was practically non-existent, since only 20 persons or 0.2% of the total number of examinees had plates or bridges, and the number on whom filling or other dental work was performed was extremely low.

Of all the workers with impairments in this group (7,621), 2,457, or 27%, had no other impairment than missing teeth. Therefore, the number of workers with impairments other than missing teeth in this group is 5,164, or 58.6%.

If the total number of examinations (8,898) is considered, there were 843 workers (653 in the camps, 190 in the dispensaries) who had no

other impairment than missing teeth and thus the percentage of workers with impairments, regardless of missing teeth, is 88.4 for the total number of workers examined, 84% for the camps and 93.7% for the dispensaries.

More than two-fifths (41.9%) of the workers examined showed carious teeth, the percentage in the camps being 45.0 and 38.3 in the dispensaries. This is one of the rare instances in which a higher incidence is found among the workers of the camps and has much to do with the age of the examinees as will be seen below when the prevalence by age of this condition is analyzed.

Pyorrhea and gingivitis are also highly prevalent among the country people as represented here. More than two-fifths (44.5%) of the workers suffered from one or the other or from both. In the camp workers the proportion is 36.7% and in the dispensary workers 53.7%.

Two impairments in this group which are conspicuous by the small number of cases found are constipation (2.1%) and hemorrhoids (0.6%). However, until more definite information is obtained we are not in position to offer an explanation of the low prevalence of these conditions.

The age prevalence of this group of impairments shows the expected upward trend with advancing age. The group as a whole increases from 76.0% in the age group 20-24 years to 96.9% in the age group 50 years and over (Figure 6). The same is the case with all the important classifications in this group with only a very important exception: carious teeth. Missing teeth, pyorrhea and gingivitis, constipation, etc., increase consistently with age. In the case of carious teeth, the rate of incidence remains almost constant at about 45.0% in the age groups 20-24, 25-29 and 30-34 years, to descend to 42% in the age group 35-39 years, to 35.4% in the age group 40-44 years and to 34.5% in the upper age limit, 50 years and over.

Until more specific and detailed studies are made, the authors do not feel justified in venturing an explanation of this finding. It is logical to assume that only the most visible caries were observed by the examiners; oral specialists in all probability would have found more decayed teeth proportionately in all age groups *but not in some of them.* A possible explanation is insufficient and deficient nutrition which plays such an important role in dental health and which has been more serious during the last decades. Apparently, people living in the beginning of the century had, and still have, relatively better teeth than those born afterwards.

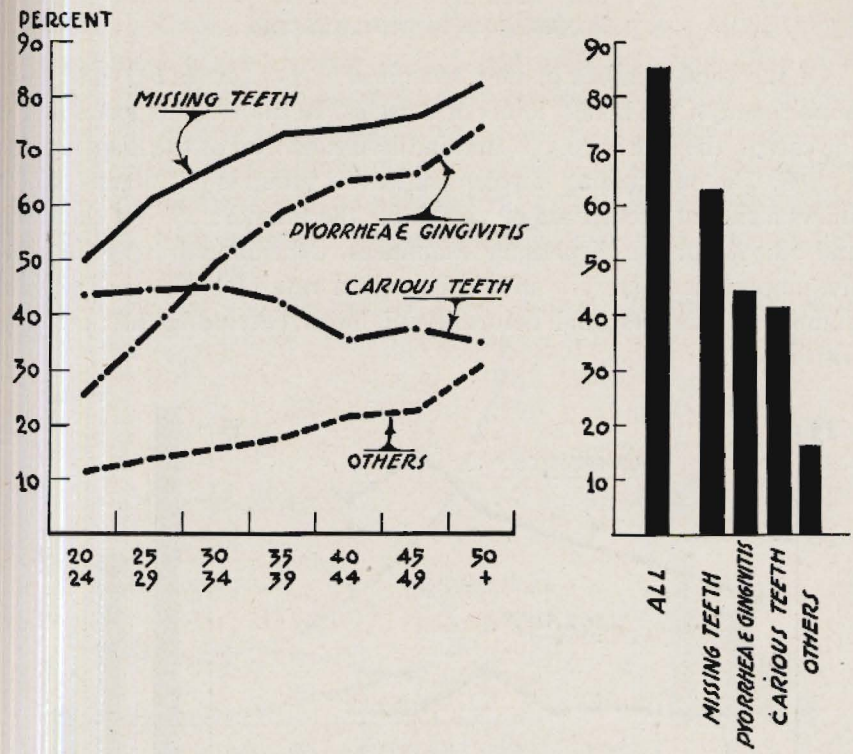


FIG. 6. Age Prevalence and Frequency of Impairments of the Gastro-intestinal System.

