

# COMPILATION OF ANATOMICAL, PHYSIOLOGICAL AND DIETARY CHARACTERISTICS FOR A FILIPINO REFERENCE MAN

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## Abstract

The Asian Reference Man is the study of the biological characteristics of the different ethnic populations in the Asian Region. Its aim is to update the existing International Reference Values called ICRP Reference Man which is used for the calculation of radiation exposure. The Philippines is a participant in the study of the formulation of the Asian Reference Man and is represented by the Philippine Nuclear Research Institute. The biological parameters included in the study are the physical, anatomical, physiological and the dietary characteristics representing the Filipino race and customs. The normal Filipino values were obtained from past nationwide and regional surveys, from medical records of private and government institutions and from random sampling of the population. Results of the study are presented in tabulations according to its gender and to its age group. Statistical analysis of the data are presented as the mean, standard deviation and the median using Microsoft Excel Software and Clipper Compiled Program.

## INTRODUCTION

The Asian Reference Man was conceptualized when the International Commission on Radiation Protection (ICRP) recognized that substantial differences in the values of biological parameters exist between Caucasian and the Asian Man. Since sixty (60) percent of the world population come from Asian Region, the application of the Caucasian data for the calculation of internal and external radiation exposure for Asians may produce inaccurate results.

The differences in the anatomy, physiology, and metabolic characteristics between the Caucasian and the Asian has been earlier demonstrated by Tanaka et al [1]. Hence in 1988, the International Atomic Energy Agency (IAEA) organized a coordinated research programme on the compilation of physical, anatomical, physiological and metabolic characteristics for a Reference Asian Man. Twelve (12) IAEA member countries from the Asian Region joined this programme. The Philippines is represented by the Philippine Nuclear Research Institute (PNRI) with the task of collecting biological data specific to the average normal Filipino.

## PHYSICAL PARAMETERS

The Filipino is defined to be a mixture of different races namely, Malay (40%), Indonesian (30%), Negrito (10%), Chinese (10%), Indian (5%), Arab (2%), and European or American (3%) [2]. The physical characteristics of an average Filipino are as follows [3,4]:

	<i>MALE</i>	<i>FEMALE</i>
Height, cm	163	151
Weight, Kg	56	49
Life Span, yrs	61.9	65.5
Sex Ratio, %	50.2	49.8

Table 1 shows the other observed values for the average weight of the Filipino male and female according to age group. Results indicate that at birth, the male is heavier than the female. However, at the age of ten years, the female weighs slightly more than the male. The male reached the maximum weight at age 30-39 years while, the female weight peaks at a later age (40-49 years).

Table 2 gives the growth rate of the average Filipino as a function of time. At the age of ten, the female has the tendency to increase body length while that of her male counterpart occurs at the age of fifteen years. The peak in the growth of the male Filipino is observed at 30-39 years. The female's maximum growth is shown at the age of 20-29 years.

The other somatological data measured in centimeters, for the Filipino man aged 20 to 50 years old are as follows:

	<i>MALE</i>	<i>FEMALE</i>
Sitting Height, cm	86.0	80.3
Chest Girth, cm	88.0	84.0
Chest Width, cm	38.0	35.0
Neck Girth, cm	43.0	37.5
Arm Length, cm	35.1	32.2

Sources of the above information were the Food and Nutrition Research Institute (FNRI) and the Bureau of Product Standards (BPS) [3,5,6].

Tables 3 to 6 show the growth rates for the somatological data such as, arm length, sitting height, chest girth and width, neck and head circumference for other age groups for both male and female [7-9]. The growth rates of these somatological data cease to increase at age 40.

## ANATOMICAL PARAMETERS

The organ masses of the Filipino adult (20-50 years), expressed in grams, are as follows:

TABLE I. OBSERVED VALUES FOR THE WEIGHT OF THE FILIPINO

AGE	MALE			FEMALE		
	Number of People	Weight - kg		Number of People	Weight - kg	
		Mean	Std. Dev.		Mean	Std. Dev.
< 1 Year	156	7.5	1.2	169	7.0	3.1
1 Year	238	9.3	1.4	250	9.0	1.7
5 Years	236	15.2	1.7	236	15.2	1.7
10 Years	227	24.3	3.8	247	25.7	5.0
15 Years	208	43.1	7.6	227	43.3	6.2
20-29 Years	1,299	55.3	7.1	1,488	47.7	7.6
30-39 Years	913	58.0	8.8	1,079	50.4	8.9
40-49 Years	610	57.3	9.6	770	50.5	10.0
Total Adult, 20-49 Years	2,822	56.6	8.3	3,337	49.2	8.7

