

Endemic Goiter in Honduras

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Are there other factors than deficiency of iodine intake responsible for some endemic goiter? This study, coming from Central America, suggests that there may be.

Although endemic goiter has long been recognized as an important public health problem in parts of this hemisphere, little has been known until recently about its specific distribution in the area of Central America and Panama. Since the establishment of the Institute of Nutrition of Central America and Panama (INCAP), studies of the incidence of endemic goiter have been carried out in cooperation with the public health departments of the countries of Costa Rica, El Salvador, Guatemala, Honduras, and Panama. Surveys are now in progress in Nicaragua.

Preliminary reports by Muñoz¹ and Pérez² in 1951 called attention to the high incidence of endemic goiter and the frequency of large and nodular goiter in Guatemala. In 1953, Cabezas, et al.,³ reported in this Journal the results of a survey of nearly 35,000 school children in El Salvador in which the incidence of endemic goiter outside of the capital city of San Salvador was found to be 22.8 per cent. In a recent survey of over 10,000 persons of all ages in the province of Herrera, Panama, Reverte⁴ found an incidence of 46.6 per cent endemic goiter. The present paper reports the results of an endemic goiter survey which included

nearly 6 per cent of the children of school age in Honduras.

Material and Methods

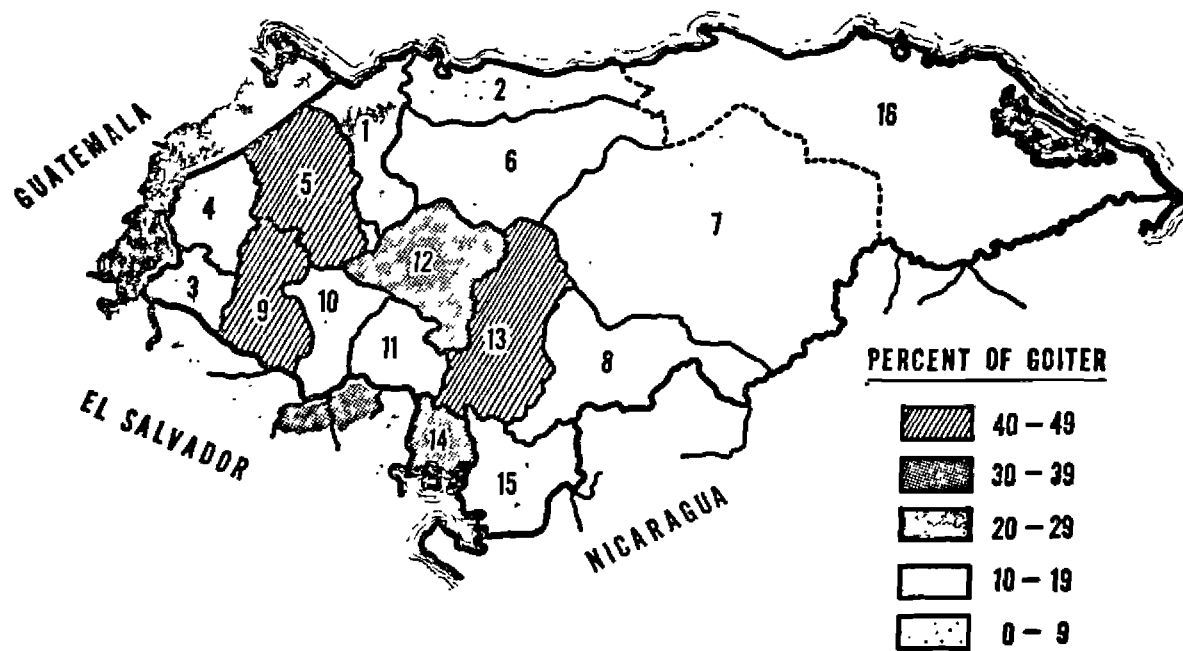
A total of 12,644 individuals in 15 departments of the country were examined, all but 352 of whom were school children. The total number of school children in Honduras was estimated at 213,000 in 1953. The sample comprised slightly less than 1 per cent of the total population of approximately 1,370,000. A sixteenth department, representing territory disputed by Nicaragua and accessible only by sea, was not visited.

The examinations for goiter consisted of an initial inspection of the thyroid area followed by a careful palpation of the gland. Normal size was considered to be approximately that of a large lima bean, but this concept had to be adjusted to the age and size of the person examined. A thyroid gland was classified as size 1 if it was larger than four to five times normal size but was not readily visible with the head in normal position. Glands which were large by palpation and visible with the head in normal position were classified as size 2. Those goiters which were readily visible at a distance of several meters were classified

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INCAP Scientific Publication I-39.

Figure 1—Geographical Distribution of Endemic Goiter in Honduras



Department	Population	No. Examined	Per cent Positive	Department	Population	No. Examined	Per cent Positive
1. Cortés	125,728	1,216	13.1	9. Lempira	90,908	234	45.7
2. Atlántida	63,582	1,941	2.3	10. Intibucá	59,362	257	2.3
3. Ocotepeque	45,673	338	17.4	11. La Paz	51,220	382	17.5
4. Copán	95,880	440	15.4	12. Comayagua	68,171	854	32.7
5. Santa Bárbara	96,397	232	42.6	13. Francisco Morazán	190,359	3,336	41.1
6. Yoro	98,700	528	3.7	14. Valle	65,349	305	36.3
7. Olancha	83,910	835	2.0	15. Choluteca	107,271	962	23.0
8. El Paraíso	82,572	784	13.3	16. Colón	35,465	0	..
				(Disputed Territory)			

as size 3. Regardless of the size of the gland, any nodules present were recorded. These criteria are essentially those of Kimball⁵ and have been followed in previous INCAP studies.¹⁻³

Results

The over-all percentage of goiter among the persons examined was 22.6. The number of persons examined in each department, the percentage of positive cases, and the geographical distribution of endemic goiter in Honduras are shown in Figure 1. Since no consistent differences could be observed between urban and rural school children in the various departments, only the combined figures are given. The incidence of endemic goiter in the capital

city of Tegucigalpa, Department of Francisco Morazán, was 40.7 per cent among 2,822 children as compared with 43.6 per cent among 464 children examined in rural areas of this department. Of the total number of goiters observed, only 14 per cent were size 2 or 3 and approximately 1 per cent were nodular.

