

## TECHNIQUE OF ENDEMIC GOITRE SURVEYS

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This chapter has been planned for the specific guidance of the physician who wishes to carry out surveys to determine the prevalence of endemic goitre in a population. It is not designed for the clinician studying goitre under hospital conditions where special methods may be required. The suggestions made have proved practical and useful under a wide variety of conditions, and the procedures will result in data which can be used with confidence to guide public health programmes.

In a survey various types of goitre may be encountered. Goitres are classified according to both physiological and morphological characteristics. Their division into "toxic" and "non-toxic" is entirely functional. "Toxic goitres" are characterized by an increased output of thyroid hormones into the blood-stream and are important to the clinician because of their dramatic manifestations and the consequences that they may have upon the life of an individual. In field surveys "toxic goitres" are hardly ever seen, though some of the signs such as exophthalmus and fine tremor could theoretically lead to the discovery of an occasional case in the field.

The "non-toxic" or endemic goitres usually present no dramatic symptoms and are frequently ignored by the goitrous person, except when they are disfiguring or produce mechanical interference with respiration. They represent a hypertrophy of the thyroid due to insufficient iodine, and indicate the prevalence of an absolute or relative deficiency of iodine in a population. These non-toxic or endemic goitres may appear at different ages according to the severity of the deficiency. A mild degree of deficiency may not become evident until there is an increase in the physiological requirement for iodine. During adolescence, particularly in girls, a signi-

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ficant increase in the number of hyperplastic glands appears in endemic regions. This so-called "adolescent" goitre is not a normal physiological phenomenon but a reflection of an iodine deficiency which has become manifest owing to an increased demand of the body for iodine. Goitres frequently appear during pregnancy and lactation for the same reason.

When the lack of iodine is more severe, endemic goitre may appear very early in life. The pathology of goitres in infants and young children does not differ from those in older children and adults. All start with hypertrophy and hyperplasia of the acinar cells within the follicles. As the deficiency of iodine persists, some of the cells atrophy and the follicles fill with colloid substance. It is the first stage in the development of a colloid goitre, which may later develop fibrosis and become irreversible. This type of goitre is functionally non-toxic and anatomically without nodules and is referred to as *simple* or *diffuse goitre*.

In areas where iodine deficiency has long been present, goitres with adenomatous nodules of varying size may appear. When this occurs, the name *adenomatous* or *nodular goitre* is employed. Functionally, such goitres usually remain non-toxic.

The determination of the prevalence of endemic goitre in a population gives a good appraisal of the severity of iodine deficiency without the necessity of considering the functional status of the thyroid. A prevalence of endemic goitre greater than 10% is almost universally considered to constitute a public health problem. Many authorities feel that a goitre rate above 5% should be considered of public health significance. The goal of the endemic goitre survey sponsored by public health authorities is the determination of the existence and degree of the goitre problem in the population under their care.

### Methods employed in Goitre Surveys

The methods of carrying out goitre surveys have shown considerable variation in different parts of the world. Many authors advocate the palpation of the thyroid of every person included in the survey. Some use palpation only when visible glands are present in order to determine the anatomical characteristics of the goitre. Still others advocate only inspection of the neck, and a few have gathered their information by questionnaires alone.

It is recommended that a gland be classified as positive for goitre only when it is 4 to 5 times larger than the normal size. Adenomatous nodules in the parenchyma should be noted regardless of the size of the thyroid. When the neck is short or the muscles are well developed, inspection alone may fail to reveal a gland that is already 4 to 5 times enlarged. This may occur also when there is a thick layer of adipose tissue or when the goitre is retrosternal.

On the other hand, in persons with very thin necks the lobes of the gland can be readily seen and may give the impression of a visible goitre, even though the thyroid is actually not more than 4 to 5 times its normal size. A similar false impression may sometimes be given by the configuration of the larynx and trachea in a person with a thin neck. Furthermore, glands with nodules are frequently discovered by palpation which would be unnoticed if the neck were only inspected.

The criterion for the diagnosis of goitre should be the determination of the degree of enlargement or the presence of nodules in the gland and not simply its visibility. The use of the palpation method, therefore, is recommended as the most accurate and reliable way of diagnosing the severity of endemic goitre. Fortunately, palpation does not add appreciably to the time required for each examination. On the contrary, palpation frequently permits the prompt resolution of doubts as to the size of the thyroid—doubts which would require more time to resolve by inspection alone.

It has been suggested that the prevalence of visible goitre bears a fairly constant relationship to the prevalence of goitre diagnosed by the palpation technique, so that if the former is known the latter can easily be inferred. However, studies made by INCAP (unpublished data) in the five countries of Central America and in Panama have shown clearly that such a relationship is not always constant, but varies from one region to another. In areas where the prevalence of visible goitre is high, the additional goitres detected by palpation will not greatly change the interpretation of the over-all prevalence reported. Where the prevalence of goitre is low, however, the detection of glands more than 4 to 5 times enlarged, but still not readily visible, may affect the conclusions drawn by public health authorities as to the magnitude of the problem. The fatness or thinness characteristic of the population and the general shape of the neck will greatly influence the correlation between visible and palpable goitre.

