Reference values for areal bone mineral density among a healthy Mexican population

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Abstract

Objective. Compare the influence of ethnicity in the prevalence of osteopenia and osteoporosis in various Mexican populations using two normal dual X-ray absorptiometry (DXA) reference databases: manufacturer's incorporating US Hispanic population and a normal mestizo Mexican population. **Material and Methods.** MMP included 9 946 subjects participating in an ongoing long-term cohort study focusing on lifestyle and chronic diseases, of which 6 487 MMP males and females aged 7 to 80 years were the normal subjects used to determine bone density T- and Z-scores, following WHO criteria, and peak bone mass values. Abnormal bone mass density values estimated by the manufacturer's and peak bone mass reference values were compared. **Results and Conclusions.** Our results show that by using the manufacturer's T-score values in the mestizo Mexican population we are underestimating the number of abnormal bone mass BMD populations.

Key words: bone densitometry, normal reference values, ethnicity, Mexico

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Resumen

Objetivo. Comparar la influencia de la etnicidad en la prevalencia de osteopenia y osteoporosis en varias poblaciones mexicanas utilizando dos bases de referencia normal de densitometría de rayos X (DXA): referencia del fabricante que incorpora hispanos en Estados Unidos y datos de una población mestiza mexicana. **Material y métodos**. Un total de 9 946 sujetos de población mestiza mexicana participantes en una cohorte de largo plazo dirigida al estudio de estilos de vida y ocurrencia de enfermedades crónicas; de los cuales 6 487 sujetos sanos de ambos sexos, con edad entre los 7 y los 80 años, fueron utilizados para determinar los valores T, Z, de acuerdo a los criterios de la OMS, así como a los valores de masa ósea pico. Se compararon los casos de densidad mineral ósea anormal de acuerdo a los valores de referencia del fabricante y los valores de masa ósea pico de la población mestiza. **Resultados y conclusión**. Las bases de referencia del fabricante subestima significativamente el número de casos con densidad mineral ósea anormal en la población mestiza mexicana.

Palabras clave: densitometría ósea, valores normales referencia, etnicidad; México

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Osteoporosis and its most common complication, fragility fractures, are well recognized internationally as public health problems.[1-6] Mexico is no exception, as femoral fractures account for nearly 40 000 hip replacement surgeries performed in the nation each year[7-13] with an estimated direct cost of 800 000 US dollars. In 1994, the World Health Organization (WHO) developed criteria to classify bone mineral density (BMD) values as an estimation of lifelong relative fracture risk[14] and to classify people as osteopenic or osteoporotic based on the low energy dual x-ray absorptiometry (DXA) T-score values of healthy young adults (20 to 40 years old). BMD is influenced by genetic and lifestyle factors which may significantly vary between ethnic groups. BMD reference values for the US Hispanic population are available from the National Health and Nutrition Examination Survey (NAHNES) and can be found in clinical equipment software. However, there are no such reference values available for the healthy Mexican population, which is ethnically distinct from the US Hispanic population.

Over the last 15 years, DXA has been widely used to determine bone mineral density (BMD) at different anatomical sites. This technology has been used for early detection of individuals at high risk of osteoporotic fractures. According to these WHO criteria, T-scores should be developed based on mean BMD values +/- standard deviation (SD) among a reference population of healthy young adults (20 to 40 years old). These criteria have been adopted as the optimal bone strength reference values to qualify as osteopenic or osteoporotic, based on the BMD evaluation. A T-score value above 1.0 SD is considered normal, between -1.0 and -2.5 SD as osteopenia, and below -2.5 as osteoporosis.[14-16] A Z-score was also developed as a comparison for BMD determinations against age- and gender-matched healthy individuals. The lifelong relative fracture risk for the osteopenic range increased to 1.6 and it was over 2.0 for the osteoporotic range. The prediction is stronger if data is analyzed for the specific region of interest, namely, if one measures femoral neck results to predict the relative risk of having a femoral neck fracture; in such an example the relative risk increases to over 2 for an osteopenic BMD value and to over 6 for osteoporotic values.[14]

In order to minimize the differences between reference populations, researchers sought to generate BMD reference values for different ethnic groups in the United States based on National Health and Nutrition Examination Survey (NHANES) data.[17-19] T-scores for Hologic and Lunar instruments have thus been developed for specific anatomical regions among 20 to 40 year-old healthy adult men and women and for different ethnicities. During the last 10 years, these estimates have been used as reference values for operational and diagnostic purposes at the clinical level.

In recent years, the use of BMD T-score values for different ethnic groups and countries has been questioned in light of increasing evidence that the true maximal bone strength at skeletal maturity is the peak bone mass (PBM), representing the optimal bone mass of an individual.[20] It is now believed that a T-score computed using this optimal bone strength value (PBM) may be a better reference than the mean of a healthy young adult population because bone mass is still increasing[21-22] in individuals between 20 and 30 years of age. Therefore, including sub-optimal BMD estimates in the calculation of T-scores may lead to a significant underestimation of osteopenic and/or osteoporotic cases.

BMD is the strongest predictive factor of fractures that can be assessed with high reproducibility and specificity.[22-26] To use this predictor in Mexico, it is thus crucial to have reference PBM values for the Mexican population in order to compute a T-score that truly reflects optimal bone strength at skeletal maturity. Adopting national standards based on BMD reference values and T-score estimates for our population may improve the assessment of osteoporosis in Mexico. Since anti-fracture interventions provide over 50 percent protection against osteoporotic fractures after the first year of treatment, improved ability to assess fracture risk would improve both public health decision making and clinical outcomes.[3]

The aim of the study is to provide BMD reference values based on a healthy, urban Mexican population aged 7 to 80 years and stratified by sex, enabling us to estimate the PBM reference values for the Mexican population. These values are necessary for computing a T-score that truly reflects optimal bone strength at skeletal maturity in this population. Using these BMD reference values, we are able to calculate optimal BMD T- and Z-scores, both according to WHO criteria and PBM values. Adopting these reference values as a national standard can improve public health practices and clinical assessment of osteoporosis in Mexico.

Material and Methods

Study Population: The present analysis was performed with healthy employees and their healthy relatives from three different health and academic institutions: Instituto Mexicano del Seguro Social (IMSS) and the Instituto Nacional de Salud Pública (INSP) in Cuernavaca, Morelos, Mexico, and employees from the Universidad Autónoma del Estado de México (UAEM) in Toluca, State of Mexico. Subjects recruited for the study were

participating in the first stage of an ongoing, long-term cohort study focusing on lifestyle and health, approved by the respective ethical committees of each participating institution; informed consent was obtained in all cases. Out of a total population of 13 275 study candidates identified between March 2004 and April 2006, 9 467 employees were invited to participate in the cohort study and a total of 8 307 adults were formally enrolled. Those participants who were parents of children 7 to 18 years of age (about 20% of the employees) were also asked to invite their children to be part of the study. Of those willing to participate, 1 639 youths were formally invited and enrolled in the study. Thus, a total of 9 946 subjects between 7 and 92 years of age were formally recruited. BMD determinations in this study population constitute part of a more extensive epidemiologic evaluation designed to prospectively evaluate different hypotheses about the relationships between lifestyle and chronic disease occurrence in Mexico.

For the present analysis, we excluded subjects older than 80 years of age as well as participants with chronic diseases that may affect bone metabolism and/or alter the BMD values, such as: diabetes (n=631), cancer (n=96), obesity (BMI ≥35, n=262), arthritis (n=286), kidney stones (n=182), renal dysfunction (creatinine >2 mg/dL for men, >1.8 mg/dL for females, n=283) previously diagnosed osteopenia/osteoporosis or fractures after the age of 45 (n=64), use of medications that may alter bone metabolism (n=69), and weight change in previous year (≥10 kg, n=89). We also excluded pregnant women and those women who were unable to undergo BMD measurements. The final healthy reference population for the present analysis is 6 478. This large sample allowed us to estimate PBM as well as T- and Z-scores. The general characteristics of this population are depicted in table I.