TABLE II. OBSERVED VALUES FOR THE HEIGHT OF THE FILIPINO

AGE	MALE			FEMALE		
	Number of People	Height - cm		Number of People	Height - cm	
		Mean	Std. Dev.		Mean	Std. Dev.
< 1 Year	156	68.1	3.6	167	66.4	4.0
1 Year	234	75.7	4.7	245	75.0	4.9
5 Years	253	102.9	6.4	236	102.6	5.6
10 Years	227	126.8	6.2	247	128.9	7.9
15 Years	208	155.1	8.2	227	149.8	5.9
20-29 Years	1,299	163.3	6.1	1,486	151.4	5.4
30-39 Years	913	164.2	22.6	1,079	151.4	5.3
40-49 Years	610	162.2	5.9	790	150.8	5.6
Total Adult, 20-49 Years	2,822	163.4	13.8	3,355	151.3	5.4

TABLE III. OBSERVED VALUES FOR THE ARM LENGTH OF THE FILIPINO

AGE	MALE			FEMALE		
	Number of People	Arm Length - cm		Number of People	Arm Length - cm	
		Mean	Std. Dev.		Mean	Std. Dev.
< 1 Year	156	13.8	1.1	169	13.3	1.1
1 Year	237	15.5	1.2	249	15.4	1.3
5 Years	253	21.0	1.5	235	20.8	1.4
10 Years	227	26.2	1.6	247	26.9	1.9
15 Years	208	32.7	2.2	227	31.5	1.8
20-29 Years	1,300	34.9	1.9	1,490	32.1	1.9
30-39 Years	913	35.3	2.2	1,079	32.2	1.8
40-49 Years	610	35.3	1.8	788	32.3	1.8
Total Adult, 20-49 Years	2,823	35.1	2.0	3,356	32.2	1.8

TABLE IV. OBSERVED VALUES FOR THE SITTING HEIGHT OF THE FILIPINO

AGE	MALE			FEMALE		
	Number of People	Sitting Height - cm		Number of People	Sitting Height - cm	
		Mean	Std. Dev.		Mean	Std. Dev.
< 1 Year	-	-	-	-	-	-
1 Year	-	-	-	-	-	-
5 Years	253	56.8	3.6	236	56.0	2.9
10 Years	227	66.9	3.4	247	67.8	3.8
15 Years	208	80.2	4.4	227	79.2	3.3
20-29 Years	1,308	85.9	4.1	1,491	80.4	3.5
30-39 Years	918	86.2	3.4	1,082	80.5	3.6
40-49 Years	615	85.7	3.5	790	79.7	4.7
Total Adult, 20-49 Years	2,841	86.0	3.8	3,363	80.3	3.9

TABLE V. OBSERVED VALUES FOR THE CHEST CIRCUMFERENCE AND CHEST WIDTH OF THE FILIPINO

Age	Number of People	Chest Circumference cm		Number of People	Chest Width (Posterior) cm	
		Male	Female		Male	Female
0-1 Year	8,546	38-51	38-51	8,546	-	-
2 Years	Male 11,933 Female 12,287	50	49	Male 11,933 Female 12,287	21	20
4 Years		54	53		23	22
6 Years		58	56		25	24
8 Years		62	60		27	26
10 Years		66	64		29	28
12 Years		70	67		30	29
14 Years	Male 8,350 Female 6,327	75	71	Male 8,350 Female 6,327	33	31
16 Years		80	76		35	33
18 Years		84	80		36	34
20 Years		88	84		38	35
≥ 20 Years	19,265	85-112	78-98			33-37

TABLE VI. OBSERVED VALUES FOR THE NECK AND HEAD CIRCUMFERENCE OF THE FILIPINO

Age	Number of People	Neck Circumference cm		Number of People	Head Circumference cm	
		Male	Female		Male	Female
0-1 Year	8,546	23-26	23-23	8,546	37-47	37-47
2 Years	Male 11,933 Female 12,287	27	26.0		-	-
4 Years		28	27.5		-	-
6 Years		30	29.0		-	-
8 Years		31	30.0		-	-
10 Years		32	31.5		-	-
12 Years		34	32.5		-	-
14 Years	Male 8,350 Female 6,327	36	34.4		-	-
16 Years		38	35.5		-	-
18 Years		40	36.5		-	-
20 Years		43	37.5		-	-
≥ 20 Years	12,024	-	35.5-39.5		-	-

ORGAN	MALE	FEMALE	ORGAN	MALE	FEMALE
Brain	1,387	1,321	Kidneys	295	293
Heart	334	288	Liver	1,472	1,361
Lungs	1049	864	Adrenals	17	25
Spleen	138	120	Thyroid	22	30
Pancreas	129	105	Gall Bladder	29	40