### Significance of Non-visible Goitre

In the majority of countries in the world there are areas commonly recognized as goitrous owing to the high prevalence of visible goitre, too large to escape the notice of even the casual visitor. In such cases it is frequently assumed that the rest of the country is relatively free from endemic goitre. However, careful surveys, especially those employing the palpation method, usually show such a belief to be erroneous by revealing a high goitre rate in many zones where the disease was previously unsuspected. For example, this has proved to be true in each of the Latin American countries where nation-wide surveys have been carried out.<sup>5</sup>

From a public health point of view, the prevalence of goitre which is readily palpable but not readily visible with the head in normal position may be of great importance. The following reasons reinforce the recom-

mendation that both palpation and inspection should be used in carrying out goitre surveys:

1. It is most convenient to carry out mass surveys in schoolchildren. However, large visible goitres are usually much less prevalent in children than in the adult population, although the total prevalence of enlarged thyroid is more clearly comparable. Palpable goitres in children, therefore, must be recorded in order to obtain an accurate indication of the total goitre prevalence in the whole population.

2. If the attempt is made to measure the effectiveness of iodization programmes by the changes in the size and frequency of visible goitres, two problems are encountered. Many of the goitres are fibrotic and will change very little in size even under optimum treatment, and it is almost impossible to evaluate subjectively by inspection the changes in size of a relatively large thyroid. On the contrary, if the criterion for evaluating the response to iodine administration can be the disappearance of the goitre, the task becomes feasible. Most of the diffuse goitres in children which are palpable but not visible with the head in normal position will no longer be present after relatively limited periods of adequate iodine administration.<sup>6</sup>

3. It should be noted that in a population in which goitre is moderately prevalent, but in which most of the glands are not of a large size, the failure to include palpable goitre could lead to the false conclusion that goitre was not sufficiently prevalent to be of public health consequence. This is, of course, particularly true in cross-sectional samples with large numbers of children, but it may also apply to adult populations.

4. Adenomatous goitres in children are usually detectable only by palpation. It has been suggested that adenomatous goitres during childhood are strong presumptive evidence of an iodine deficiency in the mother that was particularly manifest during the stress of pregnancy (O. P. Kimball —personal communication, 1951).

### Assessment of Size of Gland

The normal size of the thyroid varies with the age and build of the individual. In the adult, the lobes are stated to have the size of a lima bean with the isthmus appearing as a thin connecting strand. The gland has a rather firm consistency, is slightly compressible, and presents a smooth surface. On palpation the lateral lobes can be felt beneath the muscles on both sides of the trachea. The isthmus is either not palpable or can just barely be detected.

As stated previously it has been found practical for survey purposes to list as positive for endemic goitre a gland estimated to be more than 4 to 5 times the normal volume. To avoid exaggerating the prevalence recorded, doubtful cases of enlarged glands should be classified as normal. These pro-

cedures will give a very conservative estimate of the prevalence of endemic goitre, but one in which few normal cases will be erroneously included.

It should be noted that, in any field examination, no matter what criteria are adopted a certain percentage of the cases will be border-line. It has been found in practice that if the experience and training of two different observers are similar, they will make different decisions as to the classification of many of the individual border-line cases and yet arrive at approximately the same average goitre rate. In other words, the variations in assigning border-line cases to either the normal or the positive category tend to be random for most observers.

Any attempt to define the normal thyroid gland in terms of an arbitrary standard tends to break down in actual practice. However, persons carrying out field surveys soon become familiar with the size of the thyroid in individuals of varying ages and body build through examinations of populations with little or no goitre. For North American adults the size of a large lima bean has been suggested as a standard for comparison. This obviously does not apply to young children and, furthermore, lima beans are different or unknown in many parts of the world. The FAO/WHO Third Conference on Nutrition Problems in Latin America, held in Caracas, Venezuela, in 1953, met this problem by suggesting that the dimensions of the thumb nail of the person being examined be used as an approximate reference.<sup>2</sup> In this case the thumb nail must be visualized as outlining the size of a kidney-shaped bean. Usually a thyroid gland whose lateral lobes have a volume greater than the terminal phalanges of the thumbs of the person being examined will be considered goitrous. For many persons, the size of the lateral lobes may be more easily visualized in comparison with the terminal phalanx of the thumb than as an arbitrary multiple of a normal standard.

These comparisons have all proved of practical value in training new survey workers. It should be emphasized, however, that only as the examiner becomes accustomed to estimating thyroid volume by palpation do reference standards become really meaningful. By this time these "standards" have become merely useful adjuncts and are no longer employed uncritically.

### Technique of Examination

The technique varies slightly according to the age of the subject. Children and adults are examined while standing with the head and neck in a vertical position. According to the height of the individual the examiner sits or stands directly in front of the subject. He examines the thyroid area and without delay uses both thumbs simultaneously to examine very gently the full extent of the lobes and the isthmus (see Fig. 1). It is advisable to ask the patient to relax the neck muscles by throwing the head slightly downwards, and it may be helpful to get him to swallow several times.