BMD assessment

Bone density measurements were performed at the non-dominant proximal femur, the lumbar spine (L1-L4), and whole body using a DXA Lunar DPX NT instrument. The user manual instructions and International Society of Clinical Densitometry (ISCD) procedures were strictly followed.[16,27] Standardized densitometry technicians performed all BMD measurements. Standard calibration of instruments was performed daily using the phantom provided by the manufacturer; technicians ensured that the daily variation coefficient (VC) was within normal operational standards and *in vivo* VC was lower than 1.5%. Results obtained by DXA are expressed as grams of hydroxyapatite per square centimeter (WHO Technical Report Series: Prevention and Management of Osteoporosis. http://whqlibdoc.who.int/trs/WHO_TRS_921.pdf).

T- and Z-scores estimates procedures

In order to compute T-scores by specific site (total body, femur and lumbar spine), we first estimated the reference value for PBM in our population following a previously reported procedure.[28] Briefly, we calculated the difference in g/cm^2 between the BMD of a subject and the PBM for the corresponding sex. The difference between these values is expressed as standard deviation (SD), or in other words, the difference between the studied subject and the PBM is standardized. The T-score obtained with this method represents the difference expressed by the number of standard deviations between the Young Normal (YN) value of the population of the same sex and the BMD of the subject studied. This sequence is summarized by the following formula:

Table I

Population characteristics for a cohort study on lifestyle and health. Mexico

	Men= 1 849						*Women= 4 629*					
	7-18 years old n=483		*19-50 years old n=1 004*		*51 and + n= 362*		*7-18 years old n= 568*		*19-50 years old n=3 100*		*51 and + n=961*	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Age	13.03	3.10	36.50	8.84	60.99	8.24	13.44	3.12	36.28	8.78	60.87	8.21
Height	156.06	17.01	169.27	6.72	166.53	6.60	151.88	11.82	156.90	28.21	153.05	5.85
BMI	20.56	4.58	26.37	3.43	26.50	3.15	21.05	4.21	25.44	3.75	26.93	3.51
Abdominal circunference	76.07	13.28	91.11	9.03	94.47	8.57	77.00	11.71	85.64	10.00	94.68	10.99
% fat	24.18	10.97	28.41	6.71	29.87	6.32	35.23	9.01	41.11	6.48	43.94	5.76

$$T = \frac{(BMD - YN)}{SD}$$

Similarly the Z-value or Z-score represents the comparison between the subject's BMD and the mean BMD value of the healthy adult population of the same age and sex, referred to as Adult Mean Normal (AMN). It is also used as a measure of the standard deviation of the reference population. The formula is:

$$Z = \frac{(BMD - AMN)}{SD}$$

Results

We evaluated 6 478 healthy men and women from 7 to 80 years of age who did not have conditions affecting bone health, out of a total of 8 307 adults and 1 603 of their children formally enrolled in the first stage of an ongoing, long-term cohort study focusing on lifestyle and health. This recruitment strategy allowed us to have a cohort with healthy bones resembling the real ethnical mixture of a socioeconomic urban middle class population reflecting a wide sector of the Mexican population.

As shown in figure 1, BMD increases from infancy on and reaches PBM sometime between the late twenties and the mid thirties. Once PBM is reached, there is a progressive decrease in BMD with advancing age; these values curve as the population grows older and vary by sex and by skeletal region. Male BMD values are always greater than female BMD values. As shown in Figure 1, males reach the PBM subtotal of the skeleton and whole body BMD values (excluding the skull) between ages 22 and 25, while females do so at 27. Males reach PBM of the total femur measurement at age 23, while females reach it at age 27. Males and females both reach PBM of the lumbar spine at age 32.

Z-score values are depicted in figure 2. The curves for female BMD values are dramatically different than those for male values; male values are greater than female values starting in early childhood and continuing throughout life. It should also be noted that the values decrease less dramatically for males in later adulthood compared to females. Z-scores reflect a comparison of the individual patient compared to age- and sex-matched controls and can be used to evaluate follow-up studies in other clinical applications.

According to WHO recommendations, computation of the T-score is necessary to establish the cut-off

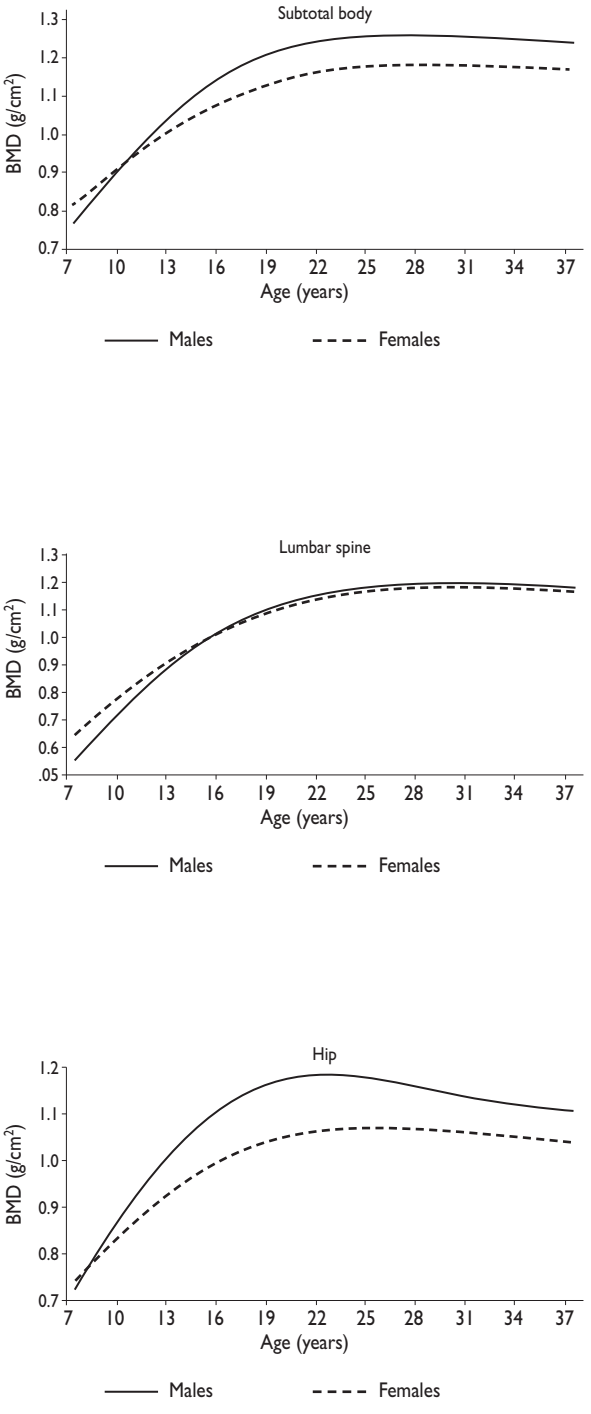

FIGURE 1. BONE MINERAL DENSITY DISTRIBUTION FOR THREE ANATOMICAL REGIONS IN MEXICAN MALES AND FEMALES FROM 6 TO 27 YEARS OLD

