The incidence of Goitre in the Northern, Eastern and Central Provinces and in the Ndola Rural District of Zambia

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SUMMARY

A survey of 4 of the 8 provinces of Zambia for endemic goitre is presented. The condition is present in varying degrees in all the areas surveyed, except parts of Central Province and the Lusaka environs.

INTRODUCTION

Reports of endemic Goitre in Zambia have appeared over the last 27 years. Mackay (1946) reported the prevalence of goitre in the Chitambo area. Beet (1951) reported that 38% of Lala children in the Serenje and Mkushi districts had enlarged thyroids. Fisher (1971) found that 17% of secondary school children in Luanshya and Kitwe had goitre. Reid et al (1971) reported an incidence among secondary school children in Zambezi of 43% in males and 55% in females.

These reports suggest that goitre is endemic in many parts of Zambia. A study on the incidence of goitre was therefore included in the Nutrition Status Survey of the National Food and Nutrition Programme of Zambia to assess the relative size of the problem in the country as a whole. This survey began in December 1969, and by July 1971 the study of Northern, Eastern and Central Provinces and the Ndola Rural District had been completed. The findings of the survey in these areas follow.

METHODS

A Medical Officer attached to the survey team examined every individual for goitre as part of a routine clinical assessment. The examination and grading of goitre was carried out according to Perez et al (1960). The grades were as follows:

Grade 0	Non palpable thyroids or thyroids judged to be less than four times enlarged.
Grade 1	Palpable thyroids more than four times enlarged and visible only with the head thrown back and the neck fully extended.
Grade 2	Goitres visible at any angle of the head with respect to the neck.
Grade 3	Large and disfiguring goitres.

During the period of the survey four different medical officers carried out these investigations. All were instructed to adhere to the classification above, but it is possible that individual differences in opinion on the grading of some goitres existed. This should be taken into account when the various incidences of different grades of goitre are considered. The total incidences of all grades of goitre are also listed and these probably give an accurate picture of the incidence of goitre in general.

Construction of the population sample

The sample population was determined by consultant statisticians of the Food and Agriculture Organisation and formed the basis of the surveys of the National Food and Nutrition Programme of Zambia. Northern Province was, in part, a pilot project for the programme and had a larger sample. Population figures for the Northern Province were obtained from the 1963 census and for other areas from the 1969 census. In all cases a stratified, two stage, random selection was made according to Cochran (1963).

The Northern Province sample comprised the populations of fourteen villages in each of six ecologically defined strata, a total of eighty-four villages within the province. The six strata were recombined later to give the following four survey areas:

1) The area of highlands around Lake Tanganyika and Mbala and the Lake Shore and the land to the East of Mweru Wantipa.
2) The area of the Lake Banguelu basin and Swamps and the land south of the Mansa – Luwingu Road.
3) The Chambeshi River Valley.
4) The highland plateau regions of the Province and all areas not included in the above.

The size of the sample population was weighed according to the population density in the area concerned, and comprised of 2898 individuals of all age groups, taken as family units. This consisted of 0.5% of the census population figure.

In the Central and Eastern Provinces and the Ndola Rural region, a similar random sample of villages was constructed from the 1969 census figures. Eastern Province and Ndola Rural were treated as single entities. Central Province was divided into two areas:

1) West of the line of rail: Mumbwa, Kabwe Rural and Lusaka Rural.

2) East of the line of rail: Kabwe Rural, Feira and Rufunsa.

The Serenje and Mkushi districts were not surveyed and the Urban centres were not included in this part of the survey. The survey sample in each province is shown in Table 1.

Table 1:

Survey sample in each province.

PROVINCE	TOTAL POPULATION	CENSUS DATE	NUMBER IN SURVEY	% OF TOTAL POPULATION
Northern	564,000	1963	2,898	0.5
Eastern	510,000	1969	583	0.1
Central	274,000	1969	1,117	0.4
Ndola Rural	72,000	1969	983	1.4
TOTAL	1,420,000	–	5,582	0.4

The survey population was analysed in the following age/sex groups.

1) Males under five years old.
2) Females under five years old.
3) Males 5–15 years.
4) Females 5–15 years.
5) Adult males (over 15).
6) Non pregnant, non lactating adult females (over 15).
7) Pregnant or lactating adult females (over 15)

RESULTS AND DISCUSSION

The incidence of goitre of each grade throughout the total population is shown in Table 2.

Table 2:

Overall incidence of goitre in the survey population.