SKIN AFFECTIONS

A total of 1,401 workers, or 15.7% of the total, were found suffering from affections of the skin, the most prevalent of which are dermatitis and scabies. For the whole group of impairments the rate in the dispensaries (21.4%) is double that found in the camps (10.9%). Dermatitis shows a rate of 5.8 in the camp workers and 13.4% for the workers examined at the dispensaries. Scabies is also more prevalent in the dispensary examinees (3.3%) than in the camp examinees (2.0%).

The upward trend in the prevalence of impairments according to age is clear also in this group, although the rate of increase is not so marked as in other groups of impairments (Figure 7). The curve starts with 12.4% in the lower age limit (20-24 years) and rises to 20.5% in the upper age limit.

The curves for all the impairments included in this group show the same upward trend, except the curve for scabies which is almost horizontal.

BONES, JOINTS AND MUSCLES

Of the total number of men examined, 2,727, or 30.6% had some impairment of the bones, joints or muscles. In the workers examined at the camps, the rate is 26.3%, and in those examined at the dispensaries, 35.7%. The outstanding impairment in this group is pes planus, which shows a rate of occurrence of 25.3% for the total, 22.2% for the camp and 28.9% for the dispensary examinees. Other impairments of relative importance here are ankylosis, with a rate of 2.0% for the total number of workers, and deformity of limbs (excluding pes planus), with 2.6%.

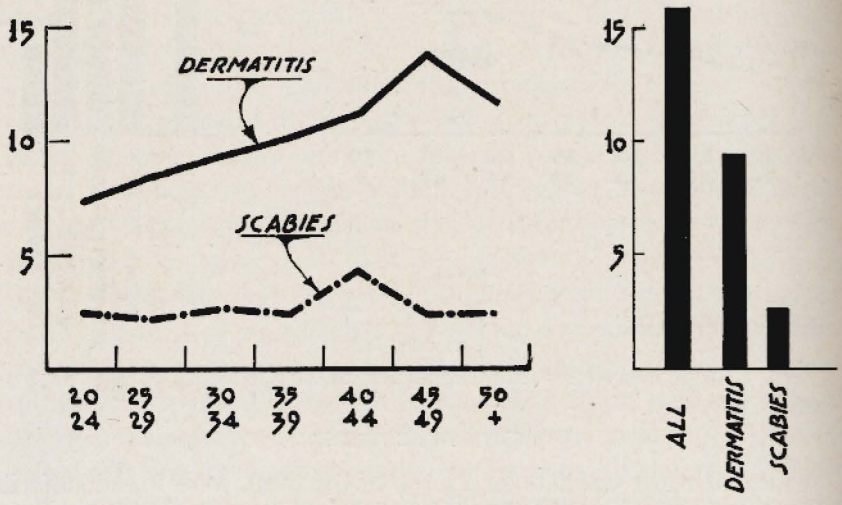


FIG. 7. Age Prevalence and Frequency of Skin Affections.

The age prevalence of impairments in this group does not show any point of significance except that the tendency in all impairments is to increase slightly as age advances. The occurrence of pes planus, which is the most prevalent sub-classification in this group, is almost constant at about 25.0 in all ages.

CARDIOVASCULAR SYSTEM*

More than one-fifth (21.8%) of the workers had some impairment of the heart or of the blood vessels. The rates for camp and dispensary examinees are 19.5% and 24.4% respectively.

* The blood pressure was taken in every case, but the analysis of such data is not included in the present study.

Since cardiovascular impairments are more frequent in the middle and advanced ages, it is well to recall that more than four-fifths of the workers (84.4%) are from 20 to 44 years of age (Table 1). Therefore, the age composition of this population group is apt to give a rather low incidence of cardiovascular impairments since, as observed by Sydenstricker and Britten,[9] it is not until nearly 50 years of age that the effect of marked deterioration of the heart and blood vessels is begun to be seen.