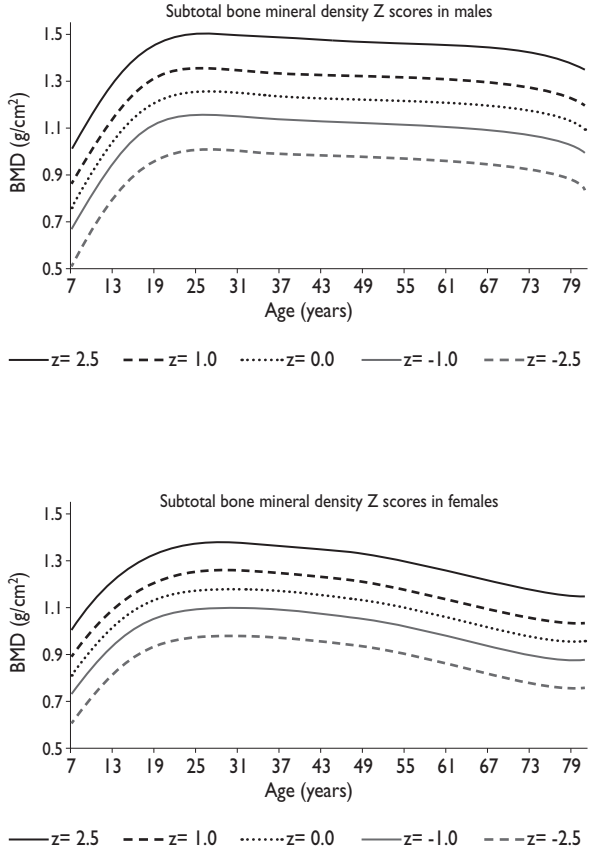

Figure 2. Reference parameters for bone mineral density among a Mexican population classified by age and sex

point for defining the presence of osteopenia and/or osteoporosis in each specific population. Therefore, both the method for computing T-scores and the reference population used for these computations must be optimized to generate accurate frequency estimates of these health problems. Currently, using instruments on one population that have been calibrated for another can thus impede accurate measurement. The DEXA instruments used in Mexico compute T-scores according to the BMD mean derived from a reference population of healthy US Hispanics between ages 20 and 40. In table II, we document the differences in the number of osteopenic and osteoporosis cases that occur when US Hispanics versus Mexicans are used as reference populations.

Our results indicate that, by using the normal reference T-scores obtained from the BMD values for the normal female population aged 20 to 40 in our cohort to classify the individual BMD values obtained from two large patient populations (the abnormal population in our cohort and the BMD data obtained and kindly provided to us by Deleze, Cons *et al*. [previously used for another publication[29]]) that included 4 460 women aged 50 and older who were classified as normal, osteopenic or osteoporotic by 10 densitometry centers located across the country, a higher prevalence of osteopenia and osteoporosis is observed compared to the prevalence obtained using the reference population of healthy US Hispanics integrated in the densitometer by the manufacturer (see figure 3 and tables A.1-A.4 at the appendix). If we restrict the reference population to only those between the ages of 30 to 40 years, there is not a greater underestimation of cases of osteopenia and osteoporosis found using the manufacturer's database (figure 3). If the T-score is computed using the PBM value instead of mean BMD, which we consider to be a more realistic way to define the optimal bone quality reached at skeletal maturation,[21] the degree of discrepancies between the manufacturer's and our estimates of osteopenia and osteoporosis are substantially similar using the T-scores obtained from either of our Mexican populations (women ages 20 to 40 or ages 30 to 40 years old) (figure 3).

It is clear that by using the manufacturer's T-score values to classify our abnormal Mexican population, we are underestimating the number of abnormal BMD cases. Using either our own T-scores calculated for populations aged 20 to 40 or 30 to 40, or our PBM, we found that 24.22% of the cohort population is osteopenic, whereas using the manufacturer's T-score for this value is only 16.52%. The results are similar for osteporotic classification: using PBM we detect a prevalence of 9.73% versus 6.79% when using the manufacturer's values. Analyzing the data obtained from the Deleze, Cons cohort with the same criteria, it also became clear that there is a significant underestimation, restricted only to the femoral neck region (tables A.1-A.4 at the appendix).

Tables III.1-III.2 provide a comprehensive reference for the PBM-derived T-score values for a male and female Mexican population. These tables include reference values for both sexes for the 1) total skeleton (excluding the head from whole body scans), 2) the complete proximal femur, and 3) the lumbar region (L1-L4). Tables IV.1-IV.18 describe the Z-score for the same population, depicting each age and the corresponding BMD. These

Table II
Concordance of osteopenia and osteoporosis prevalence according to different T score computations derived from different reference populations

		Classified according to BMD mean of a 20-40 years old Mexican population			
		Normal %	*Osteopenia* %	*Osteoporosis* %	*Total* %
Classified according to manufacturer's*	Normal (%)	68.57	8.13	0.00	76.70
	Osteopenia(%)	0.04	14.29	2.18	16.52
	Osteoporosis(%)	0.00	0.45	6.34	6.79
	Total (%)	68.61	22.87	8.52	100.00
		Classified according to BMD mean of a 30-40 years old Mexican population			
		Normal %	*Osteopenia* %	*Osteoporosis* %	*Normal* %
Classified according to manufacturer's*	Normal (%)	66.92	9.77	0.00	76.70
	Osteopenia(%)	0.03	13.67	2.82	16.52
	Osteoporosis(%)	0.00	0.48	6.31	6.79
	Total (%)	66.95	23.92	9.13	100.00
		Classified according to Peak Bone Mass estimate in Mexican population			
		Normal %	*Osteopenia* %	*Osteoporosis* %	*Normal* %
Classified according to manufacturer's*	Normal (%)	66.02	10.68	0.00	76.70
	Osteopenia(%)	0.03	13.37	3.12	16.52
	Osteoporosis(%)	0.00	0.17	6.61	6.79
	Total (%)	66.05	24.22	9.73	100.00

*T score from the total body BMD mean derived from a 20 – 40 year old, US Hispanic population

tables can be used manually to find the T-score and Z-score for the urban Mexican population.

Discussion

WHO guidelines are helpful for clinically adapting previous definitions of osteoporosis; practically speaking, these guidelines allow for greater accuracy when describing the extent and characteristics of osteoporosis. However, the expert panel that created these guidelines recognized that they would likely change as new knowledge was gathered.[30] Today, it has become quite evident that fracture risk is also affected by factors other than BMD; not all individuals with low BMD will fracture, while some with normal BMD will.[31] Also, WHO criteria define low BMD without regard to an individual's age, missing a key element of fracture risk. For example, though a 40 year-old and 65 year-old woman may have the same BMD levels, the older woman's probability of suffering a fracture is increased by the concurrent presence of other risk factors.[33-35] In addition to excluding age from risk assessment, WHO criteria do not use PBM values as the optimal bone quality, using the less accurate mean BMD distribution for young adults (20 to 40 years old). The rationale behind the use of this age range is not clearly identified, nor is it clear how to form a reference group for populations that include different racial or ethnic groups.[22-26, 32]

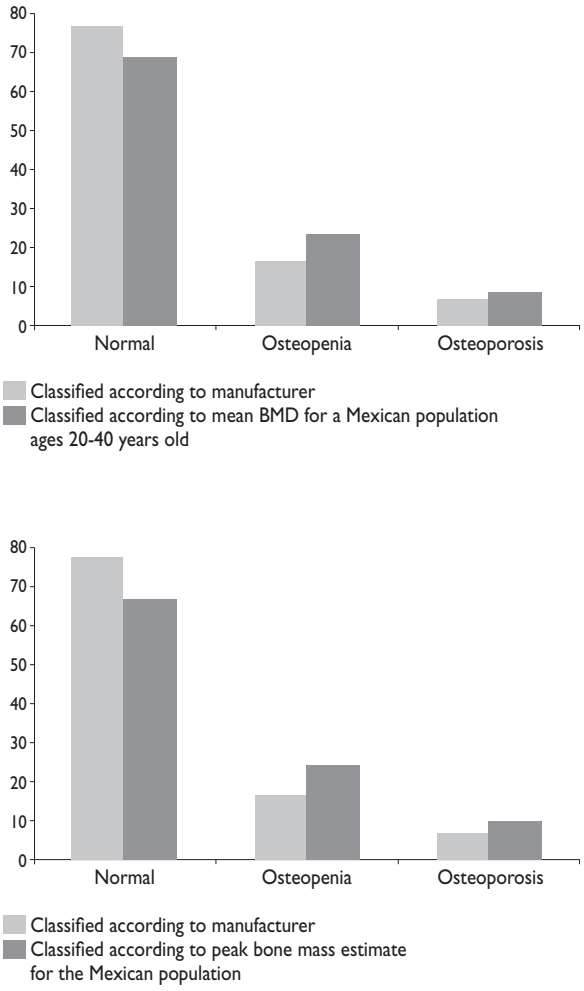

Figure 3. Concordance of osteopenia and osteoporosis prevalence according to different T-score computations derived from different reference population

