

*Throughout the 1920's a steady succession of papers on endemic goiter were published in this Journal. Since that decade we have had fewer references to this public health problem. So it serves as a salutary reminder to be told, in this survey, that many children are still found to have enlarged thyroid glands.*

## Endemic Goiter in El Salvador School Children\*

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ENDEMIC goiter is known to occur in the interior of the North American Continent, in Mexico, Colombia, and the inland areas of most of the countries of South America. It is reasonable to suppose that endemic goiter would be found common in many areas of Central America and Panama, especially the highland plateaus. Since the establishment of the Institute of Nutrition of Central America and Panama (INCAP) in 1949, extensive surveys have been conducted to determine the incidence of endemic goiter in this area. As a result, endemic goiter has been shown to be a serious public health problem in Guatemala, El Salvador, Honduras, and Panama. Of these countries, the first to complete endemic goiter surveys of all representative areas is El Salvador.

The present report is based upon the examination of nearly 35,000 school children in both urban and rural areas in all 14 departments. Its purpose was to ascertain the magnitude of the public health problem in El Salvador in respect to this condition and to demonstrate the necessity of a control program.

### MATERIAL AND METHODS

School children of all ages in both public and private schools were examined in the capitals of all 14 departments, and when possible children in several localities in each department outside of the capital were studied in a similar manner. The school children examined represent approximately 2 per cent of the total population of the country and 5 per cent of the total number of school children. Coverage of urban areas was somewhat more complete because of their greater accessibility and the larger number of children easily available for examination.

For the purpose of the survey, the thyroid of each child was first inspected with the head thrown back. The gland was then carefully palpated with the head forward and the neck muscles relaxed. Glands were not considered enlarged unless they were definitely four to five times "normal" size. Normal size was considered to be approximately that of a large lima bean, although this concept had to be adjusted somewhat to the age and size of the child. In case of doubt the gland was not recorded as enlarged. Glands easily palpable or visible with the head thrown back but

\* INCAP Scientific Publication I-18.

TABLE 1  
*Endemic Goiter in El Salvador School Children*

Department	In the Capital City		Outside the Capital City	
	No. Examined	Per cent Positive	No. Examined	Per cent Positive
1. San Salvador	8,119	1	2,893	26
2. La Libertad	1,525	22	1,171	27
3. Cuscatlán	993	25	453	23
4. Cabañas	555	24	419	9
5. La Paz	1,256	10	719	24
6. Chalatenango	653	23	—	—
7. San Vicente	1,120	17	475	29
8. Usulután	719	12	997	32
9. San Miguel	2,459	7	132	39
10. Morazán	387	33	—	—
11. La Unión	472	18	—	—
12. Santa Ana	3,261	21	397	26
13. Sonsonate	1,179	41	595	51
14. Ahuachapán	901	26	763	54
Total	23,599	13	9,014	29

not visible with the head in normal position were classified as size one. Glands clearly visible with the head in normal position were classified as size two, and size three enlargements were coded only when the goiter was visible at a distance.\* The presence of nodules was always noted.

RESULTS

The number of children examined in the capital city of each department and in the remaining population are given in Table 1, together with the percentage of endemic goiter found. Of the total number of enlarged thyroids only 6.2 per cent were size two and size three, although in individual schools the percentage of enlarged thyroids of this size was as high as 18.1 per cent. On the basis of the total school population of each department capital and remaining area and the percentages of endemic goiter listed in Table 1, it can be estimated that at least 119,000 children out of the 673,100 in El Salvador reported in the last census have endemic goiter by the criteria described.

The distribution of endemic goiter by age and sex is given in Table 2. In the 5–9 year age range the incidence was only slightly higher in girls than in boys. In the 10–14 year age range the incidence increased in both groups, although the increase among the girls was more marked. Of the children 15 years of age and upward there was a still further increase in the incidence of endemic goiter in the girls and a slight decrease, of doubtful statistical significance, in the boys.

DISCUSSION

The data clearly demonstrate that endemic goiter is a serious public health problem in El Salvador. For several reasons, these figures are most certainly conservative. First, because with the criteria employed many definitely enlarged thyroids were palpated which were not considered to be more than four to five times enlarged and all doubtfully enlarged glands were considered normal for purposes of the tabulation. Second, because coverage of the rural areas in which the higher incidence apparently occurs was not as complete as coverage of the urban areas which tended to have a lower incidence. Although scattered schools were ex-

\* These are essentially the criteria of Dr. O. P. Kimball who visited the area personally in May, 1950, as a World Health Organization consultant in endemic goiter, and who initiated the surveys and demonstrated the technics of examination.