As to frequency of the various sub-classifications, thickening of arteries (slight, moderate or marked) with rates of 10.2% for the total,

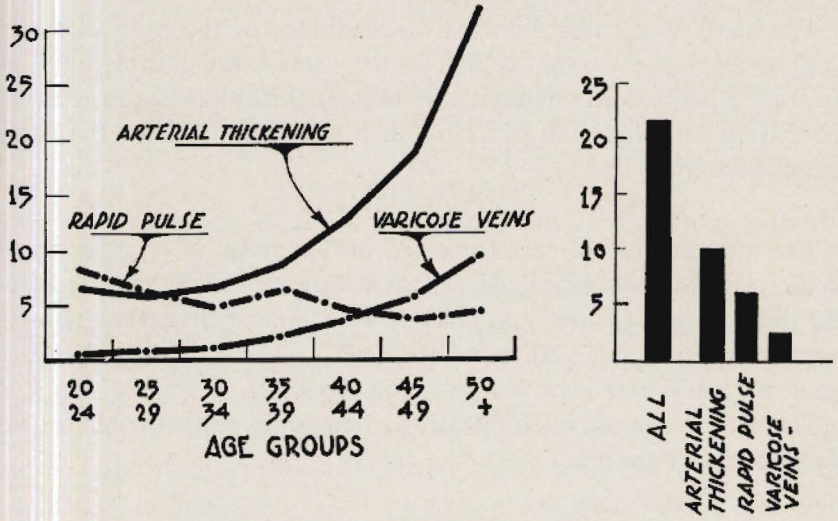


FIG. 8. Age Prevalence and Frequency of Impairments of the Cardiovascular System.

7.7% for the camps and 13.2% for the dispensaries, and rapid pulse (over 90) with 6.2% for the total, 7.8% for the camps and 4.4% for the dispensary examinees, are the most important. Cardiac murmurs were found in 4.3% of the examinees. Probably most of these murmurs were functional due to the prevalence of anemia among the persons examined.

Rapid pulse does not show marked changes with age and rather tends to diminish in the older ages (Figure 8); all the other sub-classifications increase with advancing age, though the changes are more rapid at and following the 40-44 years' age group. In some of them the most rapid changes occur at and following the 45-49 years' group. The rate in the entire group increases from 19.2% in the age group 20-24 years to 43.6% in the age group 50 years and over.

### RESPIRATORY SYSTEM

Very few cases (501 or 5.6% of the total) of diseases or impairments of the respiratory system were found in the examinations. Most of the cases were ascribed to bronchitis and a few to asthma. Twelve positive cases of tuberculosis which were reported from the dispensaries are included below in the group of infectious and parasitic diseases.

The age prevalence of this group of impairments shows the expected upward trend with advancing age.

### NERVOUS SYSTEM

The number of cases reported of conditions of the nervous system (149 or 1.7% of the total) is likewise very small, which probably is not surprising because the detection of nervous disorders requires a very specialized technique not available in the regular work of the camps and dispensaries.

### LYMPHATIC SYSTEM

The total number of cases reported in this group is 1,723 or 19.4% of the total workers examined. The proportion of cases reported from the dispensaries (31.3%) is considerably higher than that reported from the camps, 9.2%. All cases of adenitis, except those in which the cervical glands were involved, were put together.

The occurrence of conditions of the lymphatic system is almost uniform in all age groups.

### GENITO-URINARY SYSTEM

The number of workers with impairments in this group is 1,006 or 11.3% of the total men examined. The rate in the camp examinees is 7.8% and in the dispensary workers almost double, 15.4%. Hernia is the leading impairment in this group with 3.5%, followed by phimosis (2.7%), varicocele (1.8%) and hydrocele (1.5%). In all these cases the prevalence of impairments is higher among the workers examined at the dispensaries.

The prevalence of the group as a whole increases with age from 7.2% to 22.4% between the lower and upper age limits, but the changes are more marked at and following the 40-44 years age group.

### INFECTIOUS AND PARASITIC DISEASES

We come now to the last group of impairments in which the diagnoses resulting from positive laboratory examinations are given. Judg-

ing from the number of workers involved, this group of impairments is the second in importance, the first being the gastro-intestinal group. The percentages of positive samples were obtained in all cases from the number of workers examined in each class, that is, the number of samples positive for syphilis (342) divided by the number of workers examined for syphilis (6,335), etc., and not from the total number of workers physically examined.

It is interesting to note that the incidence of infectious and parasitic diseases is as high in the camps as in the dispensaries in the group as a whole, and also in the individual classifications. It is evident therefore that these infections and infestations are uniformly spread among the population studied.