For Mexico, as well as for many other developing countries, the importance of having BMD T-score reference values that reflect the population's unique characteristics has become a critical issue.[33,34] Several studies have shown that the reference data provided by manufacturers for a US Hispanic population may lead to dangerous underestimations of the population at risk.[18,34-38] The reference databases provided by manufacturers do not reflect the complex heritage of the Mexican population, also called *mestizo*, which reflects both indigenous Mexican and Spanish ancestry.

To address a few of these emerging issues, we used the worker's cohort study data with the T-score reference values that reflect the population's unique characteristics to study bone density data from a large number of subjects of both sexes, age 7 to 80. This was done in order to determine whether there were differences in the number of people classified as having a higher than normal lifelong relative risk of having a fracture, in order to build a normal mestizo reference database that allowed us to define the age at which PBM is established at different skeletal sites. To the best of our knowledge, our study is the largest reported in Latin America, with a data set comprised of healthy, urban *mestizos* from early childhood to old age, which may represent more than 70% of the Mexican population. PBM and T-scores derived for this population differ significantly from values derived from commercial manufacturer's US Hispanic database, with our data reflecting significantly higher values and a curve indicating that age-dependent BMD loss is also very different. The T-score derived from our PBM values had only an 86% concordance with the manufacturers' Hispanic values that classify the normal population using PBM reference values, and up to 89% for T-score values for the population aged 20 to 40. Using our reference values, the number of people in the range of osteopenia and osteoporosis increased by 31 and 32 percent, respectively. As expected, this lack of concordance between the Mexican database and the manufacturers' Hispanic database increases as age increases. Revising estimates of fracture risk based on our numbers will have a major clinical impact since fracture prevention interventions will increase.[29]

Since our Mexican database of reference values are not currently included in the software of commercial densitometers used in Mexico, interested users can classify their specific BMD values reported by these instruments according to the reference values presented in the BMD tables of this report (tables III.1-III.2, IV1-IV.18). Having normative BMD reference values for the urban Mexican population will be very relevant for our densitometry community. This more accurate normative reference data may give us the opportunity to improve the decision making process used in the prevention and care of bone density-related public health problems, though we must ensure that it does not simply amount to an increased burden on an already strained healthcare system. These considerations should be taken into account by policy makers in order to improve the Mexican healthcare infrastructure as well as to seek new ways to address the growing populations' healthcare needs.

Table III.1

BONE MINERAL DENSITY T SCORE FOR MALE POPULATION

T SCORE	*BONE MINERAL DENSITY (g/cm²)*								
	Subtotal body	*Lumbar t=region*	*Hip*	*Head*	*Arm*	*Proximal femur*	*Trunk*	*Ribs*	*Pelvis*
-5.0	0.762	0.490	0.480	0.913	0.402	0.785	0.567	0.424	0.601
-4.5	0.811	0.559	0.551	1.042	0.461	0.845	0.614	0.461	0.668
-4.0	0.861	0.629	0.621	1.171	0.520	0.906	0.662	0.498	0.735
-3.5	0.910	0.699	0.692	1.299	0.579	0.967	0.709	0.535	0.802
-3.0	0.960	0.768	0.762	1.428	0.638	1.028	0.757	0.573	0.870
-2.5	1.009	0.838	0.832	1.557	0.697	1.088	0.804	0.610	0.937
-2.0	1.059	0.907	0.903	1.686	0.756	1.149	0.852	0.647	1.004
-1.5	1.108	0.977	0.973	1.815	0.815	1.210	0.899	0.684	1.071
-1.0	1.158	1.047	1.044	1.944	0.874	1.270	0.946	0.722	1.138
-0.5	1.208	1.116	1.114	2.073	0.934	1.331	0.994	0.759	1.206
0.0	1.257	1.186	1.185	2.202	0.993	1.392	1.041	0.796	1.273
0.5	1.307	1.255	1.255	2.331	1.052	1.452	1.089	0.833	1.340
1.0	1.356	1.325	1.326	2.460	1.111	1.513	1.136	0.871	1.407
1.5	1.406	1.395	1.396	2.589	1.170	1.574	1.184	0.908	1.475
2.0	1.455	1.464	1.466	2.718	1.229	1.634	1.231	0.945	1.542
2.5	1.505	1.534	1.537	2.847	1.288	1.695	1.279	0.982	1.609
3.0	1.554	1.603	1.607	2.976	1.347	1.756	1.326	1.020	1.676
3.5	1.604	1.673	1.678	3.105	1.407	1.816	1.374	1.057	1.743
4.0	1.653	1.743	1.748	3.234	1.466	1.877	1.421	1.094	1.811
4.5	1.703	1.812	1.819	3.362	1.525	1.938	1.469	1.131	1.878
5.0	1.752	1.882	1.889	3.491	1.584	1.999	1.516	1.168	1.945

Table III.2

BONE MINERAL DENSITY T SCORE FOR FEMALE POPULATION

T SCORE	*Bone mineral density (g/cm²)*								
	Subtotal body	*Lumbar region*	*Hip*	*Head*	*Arm*	*Proximal femur*	*Trunk*	*Ribs*	*Pelvis*
-5.0	0.783	0.509	0.471	1.088	0.415	0.757	0.586	0.440	0.628
-4.5	0.823	0.576	0.531	1.225	0.460	0.800	0.625	0.470	0.681
-4.0	0.863	0.644	0.591	1.362	0.504	0.844	0.665	0.501	0.735
-3.5	0.902	0.711	0.651	1.499	0.548	0.887	0.705	0.531	0.788
-3.0	0.942	0.778	0.711	1.636	0.592	0.931	0.745	0.562	0.841
-2.5	0.982	0.845	0.770	1.773	0.636	0.974	0.784	0.593	0.895
-2.0	1.021	0.913	0.830	1.910	0.681	1.018	0.824	0.623	0.948
-1.5	1.061	0.980	0.890	2.047	0.725	1.061	0.864	0.654	1.002
-1.0	1.100	1.047	0.950	2.185	0.769	1.105	0.904	0.685	1.055
-0.5	1.140	1.115	1.010	2.322	0.813	1.148	0.943	0.715	1.108
0.0	1.180	1.182	1.070	2.459	0.857	1.192	0.983	0.746	1.162
0.5	1.219	1.249	1.130	2.596	0.901	1.235	1.023	0.777	1.215
1.0	1.259	1.317	1.189	2.733	0.946	1.279	1.063	0.807	1.268
1.5	1.299	1.384	1.249	2.870	0.990	1.323	1.102	0.838	1.322
2.0	1.338	1.451	1.309	3.007	1.034	1.366	1.142	0.869	1.375
2.5	1.378	1.519	1.369	3.144	1.078	1.410	1.182	0.899	1.429
3.0	1.417	1.586	1.429	3.282	1.122	1.453	1.222	0.930	1.482
3.5	1.457	1.653	1.489	3.419	1.167	1.497	1.261	0.961	1.535
4.0	1.497	1.720	1.548	3.556	1.211	1.540	1.301	0.991	1.589
4.5	1.536	1.788	1.608	3.693	1.255	1.584	1.341	1.022	1.642
5.0	1.576	1.855	1.668	3.830	1.299	1.627	1.380	1.052	1.695