For the clinical appraisal of patients most physicians advise examination from behind with the forefingers as the most accurate and reliable method for the palpation of the thyroid gland. However, for general survey work it is more convenient to adopt a position in which inspection and palpation can be carried out almost simultaneously without requiring the patient to turn around. Such a procedure is much better adapted to the rapid examination of lines of people. The examination from behind with the forefingers can still be resorted to in those relatively few cases where extra sensitivity on palpation is required.

For infants, Eggenberger's technique is recommended.<sup>1</sup> The child lies on his back, and the left hand of the examiner is placed on his shoulder-blades, lifting him slightly so that his head remains in touch with the surface of the table on which he is lying. The body of the child can be securely held by placing the thumb of the left hand in his right armpit. The region of the thyroid is then palpated with the forefinger. The gland should not be palpable and the isthmus should be palpable only as a thin strand, not more than 1 to 2 mm thick.

### Classification of Goitres <sup>a</sup>

Many different criteria have been employed for the classification of the various degrees and kinds of goitre. The need for unifying the criteria used in endemic goitre surveys is evident, especially when several surveys done at different times by different examiners may be used to draw conclusions about the effectiveness of prophylactic measures. Most classifications distinguish between visible and palpable goitres, and the presence or absence of nodules is recorded. Visible goitres, as a general rule, indicate a moderate to severe deficiency of iodine of relatively long duration. Visible goitres

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<sup>a</sup> This question is discussed in greater detail in the chapter *Pathological anatomy of endemic goitre* by De Smet (p. 315).

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#### FIG. 1. TECHNIQUE USED IN EXAMINATION OF THYROID

*Sitting or standing facing the patient, the examiner places his thumbs gently on either side of the thyroid area and determines the size of the gland by palpation.*

#### FIG. 2. GROUP 1 THYROID GLAND

*This gland was readily palpable with the head in normal position but was not visible. It is readily visible with the head fully extended.*