Sources of these information came from autopsies of medico legal cases from Baguio General Hospital (Northern Philippines), V. Sotto General Hospital (Southern Philippines), Santo Tomas University Hospital, Philippine Constabulary Crime Laboratory and National Bureau of Investigation (all in Metro Manila). The weights of the cadavers were not recorded due to the unavailability of weighing scales. The organs of all the subjects considered were visually examined for the absence of pathological conditions (inflammation, necrosis, atrophy and other degenerative appearances), and were measured using calibrated weighing scales. Most of the autopsies came from adults who died of sudden deaths due to crimes. The computation, evaluation and analysis of data were done using Microsoft Excel Version 4.

The weight of the organs from newborn to age 70 years are given in Table 7 for male and in Table 8 for the female. There were 1,191 male and 236 female autopsies submitted to the Philippine Nuclear Research Institute. The samples size for the newborn up to adolescent ages were small ( $N < 20$ ) for both genders and these samples came from Baguio General Hospital and the Santo Tomas University Hospital. This study observed that the organ masses for the male were higher than the female. Moreover, the values for individuals more than 50 years of age diminished values. The weights of the organs of the Filipino adult (20 - 50 years) were also observed to be smaller when compared to the Japanese adult [10]. This observation, however, may be due, at least in part, to the difference in sample sizes between the two studies considering that the Japanese study which spanned twenty years covers much larger population size.

## PHYSIOLOGICAL MEASUREMENTS

The two basic physiological parameters included in this study are the Water Balance Studies (WBS) and the Pulmonary Function Tests (PFT). Available data for the Pulmonary Function Tests from medical sources such as routine medical examination and executive medical check-up were extracted from the files of the Pulmonary Medicine Section of the Philippine General Hospital, Lung Center of the Philippines and the Philippine Heart Center for Asia. Actual Pulmonary Function Tests were also conducted in 50 randomly selected subjects (20 - 45 years) using the body box (plethysmograph) of St. Lukes Medical Center.

Water Balance Studies which measures the liquid intake of an average Filipino and its corresponding urinary excretion, was also done in volunteers like students, hospital staff, and office workers of the Baguio General Hospital, Cebu Doctors Hospital, Philippine Heart Center and Santo Tomas University Hospital.

The average daily liquid intake of the adult male (20-50 years) is 3.379 liters while its corresponding rate of elimination is 1.306 liters per day. Observed values for the male and female are tabulated below. Comparison of these results with the data from India and the ICRP Man shows that the Filipino consumes more liquid than the ICRP model but less liquid

TABLE VII. MASS OF SELECTED ORGANS OF THE FILIPINO MALE - g

AVERAGE VALUES

Age Group (Y)	No. of People	Heart	Lungs		Spleen	Pancreas	Kidneys		Brain	Liver	Adrenal		Thyroid	Gall Bladder
			Rt.	Lt.			Rt.	Lt.			Rt.	Lt.		
<1	18	19	35	34	7	4	7	8	1,020	89	2	-	8	5
1-2	5	62	113	103	47	25	38	38	1,125	364	-	-	-	5
3-4	5	86	133	124	50	37	53	60	1,250	681	-	-	-	-
5-6	3	97	138	143	66	49	72	74	1,283	735	-	-	-	10
7-8	5	139	239	219	77	61	84	88	1,300	922	-	-	-	-
9-10	9	166	266	249	88	70	95	98	1,317	1,064	10	10	10	-
11-12	5	191	335	316	92	89	98	103	1,350	1,140	-	-	-	-
13-14	0	-	-	-	-	-	-	-	-	-	-	-	-	-
15-16	9	306	425	406	124	100	131	138	1,357	1,299	-	-	-	-
17-18	18	311	476	456	128	110	137	146	1,362	1,438	15	10	15	20
19-20	81	323	531	498	133	124	143	149	1,385	1,455	-	-	15	35
20-50	953	334	541	508	138	129	145	150	1,387	1,472	9	8	22	29
51-60	78	358	549	520	127	117	133	138	1,320	1,356	8	8	30	55
61-70	50	368	550	526	117	113	125	131	1,274	1,286	5	5	20	25
71-80	19	374	563	539	98	101	119	123	1,151	1,245	-	-	-	-