The luetic rate of 5.4% for the total, with slight variation for camps (5.5%) and dispensaries (5.2%) is in agreement with Costa's[14] estimate for the rural population at large. Consideration should be given, however, to the fact that our group of examinees is constituted exclusively by male adults in which a somewhat higher incidence might be expected.

Only 116 samples of blood corresponding to the same number of individuals were positive for malaria, the rate of prevalence being 2.4% for the entire group and 2.0% and 3.0% respectively for the workers examined at the camps and dispensaries.

The incidence of intestinal parasitism is extremely high in this population group. Taking into consideration the infestations with any parasite, the rate of incidence is 89.1% for the group, 88.8% for the workers in the camps and 89.4% for the workers examined at the dispensaries. As may be observed, there is no appreciable difference between the two groups of workers as to the prevalence of intestinal parasitism.

*N. americanus* is the parasite most frequently found, with rates of 81.3%, 80.6% and 82.0% for the total number and for the camp and dispensary examinees respectively; next in order are *T. trichiura* with 43.0%, 47.5% and 37.8% and *A. lumbricoides* with 10.8%, 8.9% and 13.0% respectively for the three groups of workers. In 41.3% of the cases a mixed infestation was found.

No samples for tuberculosis and gonorrhea were taken in the camps. In the dispensaries, 122 samples of sputa and 8 of urethral exudate were taken in suspected cases of tuberculosis and gonorrhea, of which 12 and 2 (9.8% and 25%) respectively were positive. However, the number of cases is too small to give the results any special significance.

There are no changes in the prevalence of infectious and parasitic

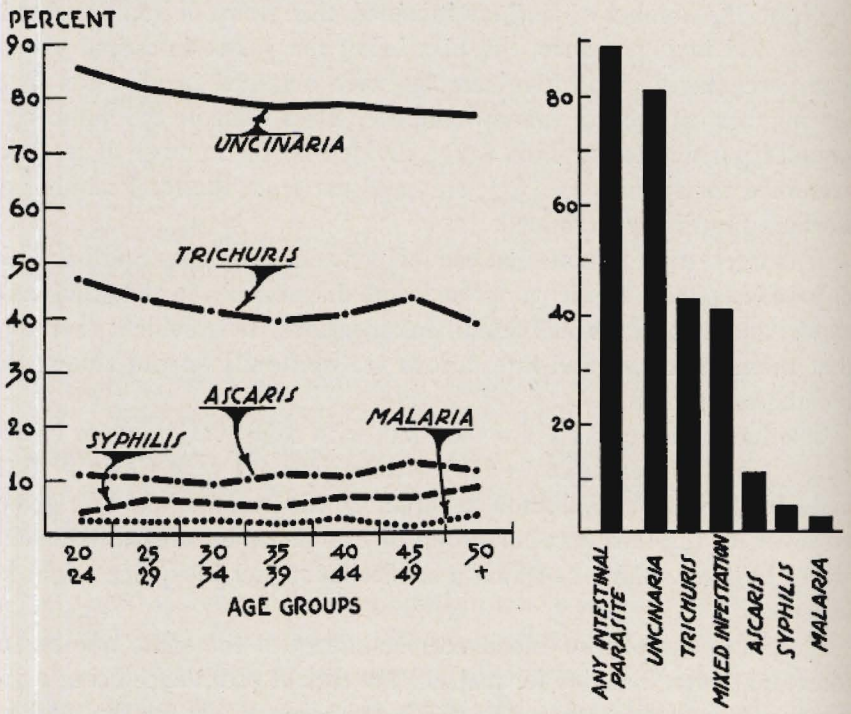


FIG. 9. Age Prevalence and Frequency of Infectious and Parasitic Diseases.

diseases according to age. The curve for the entire group (Figure 9) is almost horizontal all along the age groups, with a very slight drop in the older ages. The same is true of the curves for syphilis, malaria and intestinal parasites, though the curve for syphilis tends to increase in the older ages.