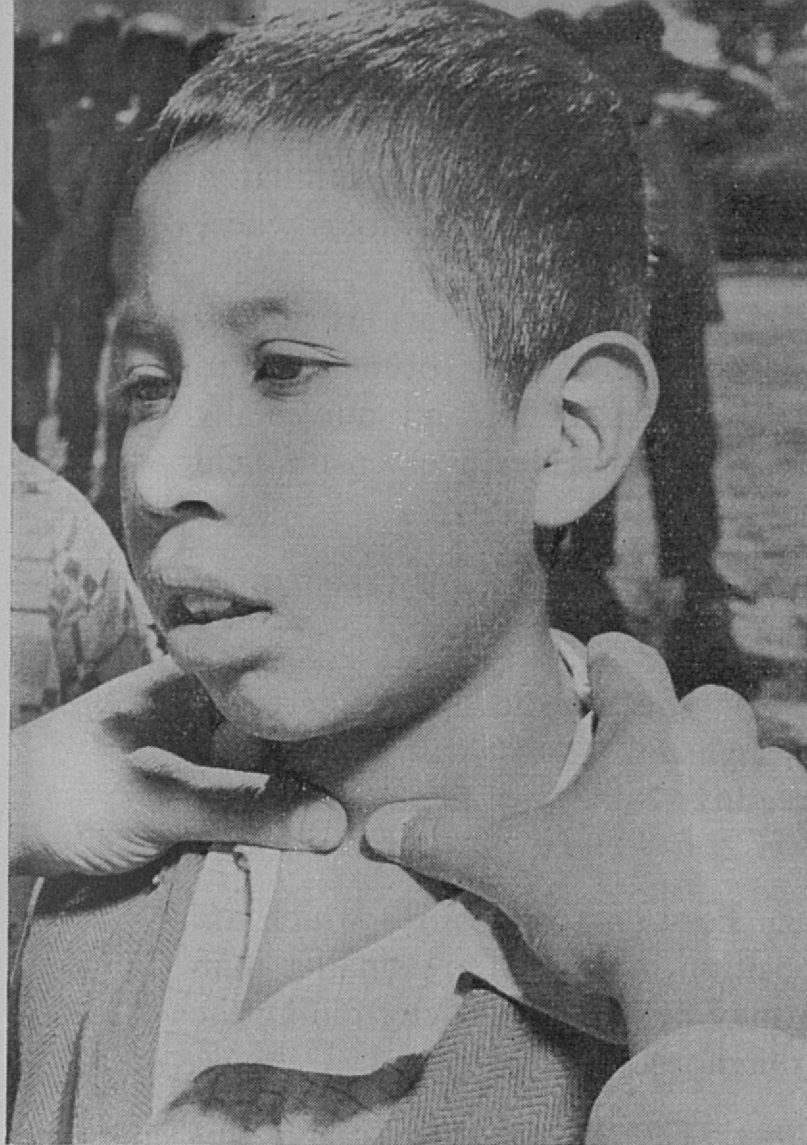
#### FIG. 3. GROUP 2 THYROID GLAND

*This gland is readily visible with the head in normal position.*

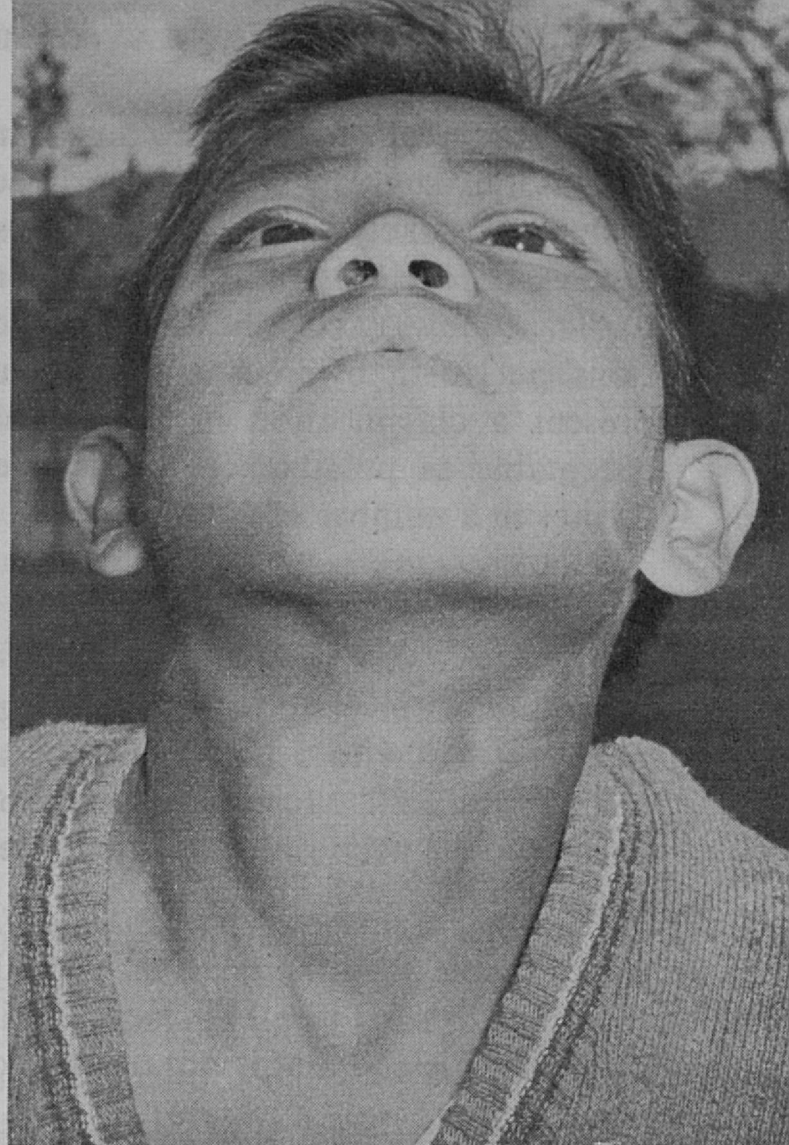
#### FIG. 4. GROUP 3 THYROID GLAND

*This gland is so greatly enlarged as to be readily visible as a prominent goitre at a considerable distance.*