Table IV.1

Bone Mineral Density Z score values of subtotal body for male population

Age	Z SCORE					Age	Z SCORE				
	-2.5	-1.0	0.0	1.0	2.5		-2.5	-1.0	0.0	1.0	2.5
7	0.524	0.673	0.772	0.871	1.019	45	0.979	1.127	1.227	1.326	1.474
8	0.581	0.729	0.828	0.927	1.076	46	0.977	1.126	1.225	1.324	1.473
9	0.633	0.782	0.881	0.980	1.129	47	0.976	1.125	1.224	1.323	1.471
10	0.683	0.831	0.930	1.030	1.178	48	0.975	1.123	1.222	1.321	1.470
11	0.729	0.877	0.976	1.075	1.224	49	0.973	1.122	1.221	1.320	1.469
12	0.771	0.919	1.019	1.118	1.266	50	0.972	1.121	1.220	1.319	1.467
13	0.810	0.958	1.057	1.156	1.305	51	0.971	1.119	1.218	1.317	1.466
14	0.845	0.993	1.092	1.191	1.340	52	0.969	1.118	1.217	1.316	1.465
15	0.876	1.025	1.124	1.223	1.372	53	0.968	1.116	1.215	1.315	1.463
16	0.904	1.053	1.152	1.251	1.400	54	0.966	1.115	1.214	1.313	1.462
17	0.929	1.077	1.176	1.275	1.424	55	0.965	1.114	1.213	1.312	1.460
18	0.950	1.098	1.197	1.296	1.445	56	0.964	1.112	1.211	1.310	1.459
19	0.967	1.116	1.215	1.314	1.462	57	0.962	1.111	1.210	1.309	1.458
20	0.981	1.129	1.228	1.328	1.476	58	0.961	1.109	1.208	1.308	1.456
21	0.991	1.140	1.239	1.338	1.487	59	0.959	1.108	1.207	1.306	1.455
22	0.999	1.148	1.247	1.346	1.495	60	0.958	1.107	1.206	1.305	1.453
23	1.005	1.153	1.252	1.351	1.500	61	0.956	1.105	1.204	1.303	1.452
24	1.008	1.156	1.255	1.355	1.503	62	0.955	1.104	1.203	1.302	1.450
25	1.009	1.158	1.257	1.356	1.505	63	0.953	1.102	1.201	1.300	1.449
26	1.009	1.158	1.257	1.356	1.505	64	0.952	1.100	1.199	1.299	1.447
27	1.008	1.157	1.256	1.355	1.504	65	0.950	1.099	1.198	1.297	1.445
28	1.007	1.155	1.254	1.354	1.502	66	0.948	1.097	1.196	1.295	1.444
29	1.005	1.153	1.253	1.352	1.500	67	0.946	1.095	1.194	1.293	1.442
30	1.003	1.152	1.251	1.350	1.498	68	0.944	1.093	1.192	1.291	1.439
31	1.001	1.150	1.249	1.348	1.496	69	0.941	1.090	1.189	1.288	1.437
32	0.999	1.148	1.247	1.346	1.495	70	0.938	1.087	1.186	1.285	1.433
33	0.997	1.146	1.245	1.344	1.493	71	0.934	1.083	1.182	1.281	1.430
34	0.996	1.144	1.243	1.342	1.491	72	0.930	1.078	1.177	1.276	1.425
35	0.994	1.143	1.242	1.341	1.489	73	0.924	1.073	1.172	1.271	1.419
36	0.992	1.141	1.240	1.339	1.488	74	0.918	1.066	1.165	1.264	1.413
37	0.991	1.139	1.238	1.338	1.486	75	0.910	1.059	1.158	1.257	1.406
38	0.989	1.138	1.237	1.336	1.485	76	0.902	1.050	1.149	1.249	1.397
39	0.988	1.136	1.235	1.334	1.483	77	0.892	1.041	1.140	1.239	1.387
40	0.986	1.135	1.234	1.333	1.481	78	0.881	1.030	1.129	1.228	1.376
41	0.985	1.133	1.232	1.331	1.480	79	0.869	1.017	1.116	1.215	1.364
42	0.983	1.132	1.231	1.330	1.478	80	0.855	1.003	1.102	1.201	1.350
43	0.982	1.130	1.229	1.328	1.477						
44	0.980	1.129	1.228	1.327	1.476						

Table IV.2

BONE MINERAL DENSITY Z SCORE VALUES OF LUMBAR REGION FOR MALE POPULATION

Age	Z SCORE				
	-2.5	-1.0	0.0	1.0	2.5
7	0.199	0.421	0.561	0.700	0.909
8	0.267	0.489	0.629	0.768	0.977
9	0.331	0.553	0.693	0.832	1.041
10	0.391	0.613	0.753	0.892	1.101
11	0.447	0.669	0.808	0.948	1.156
12	0.498	0.721	0.860	0.999	1.208
13	0.546	0.769	0.908	1.047	1.256
14	0.590	0.813	0.952	1.091	1.300
15	0.630	0.852	0.991	1.131	1.339
16	0.665	0.888	1.027	1.166	1.375
17	0.697	0.919	1.059	1.198	1.407
18	0.724	0.947	1.086	1.225	1.434
19	0.748	0.970	1.110	1.249	1.458
20	0.767	0.990	1.129	1.268	1.477
21	0.783	1.006	1.145	1.284	1.493
22	0.796	1.018	1.158	1.297	1.506
23	0.805	1.028	1.167	1.306	1.515
24	0.812	1.035	1.174	1.314	1.522
25	0.817	1.040	1.179	1.319	1.527
26	0.821	1.043	1.183	1.322	1.531
27	0.823	1.045	1.185	1.324	1.533
28	0.824	1.046	1.185	1.325	1.533
29	0.824	1.047	1.186	1.325	1.534
30	0.824	1.047	1.186	1.325	1.534
31	0.824	1.046	1.186	1.325	1.534
32	0.823	1.046	1.185	1.325	1.533
33	0.823	1.046	1.185	1.324	1.533
34	0.822	1.045	1.184	1.323	1.532
35	0.821	1.044	1.183	1.323	1.531
36	0.821	1.043	1.182	1.322	1.530
37	0.819	1.042	1.181	1.321	1.529
38	0.818	1.041	1.180	1.319	1.528
39	0.817	1.040	1.179	1.318	1.527
40	0.816	1.038	1.178	1.317	1.526
41	0.814	1.037	1.176	1.315	1.524
42	0.813	1.036	1.175	1.314	1.523
43	0.811	1.034	1.173	1.312	1.521
44	0.810	1.032	1.172	1.311	1.520
45	0.808	1.031	1.170	1.309	1.518
46	0.807	1.029	1.169	1.308	1.517
47	0.805	1.028	1.167	1.306	1.515
48	0.803	1.026	1.165	1.305	1.513
49	0.802	1.025	1.164	1.303	1.512
50	0.800	1.023	1.162	1.302	1.510
51	0.799	1.022	1.161	1.300	1.509
52	0.798	1.020	1.160	1.299	1.508
53	0.796	1.019	1.158	1.298	1.506
54	0.795	1.018	1.157	1.296	1.505
55	0.794	1.017	1.156	1.295	1.504
56	0.793	1.016	1.155	1.294	1.503
57	0.792	1.015	1.154	1.294	1.502
58	0.792	1.015	1.154	1.293	1.502
59	0.791	1.014	1.153	1.292	1.501
60	0.791	1.014	1.153	1.292	1.501
61	0.791	1.014	1.153	1.292	1.501
62	0.791	1.014	1.153	1.292	1.501
63	0.791	1.014	1.153	1.292	1.501
64	0.792	1.014	1.154	1.293	1.502
65	0.792	1.015	1.154	1.293	1.502
66	0.793	1.016	1.155	1.294	1.503
67	0.793	1.016	1.155	1.294	1.503
68	0.793	1.016	1.155	1.294	1.503
69	0.792	1.015	1.154	1.294	1.502
70	0.790	1.013	1.152	1.292	1.500
71	0.787	1.010	1.149	1.288	1.497
72	0.783	1.005	1.145	1.284	1.493
73	0.776	0.999	1.138	1.277	1.486
74	0.768	0.991	1.130	1.269	1.478
75	0.757	0.980	1.119	1.258	1.467
76	0.744	0.967	1.106	1.245	1.454
77	0.728	0.951	1.090	1.229	1.438
78	0.709	0.932	1.071	1.210	1.419
79	0.687	0.909	1.049	1.188	1.397
80	0.661	0.884	1.023	1.162	1.371