TABLE VII (CONTINUED). MASS OF SELECTED ORGANS OF THE FILIPINO MALE - g

## MEDIAN VALUES

Age Group (Y)	No. of People	Heart	Lungs		Spleen	Pancreas	Kidneys		Brain	Liver	Adrenal		Thyroid	Gall Bladder
			Rt.	Lt.			Rt.	Lt.			Rt.	Lt.		
<1	18	15	26	25	5	3	4	5	1,020	70	-	9	5	-
1-2	5	62	113	105	47	25	40	39	1,150	325	-	-	5	-
3-4	5	86	130	125	50	35	54	60	1,250	670	-	-	-	-
5-6	3	100	130	150	66	50	70	72	1,250	740	-	-	10	-
7-8	5	135	242	220	75	60	80	90	1,250	900	-	-	-	-
9-10	9	170	266	250	90	70	95	100	1,250	1,000	10	10	-	-
11-12	5	195	356	340	90	90	100	100	1,350	1,100	-	-	-	-
13-14	0	-	-	-	-	-	-	-	-	-	-	-	-	-
15-16	9	303	425	400	123	100	128	138	1,325	1,300	-	-	-	-
17-18	18	310	485	460	128	110	135	149	1,350	1,425	10	15	20	-
19-20	81	320	510	480	133	125	145	150	1,380	1,460	-	15	35	-
20-50	953	325	540	500	144	126	150	150	1,400	1,450	9	20	20	-
51-60	78	350	550	520	125	115	125	140	1,300	1,345	8	30	55	-
61-70	50	400	550	520	120	117	125	125	1,250	1,275	5	20	25	-
71-80	19	350	550	520	100	100	125	125	1,200	1,215	-	-	-	-



TABLE VII (CONTINUED). MASS OF SELECTED ORGANS OF THE FILIPINO MALE - g

**STANDARD DEVIATIONS**

Age Group (Y)	No. of People	Heart	Lungs		Spleen	Pancreas	Kidneys		Brain	Liver	Adrenal		Thyroid	Gall Bladder
			Rt.	Lt.			Rt.	Lt.			Rt.	Lt.		
<1	18	11	17	17	7	4	7	7	0	58	-	-	-	-
1-2	5	6	6	12	2	4	8	9	83	100	-	-	-	-
3-4	5	3	3	9	1	5	8	5	45	109	-	-	-	-
5-6	3	5	5	17	1	1	10	4	85	27	-	-	-	-
7-8	5	10	10	12	3	7	8	4	105	27	-	-	-	-
9-10	9	11	11	14	7	8	12	11	120	106	-	-	-	-
11-12	5	14	14	38	3	6	14	12	71	102	-	-	-	-
13-14	0	-	-	-	-	-	-	-	-	-	-	-	-	-
15-16	9	11	93	102	3	2	9	7	121	285	-	-	-	-
17-18	18	13	100	91	2	8	11	10	148	268	5	-	5	-
19-20	81	32	81	79	9	11	18	19	106	195	-	-	5	15
20-50	953	62	70	69	18	15	16	16	143	232	5	4	10	18
51-60	78	63	62	55	8	12	19	18	134	224	2	3	8	5
61-70	50	65	58	60	10	25	19	16	186	200	-	-	-	15
71-80	19	59	51	53	25	8	10	11	102	156	-	-	-	-

TABLE VIII. MASS OF SELECTED ORGANS OF THE FILIPINO FEMALE - g

## AVERAGE VALUES

Age Group (Y)	No. of People	Heart	Lungs		Spleen	Pancreas	Kidneys		Brain	Liver	Adrenal		Thyroid	Gall Bladder	Thymus
			Rt.	Lt.			Rt.	Lt.			Rt.	Lt.			
<1	10	15	33	31	7	4	6	7	-	66	3	2	2	-	-
1-2	5	58	106	85	33	24	34	34	1,027	390	-	-	5	-	60
3-4	3	70	131	119	50	28	42	43	1,233	492	-	-	-	2	-
5-6	1	94	162	156	65	42	55	62	1,250	600	-	-	-	-	-
7-8	2	128	187	190	73	55	67	72	1,275	803	-	-	-	-	-
9-10	3	156	223	208	75	63	83	85	1,282	875	-	-	20	20	-
11-12	3	181	293	273	80	70	94	96	1,293	1,002	-	-	-	-	-
13-14	2	200	370	355	107	89	110	114	1,310	1,250	-	-	-	-	-
15-16	2	248	375	360	110	97	119	121	1,330	1,265	-	-	-	-	-
17-18	10	261	376	359	115	103	127	131	1,343	1,318	-	-	30	40	-
19-20	15	265	427	407	119	109	129	135	1,351	1,355	-	-	-	-	-
20-50	154	288	443	421	120	105	143	150	1,321	1,361	14	11	30	40	-
51-60	19	314	404	383	98	96	120	126	1,151	1,243	8	5	20	23	-
61-70	12	333	329	315	98	97	118	122	1,142	1,168	-	-	-	-	-
71-80	9	335	337	286	92	92	112	115	1,072	1,144	-	-	-	-	-