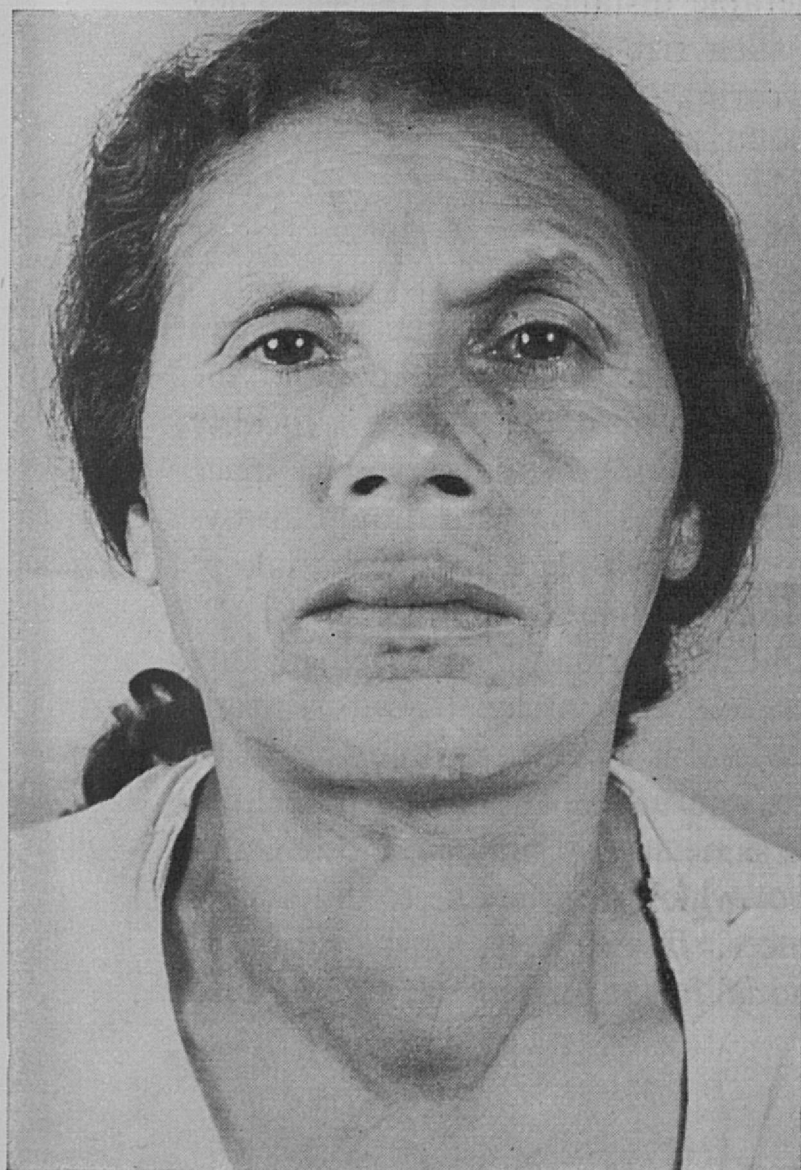




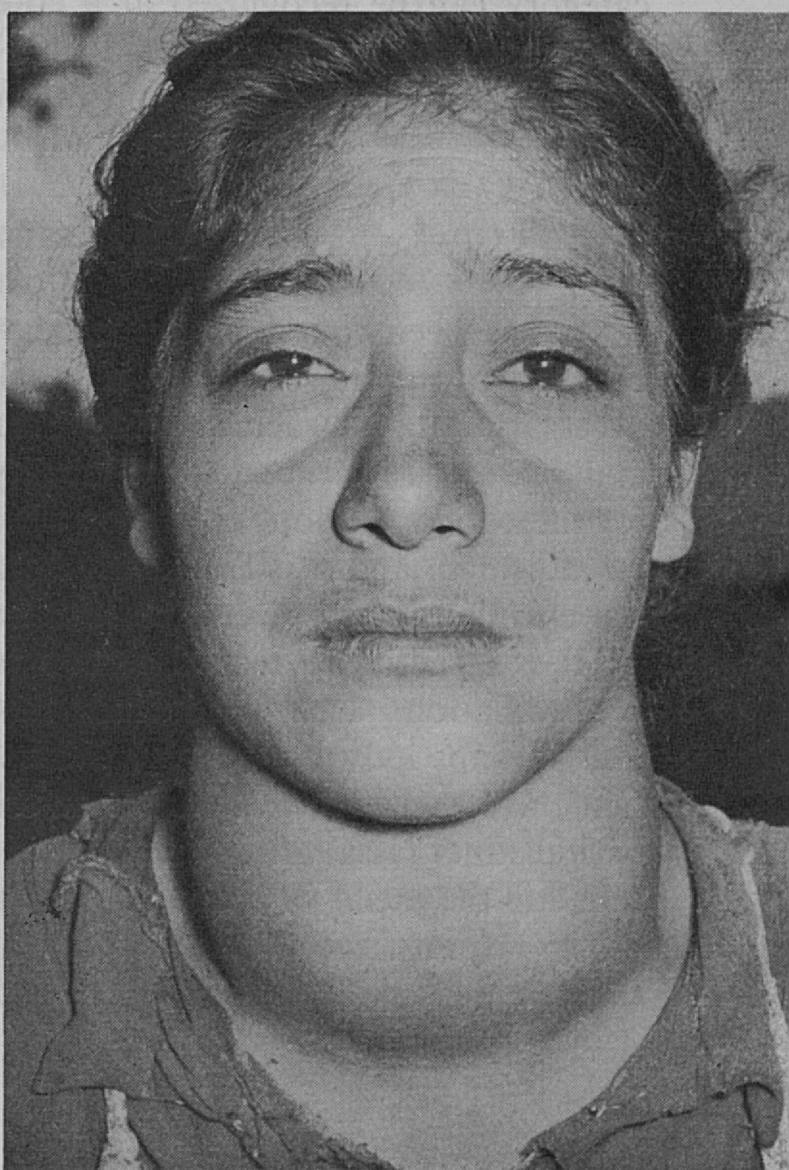
1



2



3



4

thus have a tendency to be common among older people, and their presence in children suggests a particularly severe deficiency of iodine. Similarly, nodules are likely to be present to a significant degree only in areas where a marked deficiency of iodine has been long standing.

The following classification represents a synthesis of the various suggestions put forth by international groups. Every effort has been made to present a classification in terms which are as practical and universally acceptable as possible. It has proved to be workable in extensive field studies in a number of countries.