TABLE 2

*Incidence of Endemic Goiter in El Salvador School Children Classified by Age and Sex \**

Age	Boys		Girls	
	No. Examined	Per cent Positive	No. Examined	Per cent Positive
5- 9	3,268	8.6	3,909	10.2
10-14	7,346	14.2	8,099	18.2
15+	1,833	12.6	2,225	21.8

\* This table includes only children examined by A. C.

amined to determine the incidence in the departments outside of the capital cities, these of necessity were still located in concentrations of population not truly rural. Third, in an adult group studied, 350 soldiers from many parts of the country living in the departmental Capital of Santa Ana, an incidence of 32.6 per cent was found, higher than in school children in the same area.

Although the incidence figures cited presumably are minimum ones, it is apparent that the deficiency is relatively mild in most areas. Nodular goiters considered by Kimball<sup>1</sup> to be associated with iodine deficiency in the mother were not common in El Salvador. By contrast, nodular goiters are common in the highlands of Guatemala.<sup>2, 3</sup> Furthermore, the number of easily visible enlarged thyroids was relatively small except in certain areas.

The deaf-mutes, idiots, and cretins commonly found in association with iodine deficiency in highly endemic areas were not observed in El Salvador, although they have been encountered occasionally in Panama and Guatemala.<sup>8</sup>

It would be interesting to speculate on the total number of persons in El Salvador at the present time with endemic goiter. Extensive studies in adults have not yet been carried out. However, as mentioned previously soldiers stationed in the Department of Santa Ana and coming originally from many parts of the country were found to have an incidence slightly higher than

school children in the same area. If the average figures for school children can be taken as reasonably representative of the population as a whole, El Salvador would have a total of 329,000 persons with endemic goiter out of the population of 1,856,000. For the reasons discussed, the true incidence is probably considerably higher.

The salt used in El Salvador is entirely derived from the sea and crystallized by solar evaporation and further drying with artificial heat. The average iodine content of this salt as determined by the laboratories of the Institute of Nutrition of Central America and Panama is 0.22 parts per 10,000 of salt. None of the 22 samples analyzed was found to have more than 0.57 parts of iodine. The quantity recommended in salt to prevent endemic goiter under ordinary circumstances is 1 part of iodine per 10,000 parts of salt.

Little is known of the action of goitrogenic substances in this area. Vitamin A deficiency has been reported to increase the amount of endemic goiter.<sup>5, 6</sup> The diets in El Salvador generally contain inadequate amounts of vitamin A. Known goitrogenic foods such as cabbage are not consumed in large quantities by the population. Excessive calcium is known to increase the requirement of the body for iodine,<sup>4</sup> but the calcium content of the diet is relatively low.<sup>7</sup>

On the basis of the data presented it is concluded that endemic goiter constitutes a serious public health problem in

El Salvador and that all salt destined for human consumption should be iodized. Less complete surveys which have not yet been reported suggest that this is also true for Guatemala, Honduras, and Panama.

#### SUMMARY

Nearly 35,000 school children were examined for endemic goiter in all 14 departments of El Salvador. Of 8,000 children examined in the Capital City only 1.1 per cent were found to have thyroids more than four to five times enlarged. Of the 26,400 children examined in the remainder of the country, the average incidence was 22.8 per cent, although it varied from 8.5 to 38.7 per cent depending on the department. The incidence of easily visible enlarged thyroids was relatively small, 6.2 per cent of the total with goiter. Deaf-mutes, idiots, and cretins were not observed.

On the basis of the samples studied it is estimated that the total of 119,000 school children in El Salvador out of a total school population of 673,000 are affected. Endemic goiter is thus a serious public health problem in El Salvador and the iodization of all salt

for human consumption is recommended. The average iodine content of the salt presently in use was found to be 0.22 parts per 10,000 of salt. Except for the possible importance of the widespread dietary deficiency of vitamin A, no goitrogenic factors have been identified.

**ACKNOWLEDGMENT** — The authors gratefully acknowledge the interest and support of Dr. Juan Allwood Paredes, director of public health of El Salvador, and of Drs. Erasmo Saldaña, Jorge Ramos, and José Comandari, who assisted in the examination of children in the towns under their jurisdiction as public health physicians. Miguel Guzmán of INCAP supervised the final tabulations of the data.

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