Age/Sex Group	Grade 0 %	Grade 1 %	Grade 2 %	Grade 3 %	Total No. Examined No.	% of Total Positive %
Males under 5 years	99.0	1.0	0	0	1,013	1.0
Females under 5 years	99.0	1.0	0.01	0	1,002	1.1
Males 5 – 15 years	93.6	6.3	0.05	0.05	906	6.4
Females 5 – 15 years	91.1	8.7	0.10	0.05	847	8.9
Adult Males	91.4	7.2	1.40	0.00	708	8.6
Adult Females	79.6	14.3	4.80	1.30	621	20.4
Adult Females (pregnant or lactating)	81.7	12.6	4.5	1.2	485	18.3
TOTAL	91.9	6.4	1.3	0.4	5,582	8.1

It shows that 8.1% of the total population studied have a goitre of some kind. Adult men show 8.6%, non pregnant/non lactating females 20.4% and pregnant or lactating females show 18.3% incidence. Of the children aged between five and fifteen years the males show 6.4% and the females 8.9%.

Subsequent tables show the incidence of goitre in each age/sex group in each of the provinces and other areas studied.

Table 3 shows the incidence of goitre among pregnant or lactating females. As far back as 1875, Tait recognised that pregnant and lactating women were more prone to develop goitre than other members of the population. This is confirmed in Tables 3 and 4. The incidence among non pregnant/lactating females is shown in Table 4. With the exception of Lake Bangweulu, Chambeshi Valley and all of Central Province, they would appear to have rates slightly lower than those in Table 3.

From both Tables 3 and 4 it appears that only the Lake Tanganyika area of Northern Province shows a very high incidence of goitre. Eastern Province, Ndola Rural and the west of Central Province show high incidences, varying from 31.6% to 59.6% of the adult females. The eastern side of

Table 3:
Percentage incidence of goitre — pregnant and lactating females.

	Grade 0 %	Grade 1 %	Grade 2 %	Grade 3 %	Total No. Examined No.	% of Total Positive %
Province						
Northern	90.3	4.7	3.0	2.0	300	9.7
Eastern	51.2	37.2	11.6	0	43	48.8
Central	75.4	21.2	3.5	0	85	24.6
Ndola Rural	68.4	22.8	8.8	0	57	31.6
Northern Province						
Lake Tanganyika	79.6	13.6	5.1	1.7	59	20.4
Lake Bangweulu	95.8	1.4	1.4	1.4	70	4.2
Chambeshi	100.0	0	0	0	51	0
Plateau Areas	88.3	4.2	4.2	3.3	120	11.7
Total	90.3	4.7	3.0	2.0	300	9.7
Central Province						
West	37.5	56.3	6.3	0	32	62.6
East	98.2	0	1.8	0	53	1.8
Total	75.4	21.2	3.5	0	85	24.6

Central Province shows a very low incidence.

The findings for adult males are also shown in Figure 4. Although the rate of incidence is much lower in this group, the pattern of distribution reflects that shown in Tables 3 and 4.

The findings for the 5–15 year age group are shown in Table 5. Clements (1960) concludes that in non-endemic areas sporadic goitres occur naturally in 4% of all females in this age group. Females showed an observed rate of 8.9% of the total studied. The table indicates places within the survey areas where goitre is endemic. Perez at al (1960) state that in endemic areas, during female adolescence, there is a significant increase in the number of hyperplastic glands. This so called "adolescent goitre" reflects an iodine deficiency that has become manifest owing to an increased demand by the body for iodine.

On this evidence it would appear from Table 5 that the Eastern Province, the Ndola Rural, Lake Tanganyika and Mumbwa Districts, and the highland plateau areas of Northern Province all exhibit endemic goitre to varying degree.

Table 6 shows the incidence among children under five. It indicates that in the western part of Central Province endemic goitre is so severe that 4.1% of the females and 3.1% of the males exhibit an enlarged thyroid before the age of five. As no records were made of the incidence of cretinism, myxoedema or cartinoma of thyroid, the effects of this on the population and the development of these children have yet to be investigated.

The area surveyed covered four of the eight provinces. Further information on the remaining provinces will appear later. It is apparent that goitre exists to some degree in all parts of Zambia to the north and east of the Kafue River.

The areas where goitre is endemic in approximate order of severity are:

1) The western side of Central Province between the Kafue River and the line of rail.
2) Eastern Province in general (The Medical Officers Survey Report indicates that the majority of cases occurred in the Lundazi District).
3) The Ndola Rural District.
4) The Mbala District, the shores of Lake Tanganyika and the area to the west of Lake Mweru Wantipa.
5) The Highland Plateau areas of Northern Province.

The areas where goitre is apparently not endemic are:

1) The eastern part of Central Province, comprising parts of Kabwe Rural, Lusaka Rural, Rufunsa and Feira.
2) The Chambeshi River Valley and Northern Province.
3) The Lake Bangweulu region, comprising the swamps, and the area south of the Luwingu-Mansa Road.

Table 4:

Percentage incidence of goitre — adult females and adult males.