*Group 0: persons without goitre.* By definition these are taken to be persons whose thyroid glands are less than 4 to 5 times enlarged.

*Group 1: persons with palpable goitres.* The thyroid is considered to be more than 4 to 5 times enlarged although not visible with the head in normal position. Most of these will be readily visible with the head thrown back and the neck fully extended (see Fig. 2).

*Group 2: persons with visible goitres.* Persons with goitres which are easily visible with the head in normal position but which are smaller than those in Group 3 (see Fig. 3). Palpation may be helpful in determining the mass of the gland, but is not needed for diagnosis.

*Group 3: persons with very large goitres.* The goitres of persons in this category can be recognized at a considerable distance (see Fig. 4). They are grossly disfiguring and may be of such size as to cause mechanical difficulties with respiration and in the wearing of clothes.

### Organization of Survey

It has been found by experience that surveys for endemic goitre can be carried out most rapidly if blank forms are prepared to contain the necessary data on each individual examined. The name, age, sex, locality and years of residence in that locality are generally included, with a space for indicating previous residence when applicable. The date should always be indicated, and it is frequently helpful to have a place for the initials of the examiner when several persons are doing the survey.

It is essential to record certain pertinent information on each locality or population. This will include the size and type of locality, its altitude and perhaps its water-supply. When a school is examined, note should be made as to whether it is public or private and urban or rural. In localities with distinct racial groups residing in the same area, it may be of interest to tabulate the racial variations in prevalence which may be due to differences in the response to environmental influences. In this case, an indication of the race must be recorded on each individual form. In general, studies have



not indicated genetic factors to be important in influencing the prevalence of endemic goitre.

The numbers 0, 1, 2 and 3 should appear widely spaced, together with the letter "A". The number corresponding to the size of the thyroid gland encountered can then be conveniently circled. The "A" can also be circled whenever nodules or adenomas are encountered. An example of such a form appears in Annex 1 (see page 382).

These forms need not be large or use good quality paper and are just as useful if mimeographed or reproduced by some other process as if printed. When examinations are being carried out in schools, it is more convenient to leave sufficient forms with the teachers at the school, to be filled in as far as possible on the day prior to the examination. Usually a few words of instruction to the teachers collectively or individually will be sufficient. Even when it is not possible to leave the forms with the teacher in advance, they can be distributed to each teacher prior to the examination and completed in a relatively short time. The teacher of older children can usually explain what is required in each space, so that the children can fill up their own forms. The older children may then be asked to help the teachers of the lower grades to complete the necessary information on the forms.

In examinations in schools the children should be lined up by grades in front of the examiner with the data forms in their hands. In the absence of another assistant, a teacher should be asked to act as recorder. As each child steps forward, he should hand his paper to the recorder. The examining physician has only to call out the number indicating the size of the gland and indicate those cases in which the "A" is also to be circled. In this manner an experienced person under ideal conditions can easily examine 150 to 200 children per hour. This technique can be adapted to other institutional groups, such as orphanages, factories, nurseries, large farms, migratory labourers and refugee camps. In general, the preparations will require as much time as the actual examinations.

In many situations, especially when there is no expectation of returning to examine the same persons, the recording of the name takes unnecessary additional time. In general, when the form has to be filled in at the time of examination, the data recorded can be limited to age, sex and locality. Previous residence needs to be recorded only when there are a significant number of persons who have recently come to the area where the examination is being carried out.

In certain institutional situations it has been found to be more convenient to have the necessary data for many people listed in tabular form in advance on a single sheet and have them called for examination in the order in which their names appear. For certain types of population studies, it is also possible, with the co-operation of the local authorities, to assemble a sufficiently large and representative group by publicizing in advance that free examinations will be held in some convenient public place.

### Selection of Sample<sup>a</sup>

The sample to be examined in endemic goitre surveys should represent, as far as possible, the different population groups and geographical localities of the country. For practical purposes, it is not necessary to attempt to determine the prevalence of goitre in a region or country with a high degree of accuracy. Ordinarily, if the figures presented to the health officials are not in error by more than 25%, they can serve as an adequate basis for action. For example, iodization of salt is indicated when an endemic goitre rate of 10% is obtained, even though the true rate may be anywhere between 7.5% and 12.5%. The higher the rate, the larger the absolute error when only 25% accuracy is attained, but also the less important this becomes from a practical point of view. A reported rate of 20% which represents a true rate anywhere between 15% and 25% is just as useful for practical purposes as one which has included the examination of so many persons that the true value is between 18% and 22%.

In planning the survey one of the major requirements is to ensure that the areas to be studied constitute a random sample of similar localities within a geographical area. Geographical characteristics, agricultural patterns, water-supplies, racial distribution, economic status and even dietary practices, when known, should all be taken into consideration in selecting localities.

Care must be taken to treat urban areas and larger towns and cities as different groups, even though they are within the same region, since there have been cases reported where the capital of a department or province had very little goitre while the prevalence in surrounding small towns was quite high. Within urban areas the higher economic groups, with their more varied food habits, are likely to have a relatively low prevalence compared with the inhabitants of poorer districts in the same town.