TABLE VIII (CONTINUED). MASS OF SELECTED ORGANS OF THE FILIPINO FEMALE - g

**MEDIAN VALUES**

Age Group (Y)	No. of People	Heart	Lungs		Spleen	Pancreas	Kidneys		Brain	Liver	Adrenal		Thyroid	Gall Bladder	Thymus
			Rt.	Lt.			Rt.	Lt.			Rt.	Lt.			
<1	10	11	25	24	4	2	4	4	-	56	3	2	2	-	-
1-2	5	58	100	75	30	24	35	34	1,000	380	-	-	5	-	60
3-4	3	70	130	112	48	28	41	43	1,200	480	-	-	-	2	-
5-6	1	94	162	156	65	42	55	62	1,250	600	-	-	-	-	-
7-8	2	128	187	190	73	55	67	72	1,275	803	-	-	-	-	-
9-10	3	156	220	200	75	63	85	86	1,275	885	-	-	20	20	-
11-12	3	182	300	280	80	70	95	96	1,300	1,000	-	-	-	-	-
13-14	2	200	370	355	107	89	110	114	1,310	1,250	-	-	-	-	-
15-16	2	248	375	360	110	97	119	121	1,330	1,265	-	-	-	-	-
17-18	10	260	380	343	115	104	125	129	1,325	1,300	-	-	30	40	-
19-20	15	255	430	420	124	107	130	133	1,350	1,400	-	-	-	-	-
20-50	154	280	450	420	120	104	150	155	1,300	1,400	20	11	30	40	-
51-60	19	300	400	380	100	99	120	125	1,120	1,240	8	5	20	23	-
61-70	12	335	325	300	97	100	120	125	1,130	1,175	-	-	-	-	-
71-80	9	350	300	282	96	93	112	115	1,100	1,120	-	-	-	-	-

TABLE VIII (CONTINUED). MASS OF SELECTED ORGANS OF THE FILIPINO FEMALE - g

## STANDARD DEVIATIONS

Age Group (Y)	No. of People	Heart	Lungs		Spleen	Pancreas	Kidneys		Brain	Liver	Adrenal		Thyroid	Gall Bladder	Thymus
			Rt.	Lt.			Rt.	Lt.			Rt.	Lt.			
<1	10	7	19	19	6	3	5	5	0	31	-	-	-	-	-
1-2	5	5	8	16	15	2	3	3	62	32	-	-	-	-	-
3-4	3	4	7	11	10	2	1	-	47	20	-	-	-	-	-
5-6	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7-8	2	3	2	10	3	3	3	2	25	48	-	-	-	-	-
9-10	3	5	21	23	4	1	6	5	29	18	-	-	-	-	-
11-12	3	4	25	17	4	7	1	1	74	84	-	-	-	-	-
13-14	2	-	10	5	7	4	10	9	30	150	-	-	-	-	-
15-16	2	8	25	20	-	2	1	1	30	15	-	-	-	-	-
17-18	10	13	23	45	10	2	6	6	125	73	-	-	-	-	-
19-20	15	21	26	26	9	8	20	19	70	109	-	-	-	-	-
20-50	154	43	41	40	14	5	24	22	115	180	8	9	8	7	-
51-60	19	41	26	32	14	7	6	6	64	136	3	-	-	17	-
61-70	12	28	66	66	10	5	9	8	42	63	-	-	-	-	-
71-80	9	61	76	68	12	5	5	5	63	136	-	-	-	-	-

than the Indian counterpart [11,12]. The daily urinary excretion rate of the average adult Filipino is equal to the Indian value but slightly less than the ICRP model [11,12].

	No. of People	Intake - liters/day		Daily Elimination liters/day
		Water	Other Liquids	
MALE	40	1.911	1.469	1.306
FEMALE	116	1.665	1.316	1.270

In the Pulmonary Function Tests conducted in this study, the total lung capacity, vital capacity, minute volume and the 8-hour working volume were determined. Classification for the levels of activity of the subjects were also considered. Hence, values for the resting, light and heavy type of activities are included. The resting activity value was taken from the result of the test using the plethysmograph. The light activity was measured by allowing the subject do a one minute exercise with the Wright's spirometer in his or her mouth and using the foot stool for climbing up and down. For the heavy activity, the exercise was extended for another minute. This procedure was suggested by the head of the Pulmonary Medicine Department of St. Lukes Medical Center.

Results of the 8-hour volume were computed using the one minute volume. Actual 8-hour working volume could not be done due to the unwillingness of the subject and the inconvenience this test would cause the subject. Thus the above mentioned experimental design to calculate light and heavy activity levels were applied as instructed by the head of the Pulmonary Medicine.

