

LIST OF FIGURES

No.	Title	Page
Figure 1	Energy absorption from the atom equal to the energy difference between both levels.	24
Figure 2	Light Path for a double beam Spectrophotometer.	27
Figure 3	Gender and age strata of study group.	87
Figure 4	Geographical distribution of the study group.	88
Figure 5	The tribe of study group.	89
Figure 6	The occupation of study group.	90
Figure 7	Resources of water used by participants.	91
Figure 8	Use of make up by the study group.	92

LIST OF TABLES

No.	Title	Page
Table 1	Electromagnetic spectrum as a function of the wavelength radiation.	25
Table 2	Concentration of Analyte Yielding an Absorbance of 0.20.	34
Table 3	Atomic Emission Lines for a Cr Hollow Cathode Lamp.	36
Table 4	Atomic absorption concentration ranges.	59
Table 5	Reference intervals of trace elements concentration in scalp hair and fingernails validated and certified by the National Institute for Environment Studies, Japan and from the Community Bureau of Reference of the Commission of the European Communities.	93
Table 6	Distribution of age groups among study group.	94
Table 7	Geographical distribution of the study group.	95
Table 8	The tribe of study group.	96
Table 9	Social habits of the study group.	97
Table 10	Use of make up by the study group.	98
Table 11	Overall mean, maximum, and minimum of each trace element concentrations in hair samples of the study group.	99
Table 12	Collective element concentration in the hair of study group.	100
Table 13	Overall Pearson correlation of the inter-element associations in the hair samples.	101
Table 14	Trace element concentration in children's hair samples.	102
Table 15	Summary of Pearson Correlation (r) of the inter-element associations in the children's hair samples.	103
Table 16	Trace Element Concentration in Female's Hair Samples.	104
Table 17	Summary of Pearson Correlation (r) of the inter-element associations in the female's hair samples.	105
Table 18	Trace element concentration in male's hair samples.	106
Table 19	Summary of Pearson Correlation (r) of the inter-element associations in the male's hair samples.	107
Table 20	Comparison of the variations in trace element concentration in the hair samples among genders.	108
Table 21	Comparison of the variations in trace element concentration in the hair samples between age groups.	109
Table 22	Comparison of the variation in trace element concentration in the hair sample depends on geographical location.	110

Table 23	Comparison of the variations in trace element concentration in the hair sample depends on the tribe of participants.	111
Table 24	Trace element concentration in the hair sample depends on work.	112
Table 25	Trace element concentration in the hair sample depends on daily working hours.	113
Table 26	Trace element concentration in the hair sample depends on water resources.	114
Table 27	Effect of social habit on trace element concentration in the hair.	115
Table 28	Effect of make up on trace element concentration in the hair.	116
Table 29	Overall trace element concentration in fingernail samples.	117
Table 30	Collective element concentration in the fingernails.	118
Table 31	Overall Pearson Correlation of the inter-element associations in the fingernail samples.	119
Table 32	Trace element concentration in children's fingernail samples.	120
Table 33	Summary of Pearson Correlation (r) of the inter-element associations in the children's fingernail samples.	121
Table 34	Trace element concentration in female's fingernail samples.	122
Table 35	Summary of Pearson Correlation (r) of the inter-element associations in the female's fingernail samples.	123
Table 36	Trace element concentration in male's fingernail samples.	124
Table 37	The summary of the Pearson Correlation (r) of the inter-element associations in the male's fingernail samples.	125
Table 38	Comparison of the variations in trace element concentration in the fingernails samples among gender.	126
Table 39	Comparison of the variations in trace element concentration in the fingernails hair samples between age groups.	127
Table 40	Variation in trace element concentration in the fingernails Sample depends on geographical location.	128
Table 41	Variations in trace element concentration in the fingernails Sample depends on the tribe of participants.	129
Table 42	Trace element concentration in the fingernails sample depends on work.	130
Table 43	Trace element concentration in the fingernails sample depends on daily working hours.	131
Table 44	Trace element concentration in the fingernails sample depends on water resources.	132
Table 45	Effect of social habit on trace element concentration in the fingernails.	133

Table 46	Effect of make up on trace element concentration in the fingernails.	134
Table 47	Overall comparison of mean trace element concentration between hair and nails.	135
Table 48	Overall comparison of mean trace element concentration between hair and nails.	136
Table 49	Validity of spectrophotometer in measurement of trace elements in scalp hair and fingernails.	137
Table 50	Range of trace element concentration in hair samples using XRF technique	138
Table 51	Range of trace element concentration in nail samples using XRF technique	139
Table 52	Correlation of trace elements concentrations between hair and nails samples using XRF technique	140

LIST OF ABBREVIATIONS

<i>AAS</i>	Atomic Absorption Spectroscopy.
<i>AES</i>	Atomic Emission Spectroscopy.
<i>AS</i>	Atomic Spectroscopic.
<i>Ca</i>	Calcium.
<i>Cd</i>	Cadmium.
<i>CH₃COOH</i>	Ethanol.
<i>Cu</i>	Copper.
<i>CuCl₂</i>	Copper chloride.
<i>EDXRF</i>	Energy dispersive X-Ray Fluorescence.
<i>ETA</i>	Thermal Atomization.
<i>FAA</i>	Flame Atomic Absorption.
<i>Fe</i>	Iron.
<i>FWHM</i>	Full Width of Half Maximum.
<i>HF</i>	Hydrofluoric Acid.
<i>HCl</i>	Hydrochloric Acid.
<i>HNO₃</i>	Nitric Acid.
<i>IAEA</i>	International Atomic Energy Agency.
<i>ICP-MS</i>	Mass Spectrometry With Inductively Coupled Plasma.
<i>ICP-OES</i>	Optical Emission Spectroscopy With Inductively Coupled Plasma.
<i>INAA</i>	Instrumental NAA.
<i>LLD</i>	Lower Limit of Detection.
<i>Mg</i>	Magnesium.
<i>NAA</i>	Neutron Activation Analysis.

<i>Pb</i>	Lead.
<i>PIXE</i>	Proton Induced X-Ray Emission Technique.
<i>PO₄³⁻</i>	Phosphor Oxide.
<i>ppb</i>	Par per billion.
<i>ppm</i>	Par per million.
<i>SD</i>	Standard Deviation.
<i>WDXRF</i>	Wavelength Dispersive X-Ray Fluorescence.
χ^2	Chi-square test.
<i>XRF</i>	X-Ray Fluorescence Technique.
<i>ZBGC</i>	Zeeman Background Correction.
<i>Zn</i>	Zinc.