Table IV.3

Bone Mineral Density Z score values of hip for male population

Age	Z SCORE				
	-2.5	-1.0	0.0	1.0	2.5
7	0.374	0.585	0.726	0.867	1.078
8	0.434	0.645	0.786	0.927	1.138
9	0.490	0.701	0.842	0.983	1.195
10	0.542	0.753	0.894	1.035	1.246
11	0.589	0.801	0.942	1.083	1.294
12	0.633	0.844	0.985	1.126	1.337
13	0.672	0.883	1.024	1.165	1.376
14	0.706	0.918	1.059	1.199	1.411
15	0.737	0.948	1.089	1.230	1.441
16	0.763	0.974	1.115	1.256	1.467
17	0.785	0.996	1.137	1.278	1.489
18	0.802	1.014	1.155	1.296	1.507
19	0.816	1.027	1.168	1.309	1.520
20	0.825	1.036	1.177	1.318	1.529
21	0.830	1.042	1.183	1.323	1.535
22	0.832	1.044	1.185	1.326	1.537
23	0.832	1.043	1.184	1.325	1.536
24	0.829	1.040	1.181	1.322	1.533
25	0.824	1.035	1.176	1.317	1.528
26	0.817	1.029	1.170	1.310	1.522
27	0.810	1.021	1.162	1.303	1.515
28	0.803	1.014	1.155	1.296	1.507
29	0.795	1.006	1.147	1.288	1.499
30	0.788	0.999	1.140	1.281	1.492
31	0.781	0.993	1.134	1.275	1.486
32	0.776	0.987	1.128	1.269	1.480
33	0.770	0.981	1.122	1.263	1.475
34	0.765	0.976	1.117	1.258	1.470
35	0.760	0.972	1.113	1.254	1.465
36	0.756	0.968	1.109	1.249	1.461
37	0.753	0.964	1.105	1.246	1.457
38	0.749	0.960	1.101	1.242	1.454
39	0.746	0.957	1.098	1.239	1.451
40	0.743	0.955	1.095	1.236	1.448
41	0.741	0.952	1.093	1.234	1.445
42	0.738	0.950	1.091	1.232	1.443
43	0.736	0.948	1.089	1.230	1.441
44	0.735	0.946	1.087	1.228	1.439
45	0.733	0.944	1.085	1.226	1.437
46	0.731	0.943	1.084	1.225	1.436
47	0.730	0.941	1.082	1.223	1.435
48	0.729	0.940	1.081	1.222	1.433
49	0.728	0.939	1.080	1.221	1.432
50	0.726	0.938	1.079	1.219	1.431
51	0.725	0.937	1.077	1.218	1.430
52	0.724	0.935	1.076	1.217	1.428
53	0.723	0.934	1.075	1.216	1.427
54	0.721	0.933	1.074	1.215	1.426
55	0.720	0.931	1.072	1.213	1.425
56	0.719	0.930	1.071	1.212	1.423
57	0.717	0.928	1.069	1.210	1.421
58	0.715	0.927	1.067	1.208	1.420
59	0.713	0.925	1.065	1.206	1.418
60	0.711	0.922	1.063	1.204	1.415
61	0.708	0.920	1.061	1.202	1.413
62	0.706	0.917	1.058	1.199	1.410
63	0.703	0.914	1.055	1.196	1.407
64	0.699	0.911	1.051	1.192	1.404
65	0.695	0.907	1.048	1.189	1.400
66	0.691	0.903	1.044	1.184	1.396
67	0.687	0.898	1.039	1.180	1.391
68	0.681	0.893	1.034	1.175	1.386
69	0.676	0.887	1.028	1.169	1.380
70	0.669	0.880	1.021	1.162	1.374
71	0.662	0.873	1.014	1.155	1.366
72	0.654	0.865	1.006	1.147	1.358
73	0.645	0.856	0.997	1.138	1.349
74	0.635	0.846	0.987	1.128	1.339
75	0.624	0.835	0.976	1.117	1.328
76	0.612	0.823	0.964	1.105	1.316
77	0.599	0.810	0.951	1.092	1.303
78	0.584	0.796	0.936	1.077	1.289
79	0.568	0.780	0.921	1.062	1.273
80	0.551	0.763	0.904	1.045	1.256

Table IV.4

BONE MINERAL DENSITY Z SCORE VALUES OF HEAD FOR MALE POPULATION

Age	Z SCORE				
	-2.5	-1.0	0.0	1.0	2.5
7	0.696	1.083	1.341	1.599	1.986
8	0.780	1.167	1.425	1.683	2.070
9	0.860	1.246	1.504	1.762	2.149
10	0.934	1.321	1.579	1.837	2.224
11	1.005	1.392	1.649	1.907	2.294
12	1.070	1.457	1.715	1.973	2.360
13	1.131	1.518	1.776	2.034	2.421
14	1.188	1.575	1.833	2.091	2.477
15	1.240	1.627	1.885	2.143	2.529
16	1.287	1.674	1.932	2.190	2.577
17	1.330	1.717	1.975	2.233	2.619
18	1.368	1.755	2.013	2.271	2.658
19	1.402	1.789	2.047	2.305	2.691
20	1.431	1.818	2.076	2.334	2.721
21	1.456	1.843	2.101	2.359	2.745
22	1.477	1.864	2.122	2.380	2.767
23	1.495	1.882	2.139	2.397	2.784
24	1.509	1.896	2.154	2.412	2.799
25	1.521	1.908	2.166	2.424	2.810
26	1.530	1.917	2.175	2.433	2.820
27	1.538	1.925	2.182	2.440	2.827
28	1.544	1.930	2.188	2.446	2.833
29	1.548	1.935	2.193	2.451	2.837
30	1.551	1.938	2.196	2.454	2.841
31	1.554	1.941	2.199	2.457	2.843
32	1.556	1.943	2.201	2.458	2.845
33	1.557	1.944	2.202	2.459	2.846
34	1.557	1.944	2.202	2.460	2.847
35	1.557	1.944	2.202	2.460	2.846
36	1.556	1.943	2.201	2.459	2.846
37	1.555	1.942	2.200	2.458	2.844
38	1.553	1.940	2.198	2.456	2.843
39	1.551	1.938	2.196	2.454	2.841
40	1.549	1.936	2.194	2.451	2.838
41	1.546	1.933	2.191	2.449	2.836
42	1.543	1.930	2.188	2.446	2.833
43	1.540	1.927	2.185	2.443	2.830
44	1.537	1.924	2.182	2.440	2.827
45	1.534	1.921	2.179	2.437	2.824
46	1.531	1.918	2.176	2.434	2.820
47	1.528	1.915	2.173	2.431	2.818
48	1.525	1.912	2.170	2.428	2.815
49	1.523	1.910	2.167	2.425	2.812
50	1.520	1.907	2.165	2.423	2.810
51	1.518	1.905	2.163	2.421	2.808
52	1.517	1.904	2.162	2.419	2.806
53	1.516	1.903	2.160	2.418	2.805
54	1.515	1.902	2.160	2.418	2.804
55	1.515	1.902	2.160	2.418	2.804
56	1.516	1.902	2.160	2.418	2.805
57	1.517	1.904	2.162	2.419	2.806
58	1.519	1.906	2.164	2.421	2.808
59	1.522	1.909	2.166	2.424	2.811
60	1.525	1.912	2.170	2.428	2.815
61	1.530	1.917	2.175	2.433	2.819
62	1.536	1.923	2.180	2.438	2.825
63	1.542	1.929	2.187	2.445	2.832
64	1.550	1.937	2.195	2.453	2.840
65	1.559	1.946	2.204	2.462	2.848
66	1.568	1.955	2.213	2.471	2.858
67	1.577	1.964	2.222	2.480	2.867
68	1.585	1.972	2.230	2.488	2.875
69	1.591	1.978	2.236	2.494	2.881
70	1.595	1.982	2.240	2.498	2.884
71	1.595	1.982	2.240	2.498	2.885
72	1.592	1.979	2.236	2.494	2.881
73	1.583	1.970	2.228	2.486	2.873
74	1.570	1.957	2.214	2.472	2.859
75	1.550	1.937	2.194	2.452	2.839
76	1.523	1.910	2.168	2.425	2.812
77	1.488	1.875	2.133	2.391	2.778
78	1.445	1.832	2.090	2.348	2.735
79	1.393	1.780	2.038	2.296	2.683
80	1.331	1.718	1.976	2.234	2.621