In Figure 10 the age prevalence of eight of the eleven groups analyzed is given, the groups omitted being the respiratory, lymphatic and nervous, in which the smallest number of impairments were found. Inspection of this graph will show that in all the groups of impairments the prevalence is higher with advancing age, except in two: (1) the infectious and parasitic group of diseases in which the prevalence is almost at the same level all along the curve; and (2) the group of impairments of the ears, nose and throat, in which the prevalence is lower as age increases. Yet even in this group a single classification—enlarged and diseased tonsils—is responsible for the downward trend. The chronic nature of the impairments analyzed in this study is thus strik-

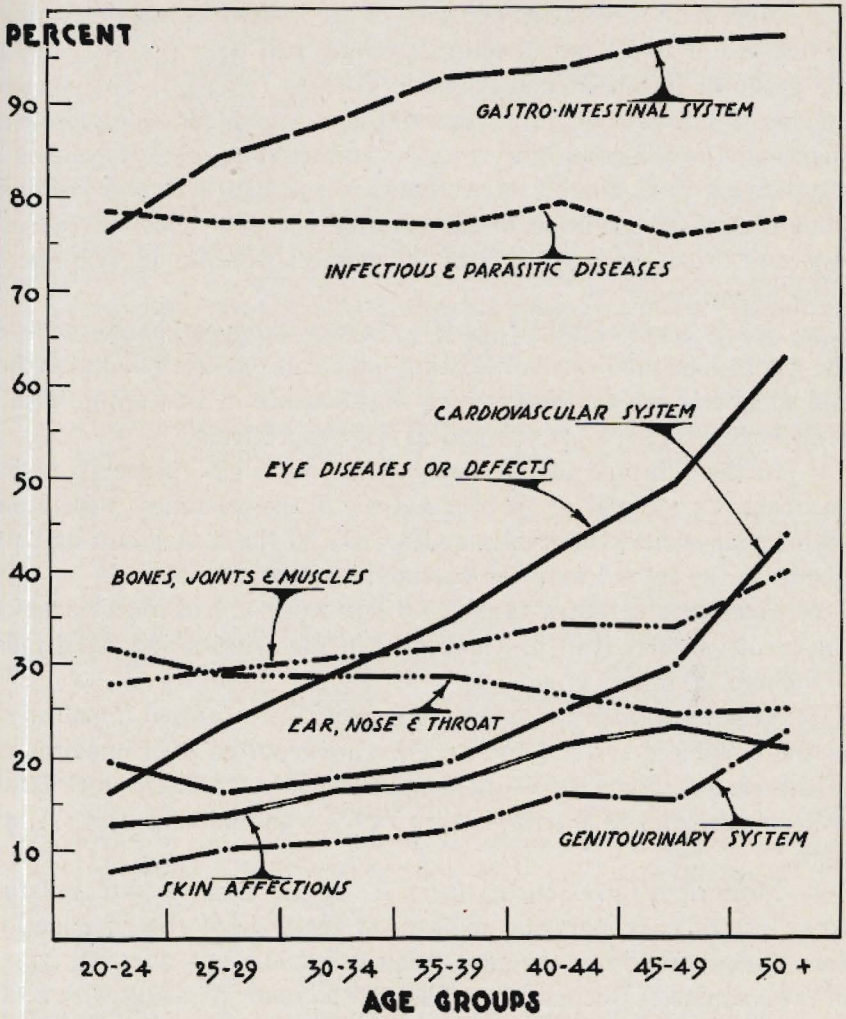


FIG. 10. Age Prevalence of Impairments by Groups of Impairments.

ingly apparent. The curves in this graph have a special significance because they include the sum total of impairments in each group.

## SUMMARY

1. The physical and laboratory examinations of 8,898 rural workers have been analyzed in order to gain knowledge on the state of health of the adult rural male population. Of these workers, 8,714 or 97.9% were found with impairments. The average number of impairments per worker examined is 4.9.

2. More than three-fifths (60.9%) of the impairments were ascribed to diseases or conditions of the gastro-intestinal tract (35.5%) and to the group of infectious and parasitic diseases (25.4%). The smallest number of impairments in relation to the total number of impairments were found in the respiratory (1.2%) and nervous (0.4%) systems.

3. Of the total number of workers, 29.7% had defective vision or some disease or condition of the external eye or eyelids. In the ear, nose and throat group, 28.7% of the workers were found with one or more impairments.

4. Nearly seven-eighths (85.6%) of the workers had impairments of the gastro-intestinal system. Missing teeth, carious teeth and pyorrhea and gingivitis are the outstanding impairments in this group with a prevalence of 63.2%, 41.9% and 44.5% respectively.

5. In the skin and in the bones, joints and muscles groups of impairments 15.7% and 30.6% respectively of the examinees were found with impairments. Dermatitis and scabies in the first group and pes planus in the second were the outstanding impairments.

6. More than one-fifth (21.8%) of the workers had impairments of the cardiovascular system. Thickening of the arteries and rapid pulse predominated in this group.