Results of the Pulmonary Function Tests taken from the files of the Philippine General Hospital, Lung Center of the Philippines and Philippine Heart Center For Asia, are summarized in Table 9 for the Total Lung Capacity and Table 10 for the Vital Capacity. The average values for the Total Lung Volume for the male adult is 5.40 liters and for the female, it is 4.4 liters (Table 9). Observed values for vital capacity are 3.78 and 2.66 liters for the adult male and female respectively (Table 10).

Computed values obtained from actual PFT (expressed in liters) conducted in 50 non smoking volunteer subjects performed at St. Lukes Medical Center using the body box are shown below:

	TOTAL LUNG CAPACITY liters	VITAL CAPACITY liters	MINUTE VOLUME liters			8-HR WORKING VOLUME liters		
			Resting	Light	Heavy	Resting	Light	Heavy
MALE	5.00	3.53	14.86	22.60	49.01	7,133	10,848	23,525
FEMALE	4.21	2.67	10.74	21.62	42.64	5,155	10,378	20,467

The above result does not significantly differ from observed values earlier obtained by Roa et. al., on the Ventilatory Function Tests conducted in 283 non-smoking normal adults below fifty years old. The same work was verified in 358 subjects in 1989 by Dr. E. Santos of the Lung Center of the Philippines [13,14]. However data for the minute volume as well as the 8-Hr working volume were not included in their published information. Comparison of the values obtained for the minute ventilation, showed higher figures than the ICRP Reference and Indian Values [11,12].

TABLE IX. OBSERVED VALUES FOR THE TOTAL LUNG CAPACITY OF THE FILIPINO

AGE	MALE				FEMALE			
	Number of People	Total Lung Capacity liters			Number of People	Total Lung Capacity liters		
		Mean	Median	Std. Dev.		Mean	Median	Std. Dev.
16-19 Years	2	5.95	5.95	0.61	1	3.85	3.85	-
20-50 Years	27	5.40	5.54	1.05	18	4.40	4.35	0.78
51-60 Years	12	5.47	5.49	0.61	2	4.03	4.03	0.71
61-70 Years	7	5.46	5.46	0.77	5	3.95	4.27	0.88
71-80 Years	1	5.45	5.45	-	0	-	-	-

TABLE X. OBSERVED VALUES FOR THE VITAL CAPACITY OF THE FILIPINO

AGE	MALE				FEMALE			
	Number of People	Vital Capacity - liters			Number of People	Vital Capacity - liters		
		Mean	Median	Std. Dev.		Mean	Median	Std. Dev.
< 10 Years	3	1.13	1.06	0.12	0	-	-	-
10-15 Years	8	3.04	3.27	0.70	14	2.49	2.50	0.37
16-19 Years	16	3.70	3.76	0.61	15	2.90	2.81	0.40
20-50 Years	586	3.78	3.81	0.58	425	2.66	2.62	0.50
51-60 Years	179	3.24	3.27	0.57	118	2.21	2.20	0.41
61-70 Years	114	3.02	2.87	0.49	89	2.06	2.02	0.43
71-80 Years	35	2.72	2.76	0.53	18	1.74	1.65	0.37
81-90 Years	5	2.56	2.83	0.45	4	1.84	1.75	0.49

## DIETARY PARAMETERS

The Philippine Nuclear Research Institute conducted its own food consumption survey in nine regions of the Philippines. The survey with the total number of 1954 households, had the average sample size 0.042% per region.

Respondents were briefed thoroughly on how to fill up the questionnaire on the food consumption. The filled up questionnaire were verified for its validity. Food purchased as bunch, scoop, a glassful or other form of group were weighted in forms that they were bought. Estimated weights were based on the nearest description on the amount of purchased food.

These survey entries were coded and a file was assigned per province. Age grouping were from 21 to 40 years old. The Food Composition Table (FCT) of the Food and Nutrition Research Institute (FNRI) was utilized to determine the edible portion and the composition of some elements in food based on 100 gram edible part of the food sample [15]. The elements available for analysis were sodium, potassium, magnesium, iodine, zinc, copper, manganese, calcium, iron and phosphorous. For food intake, all categories identified by this research were considered. Food entries on the questionnaires that were not in the list of the local FCT, utilized other FCTs created from other countries. Still other food samples have no available information. Calculation of the mean, standard deviation and median values were performed using Clipper Compiled Program.

In addition to the above survey, radiochemical analysis of eight food samples taken from residents from the National Capital Region, were conducted at the National Institute of Radiological Sciences in Japan. Each food sample consists of three complete meals and 2 snacks for an adult Filipino (21-40 years).