	ADULT FEMALES						ADULT MALES					
	Grade 0 %	Grade 1 %	Grade 2 %	Grade 3 %	Total No. Examined No.	% of Total Positive %	Grade 0 %	Grade 1 %	Grade 2 %	Grade 3 %	Total No. Examined No.	% of Total Positive %
Province												
Northern	93.5	2.1	2.5	1.9	320	65.0	98.9	1.1	0	0	353	1.1
Eastern	54.5	32.5	11.7	1.3	77	45.5	89.6	10.4	0	0	77	10.4
Central	68.1	29.5	1.6	0.8	129	31.9	77.5	17.9	4.6	0	151	22.5
Ndola Rural	68.2	20.0	11.8	0	95	31.8	88.2	9.4	2.4	0	127	11.8
Northern Province												
Lake Tanganyika	84.0	4.0	4.0	8.0	50	16.0	96.4	3.6	0	0	55	3.6
Lake Bangweulu	91.1	5.1	2.5	1.3	79	8.9	98.8	1.2	0	0	81	1.2
Chambeshi	98.2	1.8	0	0	57	1.8	100.0	0	0	0	57	0
Plateau Areas	96.3	0.1	2.0	0.7	134	3.7	99.4	0.6	0	0	160	0.6
Total	93.5	2.1	2.5	1.9	320	6.5	98.8	1.1	0	0	353	1.1
Central Province												
West	42.8	54.3	2.9	0	70	57.2	60.0	31.8	8.2	0	85	40.0
East	98.3	0	0	1.7	59	1.7	100.0	0	0	0	85	0
Total	68.1	29.5	1.6	0.8	129	31.9	77.5	17.9	4.6	0	151	22.5

Table 5:

Percentage incidence of goitre — females 5–15 years, males 5–15 years.

	FEMALES 5–15 YEARS						MALES 5–15 YEARS					
	Grade 0 %	Grade 1 %	Grade 2 %	Grade 3 %	Total No. Examined No.	% of Total Positive %	Grade 0 %	Grade 1 %	Grade 2 %	Grade 3 %	Total No. Examined No.	% of Total Positive %
Province												
Northern	91.3	7.1	1.0	0.6	496	8.7	93.2	5.5	0.6	0.7	541	6.8
Eastern	86.6	10.7	2.7	0	75	13.4	97.1	2.9	0	0	70	2.9
Central	82.1	7.7	0	0	95	17.9	81.0	19.0	0	0	79	19.0
	92.3	7.7	0	0	181	7.7	95.4	4.6	0	0	216	4.6
Northern Province												
Lake Tanganyika	87.8	11.4	0	0.8	123	12.2	91.4	7.9	0.7	0	139	8.6
Lake Bangweulu	97.3	2.7	0	0	74	2.7	100.0	0	0	0	82	0
Chambeshi	100.0	0	0	0	57	0	98.4	1.6	0	0	63	1.6
Plateau Areas	89.2	7.9	2.1	0.8	242	10.8	90.6	7.0	0.8	1.6	257	9.4
Total	91.3	7.1	1.0	0.6	496	8.7	93.2	5.5	0.6	0.7	541	6.8
Central Province												
West	59.6	40.4	0	0	42	40.4	62.5	37.5	0	0	40	37.5
East	100.0	0	0	0	53	0	100.0	0	0	0	39	0
Total	82.1	17.9	0	0	95	17.9	81.0	19.0	0	0	79	19.0

Table 6:

Percentage incidence of goitre — females under 5 years, males under 5 years.

	Grade 0 %	Grade 1 %	Grade 2 %	Grade 3 %	Total No. Examined No.	% of Total Positive %	Grade 0 %	Grade 1 %	Grade 2 %	Grade 3 %	Total No. Examined No.	% of Total Positive %
Province												
Northern	98.7	1.1	0.2	0	423	1.3	98.9	1.1	0	0	465	1.1
Eastern	100.0	0	0	0	123	0	100.0	0	0	0	118	0
Central	98.0	2.0	0	0	210	2.0	88.3	1.7	0	0	288	1.7
Ndola Rural	98.8	1.2	0	0	166	1.2	99.3	0.7	0	0	141	0.7
Northern Province												
Lake Tanganyika	94.4	5.6	0	0	71	5.6	97.0	3.0	0	0	67	3.0
Lake Bangweulu	100.0	0	0	0	81	0	100.0	0	0	0	104	0
Chambeshi	100.0	0	0	0	56	0	98.3	1.7	0	0	58	1.7
Plateau Areas	99.0	0.5	0.5	0	215	1.0	99.2	0.8	0	0	236	0.8
Total	98.7	1.1	0.2	0	423	1.3	98.9	1.1	0	0	465	1.1
Central Province												
West	95.9	4.1	0	0	147	4.1	96.9	3.1	0	0	159	3.1
East	100.0	0	0	0	143	0	100.0	0	0	0	129	0
Total	98.0	2.0	0	0	290	2.0	98.3	1.7	0	0	288	1.7

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