The number of persons within a region to be included in the survey varies according to the homogeneity of the area and the amount of goitre found. It has been suggested that approximately 1% of the population of a country or of a large geographical area within a country should be examined. In the case of densely populated areas, this may result in the examination of far more people than is necessary for practical purposes. On the other hand, in thinly populated districts in which the prevalence is relatively low, this size of sample may be entirely inadequate as a basis for recommendations to health authorities.

The degree of accuracy obtained from the sample from any relatively homogeneous area or group depends on the number of goitre cases encountered as well as on the number of persons examined. This is shown

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<sup>a</sup> The authors are greatly indebted to Dr Oudh B. Tandon, Chief of the Division of Statistics of INCAP, for many of the concepts expressed in this section.

in the table below, where it can be seen that the examination of 96 persons is sufficient to give an accuracy of 25% when the goitre rate is 40%, and 150 persons when it is 20%, but 1216 persons must be examined to obtain this degree of accuracy when the goitre rate is only 5%. Thus, the table can be used both to help determine the size of the sample required and to estimate the degree of accuracy achieved for each area when the survey is completed. It should be noted, however, that the figures in this table apply only to data derived from a relatively homogeneous group or area.

RELATIONSHIP OF THE MAXIMUM LIKELY ERROR TO THE  
NUMBER OF PERSONS EXAMINED AND THE GOITRE RATE ENCOUNTERED

Percentage with goitre	Maximum likely error				
	10%	20%	25%	30%	40%
5	7600	1900	1216	855	485
10	3600	900	576	405	225
20	1600	400	256	180	100
30	932	233	150	105	58
40	600	150	96	68	38
50	400	100	64	45	25

In actual practice it will generally be convenient in surveys of school-children to examine all the children in attendance at each school visited. A properly planned survey will usually result automatically in the examination of sufficient persons for the error involved in the estimate of percentage prevalence to be relatively small. Occasionally, however, the number of persons available for examination representing a given situation may be so small as to raise doubts as to the validity of the conclusions. In such cases, reference to the above table will be helpful.

The foregoing discussion emphasizes the fact that taking a simple percentage of the total population or of the school population will not prove to be the most efficient way of selecting a sample. In densely populated and homogeneous areas, such as a capital city, the small fraction of 1% may suffice, whereas in other circumstances 2% or 3% of the group should be examined. The sample should include all numerically important segments of the population in the age-groups studied from both a geographical and an occupational point of view, but need include no more of each relatively homogeneous population unit than is required to reach a reasonably reliable conclusion.

If the survey is conducted to determine the need for a national iodization programme, it should be unnecessary to spend time and money examining

sparsely populated and difficult-to-reach areas, the inclusion of which would not alter significantly the final over-all goitre rate encountered or the need for prophylactic measures. For most purposes an accuracy of 25% will suffice, even though the requirement of random sampling, together with the convenience of examining all persons available at a given time and place, will usually result in a much higher degree of accuracy.

### **Tabulation and Presentation of Survey Data**

The tabulation of the data obtained in endemic goitre surveys must proceed in several stages. It is usually convenient, first, to tabulate the information according to the type and severity of goitre in each age and sex group for the different localities or populations studied. A typical summary sheet for this purpose (Form 1) is shown in Annex 2 (see page 382). The ages have been selected to provide an approximate separation of pre-school children, primary-school children, adolescents and adults. While in theory these ages might vary with the age of puberty and with educational practices in a country, the intervals of 0 to 5, 6 to 12, 13 to 18, and 19 and over are recommended for the sake of uniformity.

Form 1 can also be used to group data pertaining to political units such as cities, counties, provinces and departments. Although males and females are usually tabulated separately, it is not a matter of practical importance in persons 12 years of age and under. It is not correct to use Form 1 to total the number of persons with different kinds of goitre unless the age-groups are proportionally represented. Usually it is sufficient to estimate the severity of goitre in a population from inspection of the data alone, without making a quantitative summation. When the prevalence of group 2 and 3 goitres is so high that it is desirable to present figures showing this, they should be tabulated separately for each age-group, using Form 2.

Form 2, which is shown in Annex 3 (see page 383), is designed primarily for combining data by age-groups for the various political divisions of a country. Since many surveys will collect data only from children, the use of the form for the 6-12 age-group is illustrated. Moreover, the usual survey obtains values for different areas which cannot be averaged because they represent varying percentages of the total population. However, when the population of an area is known (column 1), the percentage of the total population which it represents can be calculated (column 2). Each percentage figure for the prevalence of goitre in an area (column 3) can then be multiplied by this percentage to determine the amount (column 5) which it should contribute to the total percentage.

When these figures are added, the estimated goitre rate for all persons in the age-group tabulated is obtained, as shown in the lower right-hand corner of Form 2. When sufficient data are available for age-groups other

than schoolchildren, they can be tabulated in the same way. Each goitre rate for an area should be based on the examination of a sufficient number of persons to have an accuracy of at least 25% according to the criteria of the table on page 379.