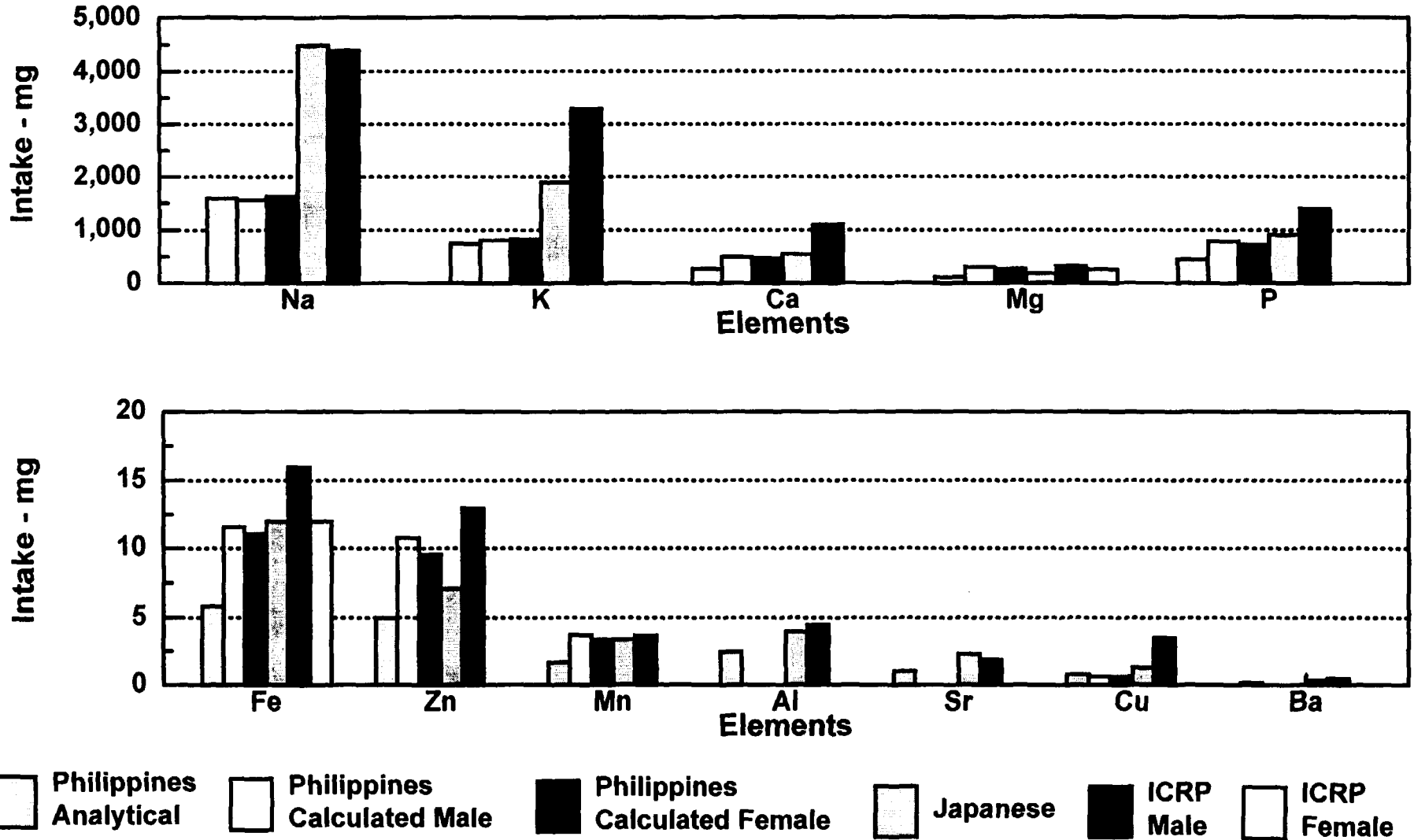
Results of the one week food consumption survey conducted in 1954 households are given in Table 11. Computed values for the food consumed by an adult Filipino have shown to be higher than the consumption of an average person from China and from India except for the values obtained in cereals [16,17]. The amount of cereals eaten by the adult Filipino lies between the quantities consumed by the Chinese and the Indian adults. However, the results obtained from this survey, are lower than the quantities consumed by the Caucasian Man [12].

Results of the computed values for the elemental composition of the daily dietary intake of the average adult Filipino using the FCTs of FNRI and those published by other countries, are given in Table 12. The calculated values obtained for the Filipino man have been observed to be lower than the ICRP Reference Man Values [12]. Significant lower values were obtained for the elements, sodium and potassium (Figure 1a). Earlier published report by De Leon et. al. showed similar results [18].