The distribution of the goiters by age and sex is given in Table 1. A significantly higher incidence of goiter was found in the girls as compared with the boys. A slightly higher (barely statistically significant) incidence was seen during adolescence in both boys and girls than during the primary school years. The 352 individuals over 19 years of age are not included in this table, since they came mainly from a

**Table 1—Incidence of Endemic Goiter in Honduran School Children
Classified by Age and Sex**

Age	Boys		Girls	
	No. Examined	Per cent Positive	No. Examined	Per cent Positive
6-12	4,092	15.5	5,418	23.2
13-18	1,192	18.5	1,590	29.7

limited and goitrous area and cannot be used for comparing age distributions of goiter in country-wide samples.

Discussion

Although it would have been desirable to have a larger sample from some of the departments, the data clearly indicate that endemic goiter is a serious public health problem in those departments which contain most of the population of Honduras. It appears that even with the very conservative estimate obtained by the criteria used, nearly one-fourth of the population of Honduras has thyroid glands pathologically enlarged.

The frequency and severity of endemic goiter varied among the different departments, but the incidence of endemic goiter was greater than 10 per cent in 11 of the 15 departments and greater than 20 per cent in seven of them. If the four departments in which goiter does not appear to be a problem are omitted from the calculation, the remaining departments (containing three-quarters of the country's population) had an over-all incidence of 29.1 per cent.*

It is of interest that endemic goiter does not seem to be a serious problem in the coastal lowlands, but is found in

very high incidence among persons living on the central plateau. Provinces such as Copán and Ocotepeque, in which the population examined live in river valleys, are intermediate in incidence. Only two areas within the department of Cortés were studied and these differed greatly in incidence. For this reason the department is shown in Figure 1 to have a lower incidence in the area near the coast than further inland.

Despite their high frequency, the majority of goiters encountered were not severe. Only about 14 per cent were visible without careful inspection and palpation, and the incidence of nodular goiter was low. In severity of goiters encountered, Honduras is intermediate between Guatemala, where visible and nodular goiters are common,^{1, 2} and El Salvador in which nearly all of the goiters recorded were size 1.³

The salt used in Honduras, as in the other countries of Central America, is entirely derived from the sea. It is crystallized by solar evaporation and usually further dried with artificial heat. The WHO study group on Endemic Goiter which met in London in 1952 recommended 1 part of iodine per 100,000 parts of salt as adequate for the prophylaxis of endemic goiter.⁶ However, the initial iodine content of the salt commonly used in Central America is considerably more than this suggested amount.³ It seems quite possible that goitrogenic factors as yet largely unidentified increase the amount of iodine required in Central America

* The sampling of the departments was not sufficiently uniform to justify the small correction which would result from weighting departmental incidence figures for the relative population of the department in computing over-all averages.

in excess of that needed in areas within the experience of the majority of the 1952 study group. The widespread deficiency of vitamin A in the diets commonly consumed in Honduras⁷ and the rest of Central America,⁸⁻¹³ together with the reported goitrogenic effect of a deficiency of the vitamin,¹⁴⁻¹⁶ has led to the suggestion that this is one factor in the apparently greater iodine requirement.³

After considering the observations submitted to it, the Third Latin American Conference on Nutrition Problems in Latin America held in Caracas, Venezuela, 1953,¹⁷ concluded that where iodization of salt is needed, the level should not be less than the 1 part of iodine in 20,000 parts of salt as used with success in Colombia nor greater than the 1 part in 10,000 found satisfactory for many years in the United States and Canada. This recommendation has been accepted by INCAP and the authors concur in it for the reasons cited.

On the basis of these data and conclusions, it is strongly recommended that salt for human consumption in Honduras be iodized at the above level. It should be noted that the term "iodization" is used to refer to the addition of iodine in any form. This is of importance since recent studies indicate that iodate is effective¹⁸ and that it has important advantages over iodide for supplying added iodine to salt in tropical and underdeveloped areas.¹⁹

Summary

A total of 12,292 school children and 352 adults in Honduras, comprising nearly 1 per cent of the population in all 15 departments, have been examined for endemic goiter by palpation and inspection of the neck. The survey showed nearly one-fourth (22.6 per cent) of the persons in the country to have pathologically enlarged thyroids.

Slightly less than 14 per cent of the goiters were readily visible with the head in normal position and fewer than 1 per cent had discrete nodules.

Omitting the four departments in which endemic goiter was not found to be a problem, the remaining three-quarters of the population had an overall incidence of 29.1 per cent. Endemic goiter is thus considered to be a serious public health menace in Honduras and the iodization of all salt for human consumption is recommended. Although goitrogenic factors are believed to be important, none has been identified, except for the possible importance of the very widespread deficiency of vitamin A. A level of iodization of not less than 1 part of iodine in 20,000 parts of salt nor more than 1 part in 10,000 is recommended.

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