

## Determine of Concentration of the Iodine in Household Salt in Albania

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**Abstract: - Objective:** To determine the iodine concentration in household salt, the coverage of adequately iodized salt, the use of none iodized salt and the useful of salt as a carrier of iodine. To relate this observation to socio-economic status in Albania.

**Methods:** The iodometric titration method is used to analyze 1027 household salt samples collected using a national, stratified, cluster survey. To achieve this aim we are used 487 samples from urbane areas and 540 samples from rural areas.

**Results and conclusions:** The national mean and median iodine concentration of household salt were 22.3 ppm (mg/kg) in the urban areas and 17.4 ppm (mg/kg) in the rural areas. There was considerable variation between the geographical areas.

Evaluation of the levels of the salt iodine in Albania shows that 60.41% of the samples are  $\geq 15$  ppm and 39.58 % are  $< 15$  ppm.

A total of 31.2 % of population used non-iodization salt and they bought the salt directly from the producers. People at the lower end of the socioeconomic spectrum were more likely to suffer the consequences of using under-iodized salt because more of them used agricultural salt than did people in the higher socioeconomic categories. The iodine concentration in salt was lower in rural areas than in urban areas.

**Keywords:** - *Sodium chloride, iodine use, households' salt, Albania, socioeconomic factors,*

### I. INTRODUCTION

Iodine is an essential element in the production of thyroid hormones which act primarily in muscle, heart, liver, kidney and brain. In the absence of an appropriate iodine diet, the human body is subject to a number of problems skilled disorders due to iodine deficiency (IDD) , including goiter, mental retardation, impaired physical development, spontaneous abortions, cretinism, anemia, stunting and child mortality are the most visible manifestations. . The different effects of these disorders that develop long-term can cause a socioeconomic late because affected individuals are less vigorous, difficult to educate and motivate and therefore less productive in their work [2-4] . the persistence of iodine deficiency is a problem, not only in poor countries but also in developed countries . More than 1.5 billion people in 118 countries around the world are affected by these disorders. Albania is a country with limited environmental resources of iodine. Since years IDD has been a great problem of public health. The levels of this microelement are very low in drinking water and food.

#### Dosage

#### Measurement of iodine salt

The iodine salt content in the form of potassium iodate (  $KIO_3$  ) reacts with the sulfuric acid (  $H_2SO_4$  , 1M) and potassium iodide (  $KI$  ) for converting iodate (  $IO_3^-$  ) to molecular iodine (  $I_2$  ). It is then titrated with sodium thiosulfate (  $Na_2S_2O_3$  , 2.5 mM) in the presence of starch as an indicator of completion of the reaction .

#### Materials and methods

### Framework

For the determination of the iodine in the salt were taken samples of salt households used from the children in their house. Samples of salt collected in plastic glasses (about 20gr. Salt for each person) are analyzed in the Food chemistry Laboratory of Institute of Public Health (IPH). The iodometric titration method is used to analyze 1027 household salt samples collected using a national, stratified, cluster survey. To achieve this aim we are used 487 samples from urbane areas and 540 samples from rural areas.

### Measurement of iodine salt

The iodometric titration method is used to analyze 1046 household salt samples collected using a national, stratified, cluster survey. To achieve this aim we are used 450 samples from urbane areas and 596 samples from rural areas.

The iodine content of iodized salt samples is measured using a Standard iodometric titration prescribed by DeMaeyer, Lowenstein and Thilly (WHO, Geneva 1979). Iodine is liberated using sulfuric acid. The free iodine is titrated with sodium thiosulphate, using starch as an indicator.

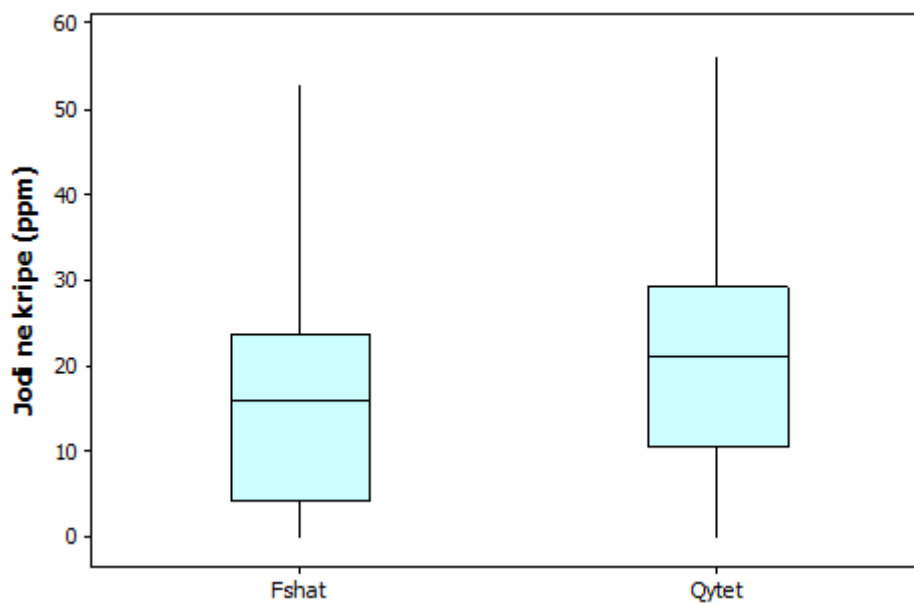
## II. RESULTS AND DISCUSSION

A total 1027 school children aged 6-13 years were included in the study. The male: female ratio was nearly 1:1. The distribution of the sample according the geographic regions is given in the Table 1:

	Costal Region		Internal Region		Total
	Urban	Rural	Urban	Rural	
Lushnje	-	-	25	36	61
Berat	-	-	36	18	54
Kruje	-	-	21	-	21
Diber	-	-	19	21	40
Kukes	-	-	24	36	60
Korce	-	-	39	39	78
Pogradec	-	-	36	36	72
Kavaje	18	18	-	-	36
Durres	57	36	-	-	93
Elbasan	-	-	38	37	75
Tirane	-	-	37	93	130
Shkoder	41	56	-	-	97
Lezhe	20	37	-	-	57
Sarande	19	21	-	-	40
Fier	-	-	36	19	55
Vlore	21	37	-	-	58
Total	176	205	311	335	1027

Salt iodine levels according to the regions of urban and rural zones :

Iodine level (ppm)	M	SE	SD	Min	Median
Village	17.4	0.6	15.4	0	15.9
City	22.3	0.7	15.7	0	21.2



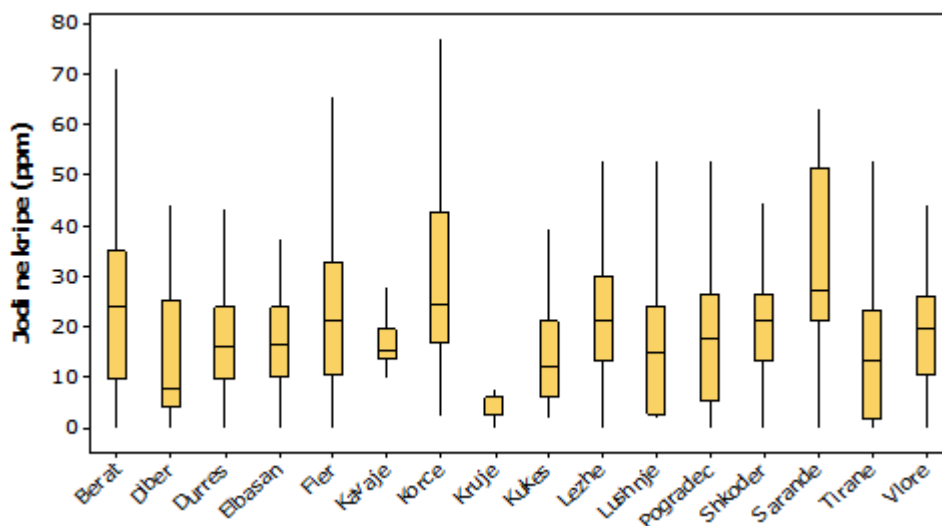
#### Graphic of salt iodine levels according the regions:

From the analyses of the salt iodine level resulted that the median salt level in urban zone is  $M = 22.3$  ppm and the median salt level in rural zone is  $M = 17.4$  ppm. ( Value of adequately iodized salt  $\geq 15$ ppm (mg/kg)

#### Salt iodine levels according to the districts:

Iodine level (ppm)	M	SE	SD	Min	Q1	Median	Q3	Max
Berat	24.09	2.73	18.7	0	9.5	23.8	34.9	70.9
Diber	14.39	2.09	12.37	0	4.25	7.9	25.4	44.4
Durres	17.5	1.29	11.95	0	9.5	15.9	23.93	66.1
Elbasan	16.56	1.22	10.32	0	9.78	16.4	23.8	44.9
Fier	27.69	3.31	24.08	0	10.6	21.2	32.8	100.5
Kavaje	16.53	1.69	9.26	0	13.38	15.3	19.5	42.3
Korce	30.6	2.8	21.17	2.1	16.9	24.3	42.85	77.2
Kruje	5.66	1.62	7.26	0	2.23	2.6	6.05	31.7
Kukes	14.59	1.43	11.01	2.1	5.8	12.1	21.2	55.5
Lezhe	22.35	1.97	14.85	0	13.2	21.2	30.15	63.5
Lushnje	16.02	1.36	13.36	1.6	2.6	14.8	24.05	66
Pogradec	18.96	1.86	15.65	0	5.3	17.4	26.5	74.1
Shkoder	21.42	1.2	11.68	0	13.2	21.2	26.5	52.9
Sarande	31.93	2.39	15.12	0	21.2	27	51.57	63.5
Tirane	15.73	1.35	15.03	0	1.73	13.2	23.3	52.9
Vlore	21.47	2.22	16.74	0	10.6	19.5	25.95	78.3

#### Graphic of salt iodine levels according to the districts:



From the analyses of the salt iodine level resulted that the median salt level is higher in the district of Saranda,  $M = 31.9$  ppm, in the district of Korca,  $M = 30.6$  ppm and in the district of Fier,  $M = 27.7$  ppm. We can say that the district of Kruja has the minimum of the median salt level,  $M = 5.7$  ppm.

#### Evaluation of the levels of the salt iodine in Albania:

Iodine concentration	Number of samples	Percentage
Adequately iodized $\geq 15$ ppm	589	60.41 %
Non adequately iodized $<15$ ppm	386	39.59 %
<b>TOTAL</b>	<b>975</b>	<b>100.00 %</b>

From the analyses of the iodine level in total samples results that 60.41% of the samples is adequately iodized and 39.7% and 39.59% was not adequately iodized.

#### REFERENCES

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