The analytical values, expressed in milligrams, for all the twelve elements obtained from the analysis of the food samples sent to Japan are as follows:

Sodium	1,596	Phosphorous	460	Aluminum	2.48
Potassium	757	Iron	5.85	Strontium	1.04
Calcium	284	Zinc	5.02	Copper	0.82
Magnesium	123	Manganese	1.65	Barium	0.19

The above analytical values validate the calculated values for sodium and potassium earlier presented (Figure 1a). However, significant differences in the analytical and the calculated values for the remaining eight elements were observed (Figures 1a & 1b). The reason for the differences is due to the daily variation in food intake by every individual and



**Figure 1 - Elemental Composition of Daily Dietary Intake**



TABLE XI. DAILY NUTRITIONAL INTAKE FOR FILIPINOS

FOOD CONSUMPTION (GRAMS PER DAY)*			
	Mean	Median	Std. Dev.
Cereals	391 / 341	323 / 265	265 / 239
Nuts and Seeds	35 / 36	30 / 28	26 / 32
Pulses	56 / 55	49 / 45	41 / 46
Nuts, Seeds and Pulses	94 / 96	84 / 84	48 / 62
Potatoes and Starches	65 / 67	50 / 51	49 / 50
Sugars	31 / 26	25 / 23	26 / 20
Confectionaries	16 / 20	19 / 17	14 / 17
Sugars and Confectionaries	64 / 53	52 / 50	43 / 36
Fats and Oils	22 / 23	20 / 20	16 / 19
Fruits	113 / 114	101 / 100	71 / 77
Green and yellow vegetables	59 / 62	51 / 50	41 / 49
Other vegetables	41 / 40	31 / 30	33 / 34
Fungi	64 / 71	64 / 71	49 / 55
Total Vegetables	143 / 220	181 / 187	62 / 143
Algae	73 / 70	56 / 53	58 / 60
Fish and Shellfish	74 / 73	61 / 63	46 / 48
Meats	98 / 89	80 / 74	67 / 61
Eggs	31 / 32	28 / 26	20 / 22
Milk and Milk Products	9 / 10	7 / 8	8 / 10
Seasonings and Beverages	30 / 34	19 / 20	22 / 31

\* Values are presented as: Male / Female

TABLE XII. ELEMENTAL COMPOSITION OF DAILY DIETARY INTAKE FOR FILIPINOS - mg\*

	Mean	Minimum	Maximum
Calcium	502 / 482	27 / 15	4,109 / 4,908
Copper	0.63 / 0.62	0.06 / 0.02	2.57 / 4.55
Iodine	0.050 / 0.048	0.004 / 0.00	0.19 / 0.37
Iron	11.6 / 11.1	0.67 / 0.42	54.6 / 77.8
Magnesium	310 / 284	25.7 / 15.5	1,131 / 1,329
Manganese	3.73 / 3.40	0.25 / 0.17	14.9 / 23.2
Phosphorus	798 / 732	73.6 / 42.7	3,110 / 3,521
Potassium	815 / 837	36.2 / 20.8	8,225 / 5,541
Sodium	1570 / 1630	3.36 / 0.96	28,451 / 28,451
Zinc	10.8 / 9.6	0.79 / 0.59	43.3 / 41.4

\* Values are presented as: Male / Female

the small sample size. The calculated values were taken from nine regions (1,954 households) surveyed while the analytical values came from only eight samples from the NCR.

## SUMMARY

This study shows significant differences between the Filipino and the ICRP Reference Values. The variance in percent ICRP are as follows:

		FILIPINO	ICRP	% Difference
<b>Physical</b>	Height, cm	163	170	4.11
	Weight, kg	56	70	20.00
<b>Anatomical</b>	Kidneys, gm	295	310	4.84
	Liver, gm	1,472	1,800	18.22
	Spleen, gm	138	180	23.33
	Pancreas, gm	129	100	(29.00)
<b>Physiological</b>	Liquid Intake, l/day	3.38	2.65	(27.55)
	Liquid Elimination, l/day	1.3	1.4	7.14
	Vital Capacity, l	3.4	4.3	20.93
	Minute Volume, l	14.8	7.5	(97.33)
<b>Dietary (U.S.A.)</b>	Cereals, gm/day	391	207	(88.89)
	Meat, gm/day	98	206	52.42
	Egg, gm/day	31	47	34.04
	Fish, gm/day	74	22	(236.36)
	Milk, gm/day	9	508	98.22
	Fats and Oils, gm/day	22	49	55.10
	Sugar, gm/day	64	69	7.24
	Fruits, gm/day	113	184	38.58
	Vegetables, gm/day	143	202	29.20

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