7. Nearly one-fifth (19.4%) of the examinees showed impairments of the lymphatic system, and 11.3% were reported with impairments of the genito-urinary system. Comparatively few workers were found with impairments of the respiratory (5.6%) and nervous (1.7%) systems.

8. More than three-fourths (77.5%) of the workers were suffering from infectious or parasitic diseases at the time of the examination. Intestinal parasitism is the most frequent impairment, affecting 89.1% of the examinees. Uncinaria prevails over all other parasites with a rate of 81.3%. The syphilitic rate is 5.4%.

9. In all the groups of impairments, except two, and in all the principal classifications, the rate of impairments increases with age, which proves the chronic character of the diseases or conditions suffered by this population group. In the infectious and parasitic group of diseases there are no important changes with age and in the group of impairments of the ear, nose and throat the curve has a downward trend caused by the rapid decrease with age of diseases or conditions of the tonsils.

BIBLIOGRAPHY

1. Morales Otero, P.; Pérez, Manuel A.; Ramírez Santos, R.; Espino, Rafaela; Ramú, Oriana; Fuster, J. L.; González, Dolores and Mar-

rero, Mario. "Health and Socio-Economic Studies in Puerto Rico, I. Health and Socio-Economic Conditions on a Sugar Cane Plantation"; The P. R. Journal of Public Health and Tropical Medicine, Vol. XII, No. 4, June 1937, pp. 405-490.

2. Morales Otero, P.; Pérez, Manuel A.; Ramírez Santos, R.; Espino, Rafaela and Marrero, Mario. "Health and Socio-Economic Studies in Puerto Rico, II. Health and Socio-Economic Conditions in the Tobacco, Coffee and Fruits Regions"; The P. R. Journal of Public Health and Tropical Medicine, Vol. XIV, No. 3, March, 1939, pp. 201-289.
3. Morales Otero, P. and Pérez, Manuel A. "Health and Socio-Economic Studies in Puerto Rico, III. Physical Measurements of Agricultural Workers"; The P. R. Journal of Public Health and Tropical Medicine, Vol. XIV, No. 4, June, 1939, pp. 450-474.
4. Report of the Adjutant General to the Governor of Porto Rico on the Operation of the Military Registration and Selective Draft in Porto Rico. Bureau of Supplies, Printing and Transportation; San Juan, P. R., 1924.
5. Dublin, Louis I.; Fisk, Eugene Lyman and Kopf, Edwin W. "Physical Defects as Revealed by Periodic Health Examinations"; American Journal of Medical Sciences, No. 4, 170, 576, Oct. 1925.
6. Love, Albert G. and Davenport, Charles B. "Defects Found in Drafted Men"; Government Printing Office, Washington, 1920.
7. Britten, Rollo H., and Thompson, L. R. "A Health Study of Ten Thousand Industrial Workers—A Statistical Analysis of Surveys in Ten Industries"; U. S. Public Health Service, Public Health Bulletin No. 162.
8. Sydenstricker, Edgar and Britten, Rollo H. "The Physical Impairments of Adult Life—1. General Results of a Statistical Study of Medical Examinations by the Life Extension Institute of 100,924 White Male Life Insurance Policyholders Since 1921"; American Journal of Hygiene, Baltimore, January, 1930.
9. Sydenstricker, Edgar, and Britten, Rollo H. "The Physical Impairments of Adult Life—2. Prevalence at Different Ages, etc."; American Journal of Hygiene, Baltimore, January, 1930.
10. Sydenstricker, Edgar, and Britten, Rollo H. 4. "Physical Impairments and Occupational Class"; Public Health Reports, Vol. 45, No. 34, August, 1930, pp. 1927-1962.
11. Standards of Physical Qualifications for Entrance Into the National Guard; Bulletin NGR 28, Washington; Government Printing Office, 1927.
12. Sergent E., et al. Técnica Clínica Médica y Semiología; Traducción Española de Montaner de la Poza, et al; 4ta edición, Barcelona, 1930.
13. Collins, Selwyn D. and Sydenstricker, Edgar. An Epidemiological and Statistical Study of Tonsillitis, Including Related Throat Conditions; U. S. Public Health Bulletin, No. 175.
14. Costa Mandry, O. "Syphilis in Porto Rico, I. Its Prevalence as Shown by the Wassermann Reaction"; The P. R. Journal of Public Health and Tropical Medicine, Vol. VII, No. 2, December, 1931, pp. 209-231.