Table IV.5

Bone Mineral Density Z score values of arm for male population

Age	Z SCORE				
	-2.5	-1.0	0.0	1.0	2.5
7	0.218	0.396	0.514	0.632	0.809
8	0.270	0.448	0.566	0.684	0.862
9	0.319	0.497	0.615	0.733	0.911
10	0.365	0.543	0.661	0.779	0.957
11	0.408	0.586	0.704	0.822	0.999
12	0.448	0.625	0.744	0.862	1.039
13	0.485	0.662	0.780	0.898	1.076
14	0.518	0.695	0.814	0.932	1.109
15	0.548	0.726	0.844	0.962	1.140
16	0.576	0.753	0.871	0.990	1.167
17	0.600	0.777	0.895	1.014	1.191
18	0.621	0.798	0.916	1.035	1.212
19	0.639	0.816	0.934	1.053	1.230
20	0.654	0.831	0.949	1.067	1.245
21	0.666	0.843	0.961	1.079	1.257
22	0.675	0.852	0.971	1.089	1.266
23	0.682	0.860	0.978	1.096	1.274
24	0.688	0.865	0.983	1.102	1.279
25	0.691	0.869	0.987	1.105	1.283
26	0.694	0.871	0.990	1.108	1.285
27	0.695	0.873	0.991	1.109	1.287
28	0.696	0.874	0.992	1.110	1.287
29	0.697	0.874	0.992	1.110	1.288
30	0.697	0.874	0.992	1.111	1.288
31	0.697	0.874	0.993	1.111	1.288
32	0.697	0.874	0.993	1.111	1.288
33	0.697	0.874	0.993	1.111	1.288
34	0.697	0.874	0.993	1.111	1.288
35	0.697	0.874	0.992	1.111	1.288
36	0.696	0.874	0.992	1.110	1.288
37	0.696	0.873	0.992	1.110	1.287
38	0.695	0.873	0.991	1.109	1.287
39	0.695	0.872	0.990	1.109	1.286
40	0.694	0.871	0.990	1.108	1.285
41	0.693	0.871	0.989	1.107	1.284
42	0.692	0.870	0.988	1.106	1.283
43	0.691	0.868	0.987	1.105	1.282
44	0.690	0.867	0.985	1.104	1.281
45	0.688	0.866	0.984	1.102	1.280
46	0.687	0.864	0.982	1.101	1.278
47	0.685	0.863	0.981	1.099	1.276
48	0.683	0.861	0.979	1.097	1.275
49	0.681	0.859	0.977	1.095	1.273
50	0.679	0.857	0.975	1.093	1.271
51	0.677	0.855	0.973	1.091	1.268
52	0.675	0.852	0.970	1.089	1.266
53	0.672	0.850	0.968	1.086	1.263
54	0.670	0.847	0.965	1.083	1.261
55	0.667	0.844	0.962	1.081	1.258
56	0.664	0.841	0.959	1.078	1.255
57	0.661	0.838	0.956	1.074	1.252
58	0.657	0.835	0.953	1.071	1.248
59	0.654	0.831	0.949	1.068	1.245
60	0.650	0.827	0.946	1.064	1.241
61	0.646	0.824	0.942	1.060	1.237
62	0.642	0.820	0.938	1.056	1.233
63	0.638	0.815	0.934	1.052	1.229
64	0.634	0.811	0.929	1.048	1.225
65	0.629	0.807	0.925	1.043	1.220
66	0.625	0.802	0.920	1.038	1.216
67	0.620	0.797	0.916	1.034	1.211
68	0.615	0.793	0.911	1.029	1.207
69	0.611	0.788	0.907	1.025	1.202
70	0.607	0.784	0.902	1.021	1.198
71	0.603	0.781	0.899	1.017	1.194
72	0.600	0.777	0.895	1.014	1.191
73	0.597	0.775	0.893	1.011	1.188
74	0.595	0.772	0.891	1.009	1.186
75	0.594	0.771	0.889	1.008	1.185
76	0.591	0.769	0.887	1.005	1.183
77	0.589	0.767	0.885	1.003	1.181
78	0.587	0.765	0.883	1.001	1.179
79	0.585	0.763	0.881	0.999	1.177
80	0.583	0.761	0.879	0.997	1.175