Where family surveys have been carried out or where adequate information has been obtained for all age-groups, it will be possible to obtain an over-all figure for the prevalence of endemic goitre in a large area or a country by means of the tabulation indicated in Form 3 (see Annex 4, page 383). In the same way that weighted percentages were obtained in Form 2, the over-all figure for an age-group can be adjusted according to the percentage of the total population which it represents. The sum of the weighted percentages will then give the rate for the total population of a country. However, this is not as useful as it might appear because iodization programmes should be based on the current need for iodine which is best indicated by the prevalence of goitre in children.

### **Observations to supplement Endemic Goitre Surveys**

Cretinism is presumed to be a complication of severe endemic goitre. An effort should be made to learn of the existence of persons with cretinism in endemic areas and, if possible, verify the diagnosis by actual examination of each case reported. Deaf-mutism and mental deficiency have been commonly mentioned as more prevalent in goitrous areas, but satisfactory confirmation of this assertion is lacking. If it is possible to determine the frequency of these conditions in severely goitrous areas by house-to-house visiting or from information furnished by school authorities, valuable evidence may be obtained by comparing these findings with those of similar studies in areas relatively free from goitre.

It is also important to note information which may help to explain differences in prevalence between nearby communities. This will include water-supply, altitude, prevailing agricultural or industrial activities, economic level, proximity to the sea and, when available, prevailing dietary habits. Not infrequently, the difference between water supplied from a lake and that supplied from deep wells will determine whether a community has a high prevalence of goitre or none at all. Dietary information which suggests the high consumption of a food known to be goitrogenic, such as cabbage, will be pertinent, as well as the occurrence of a deficiency such as that of vitamin A which has been reported to have a similar effect.<sup>3,4</sup> On the other hand, a high consumption of sea-food will tend to reduce the frequency of goitre.

### **Summary**

The classification of a population sample by size of thyroid glands gives a good estimate of the severity of iodine deficiency in an area without

the need for considering the functional status of the thyroid. Since the criteria for the diagnosis of goitre should be the determination of the degree of enlargement or the presence of adenomatous nodules and not its visibility, the use of the palpation method is recommended as the most accurate and reliable way of diagnosing the severity of the endemic goitre problem.

### Annex 1

#### SAMPLE INDIVIDUAL FORM FOR ENDEMIC GOITRE SURVEY

Department: Coclé .....

Locality : Santa Ana .....

Type of place: Primary school

Years in locality: 12

Former residence: .....

Name: Juan Pérez

Sex: M Age: 12 Race: W

Thyroid: .....

0    1    2    3    A

Other observations:

Examiner: RGB

### Annex 2

#### FORM 1 : SAMPLE TABULATION OF DATA FROM A LOCALITY

Place: Chepo

Political unit (Department, State,  
County or Province) : Cartago

Date: April 1962

Type of population: Primary school

Classification: Urban

Sex	Age-group (years)	Normal	D. 1	D. 2	D. 3	A. 1	A. 2	A. 3	Total exa- mined	Total positive	Per- centage positive
Male	0-5	—	—	—	—	—	—	—	0	—	—
"	6-12	77	55	10	2	15	1	0	160	83	52
"	13-18	2	2	3	0	1	0	0	8	6	**
"	19 and over	3	2	1	0	0	0	0	6*	3	**
Female	0-5	—	—	—	—	—	—	—	0	—	—
"	6-12	65	69	2	0	3	1	0	140	75	54
"	13-18	2	4	1	0	0	0	0	7	5	**
"	19 and over	1	3	0	0	1	0	0	5*	4	**

D = diffuse; A = adenomatous

\* School-teachers

\*\* Percentage not given owing to the small number of people examined



## Annex 3

## FORM 2 : SAMPLE TABULATION OF DATA FROM ONE AGE-GROUP IN SEVERAL LOCALITIES

Department or Province	Population 6-12 years	Percentage of total population 6-12 years	Percentage with goitre	Weighted percentage *
Progreso	1 400 000	40	20	8.0
Unión	175 000	5	28	1.4
Yoro	770 000	22	18	4.0
Granada	525 000	15	35	5.2
Cartago	630 000	18	30	5.4
Over-all total	3 500 000	100		24.0 (total goitre rate)

\* Obtained by multiplying the figures in columns 3 and 4 and dividing by 100.

## Annex 4

## FORM 3: SAMPLE TABULATION OF DATA FROM ALL AGE-GROUPS IN AN AREA OR COUNTRY

Age-group (years)	Total population in age-group	Percentage of total population	Percentage with goitre	Weighted percentage *
0-5	200 000	10	5	0.5
6-12	200 000	10	28	2.8
13-18	300 000	15	30	4.5
19 and over	1 300 000	65	25	16.2
Over-all total	2 000 000	100		24.0 (total goitre rate)

\* Obtained by multiplying the figures in columns 3 and 4 and dividing by 100.

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