Table IV.6

BONE MINERAL DENSITY Z SCORE VALUES OF PROXIMAL FEMUR FOR MALE POPULATION

Age	Z SCORE				
	-2.5	-1.0	0.0	1.0	2.5
7	0.408	0.590	0.711	0.832	1.014
8	0.493	0.675	0.797	0.918	1.100
9	0.573	0.755	0.876	0.998	1.180
10	0.647	0.829	0.950	1.072	1.254
11	0.715	0.897	1.019	1.140	1.322
12	0.777	0.960	1.081	1.202	1.384
13	0.834	1.016	1.137	1.259	1.441
14	0.885	1.067	1.188	1.310	1.492
15	0.930	1.112	1.233	1.355	1.537
16	0.969	1.151	1.273	1.394	1.576
17	1.002	1.185	1.306	1.427	1.609
18	1.030	1.212	1.334	1.455	1.637
19	1.052	1.234	1.355	1.477	1.659
20	1.068	1.250	1.372	1.493	1.675
21	1.079	1.261	1.383	1.504	1.686
22	1.086	1.268	1.389	1.510	1.692
23	1.088	1.270	1.392	1.513	1.695
24	1.088	1.270	1.391	1.512	1.694
25	1.084	1.266	1.388	1.509	1.691
26	1.079	1.261	1.383	1.504	1.686
27	1.073	1.255	1.376	1.498	1.680
28	1.066	1.248	1.369	1.490	1.672
29	1.058	1.240	1.362	1.483	1.665
30	1.052	1.234	1.355	1.477	1.659
31	1.046	1.228	1.349	1.470	1.653
32	1.040	1.222	1.344	1.465	1.647
33	1.035	1.217	1.339	1.460	1.642
34	1.031	1.213	1.334	1.455	1.637
35	1.026	1.209	1.330	1.451	1.633
36	1.023	1.205	1.326	1.448	1.630
37	1.020	1.202	1.323	1.444	1.626
38	1.017	1.199	1.320	1.441	1.624
39	1.014	1.196	1.318	1.439	1.621
40	1.012	1.194	1.315	1.437	1.619
41	1.010	1.192	1.313	1.435	1.617
42	1.008	1.190	1.312	1.433	1.615
43	1.007	1.189	1.310	1.432	1.614
44	1.006	1.188	1.309	1.430	1.613
45	1.005	1.187	1.308	1.429	1.611
46	1.004	1.186	1.307	1.429	1.611
47	1.003	1.185	1.306	1.428	1.610
48	1.002	1.184	1.306	1.427	1.609
49	1.001	1.184	1.305	1.426	1.608
50	1.001	1.183	1.304	1.426	1.608
51	1.000	1.182	1.304	1.425	1.607
52	0.999	1.182	1.303	1.424	1.606
53	0.999	1.181	1.302	1.424	1.606
54	0.998	1.180	1.301	1.423	1.605
55	0.997	1.179	1.300	1.422	1.604
56	0.996	1.178	1.299	1.421	1.603
57	0.994	1.177	1.298	1.419	1.601
58	0.993	1.175	1.296	1.418	1.600
59	0.991	1.173	1.295	1.416	1.598
60	0.989	1.171	1.293	1.414	1.596
61	0.987	1.169	1.290	1.412	1.594
62	0.984	1.166	1.288	1.409	1.591
63	0.981	1.163	1.285	1.406	1.588
64	0.978	1.160	1.281	1.403	1.585
65	0.974	1.156	1.278	1.399	1.581
66	0.970	1.152	1.273	1.395	1.577
67	0.965	1.148	1.269	1.390	1.572
68	0.961	1.143	1.264	1.385	1.567
69	0.955	1.138	1.259	1.380	1.562
70	0.950	1.132	1.253	1.375	1.557
71	0.944	1.126	1.248	1.369	1.551
72	0.938	1.120	1.242	1.363	1.545
73	0.932	1.114	1.236	1.357	1.539
74	0.926	1.108	1.229	1.351	1.533
75	0.919	1.102	1.223	1.344	1.526
76	0.913	1.095	1.216	1.338	1.520
77	0.906	1.088	1.210	1.331	1.513
78	0.899	1.082	1.203	1.324	1.506
79	0.893	1.075	1.196	1.318	1.500
80	0.886	1.068	1.189	1.311	1.493

Table IV.7

Bone Mineral Density Z score values of trunk for male population

Age	Z SCORE				
	-2.5	-1.0	0.0	1.0	2.5
7	0.341	0.483	0.578	0.673	0.816
8	0.396	0.538	0.633	0.728	0.870
9	0.447	0.589	0.684	0.779	0.922
10	0.494	0.637	0.732	0.827	0.969
11	0.538	0.681	0.776	0.871	1.013
12	0.579	0.722	0.817	0.911	1.054
13	0.616	0.759	0.854	0.949	1.091
14	0.650	0.792	0.887	0.982	1.125
15	0.680	0.823	0.918	1.013	1.155
16	0.707	0.849	0.944	1.039	1.182
17	0.730	0.873	0.968	1.063	1.205
18	0.750	0.892	0.987	1.082	1.225
19	0.766	0.909	1.004	1.099	1.241
20	0.779	0.922	1.017	1.112	1.254
21	0.789	0.931	1.026	1.121	1.264
22	0.796	0.938	1.033	1.128	1.271
23	0.801	0.943	1.038	1.133	1.275
24	0.803	0.946	1.041	1.136	1.278
25	0.804	0.946	1.041	1.136	1.279
26	0.804	0.946	1.041	1.136	1.279
27	0.802	0.945	1.040	1.135	1.277
28	0.800	0.943	1.038	1.133	1.275
29	0.798	0.941	1.036	1.131	1.273
30	0.796	0.939	1.034	1.129	1.271
31	0.794	0.937	1.032	1.127	1.269
32	0.792	0.935	1.030	1.125	1.267
33	0.791	0.933	1.028	1.123	1.265
34	0.789	0.931	1.026	1.121	1.264
35	0.787	0.930	1.025	1.120	1.262
36	0.786	0.928	1.023	1.118	1.261
37	0.785	0.927	1.022	1.117	1.259
38	0.783	0.926	1.021	1.116	1.258
39	0.782	0.925	1.020	1.115	1.257
40	0.781	0.924	1.019	1.113	1.256
41	0.780	0.922	1.017	1.112	1.255
42	0.779	0.921	1.016	1.111	1.254
43	0.778	0.921	1.016	1.110	1.253
44	0.777	0.920	1.015	1.110	1.252
45	0.776	0.919	1.014	1.109	1.251
46	0.775	0.918	1.013	1.108	1.250
47	0.775	0.917	1.012	1.107	1.250
48	0.774	0.916	1.011	1.106	1.249
49	0.773	0.916	1.011	1.106	1.248
50	0.772	0.915	1.010	1.105	1.247
51	0.772	0.914	1.009	1.104	1.247
52	0.771	0.913	1.008	1.103	1.246
53	0.770	0.913	1.008	1.102	1.245
54	0.769	0.912	1.007	1.102	1.244
55	0.768	0.911	1.006	1.101	1.243
56	0.768	0.910	1.005	1.100	1.243
57	0.767	0.909	1.004	1.099	1.242
58	0.766	0.908	1.003	1.098	1.241
59	0.765	0.907	1.002	1.097	1.240
60	0.764	0.906	1.001	1.096	1.239
61	0.763	0.905	1.000	1.095	1.238
62	0.762	0.904	0.999	1.094	1.236
63	0.760	0.903	0.998	1.093	1.235
64	0.759	0.901	0.996	1.091	1.234
65	0.758	0.900	0.995	1.090	1.232
66	0.756	0.898	0.993	1.088	1.231
67	0.754	0.897	0.991	1.086	1.229
68	0.752	0.894	0.989	1.084	1.227
69	0.749	0.891	0.986	1.081	1.224
70	0.746	0.888	0.983	1.078	1.220
71	0.741	0.884	0.979	1.074	1.216
72	0.736	0.879	0.974	1.069	1.211
73	0.731	0.873	0.968	1.063	1.206
74	0.724	0.866	0.961	1.056	1.199
75	0.716	0.858	0.953	1.048	1.191
76	0.707	0.849	0.944	1.039	1.181
77	0.696	0.839	0.934	1.028	1.171
78	0.684	0.827	0.922	1.016	1.159
79	0.671	0.813	0.908	1.003	1.145
80	0.655	0.798	0.893	0.988	1.130

Table IV.8

BONE MINERAL DENSITY Z SCORE VALUES OF RIBS FOR MALE POPULATION

Age	Z SCORE				
	-2.5	-1.0	0.0	1.0	2.5
7	0.336	0.447	0.522	0.596	0.708
8	0.368	0.480	0.554	0.629	0.708
9	0.399	0.511	0.585	0.660	0.585
10	0.428	0.539	0.614	0.688	0.614
11	0.454	0.566	0.640	0.715	1.998
12	0.478	0.590	0.664	0.739	2.102
13	0.500	0.612	0.687	0.761	2.200
14	0.521	0.632	0.707	0.781	2.290
15	0.539	0.650	0.725	0.799	2.374
16	0.554	0.666	0.741	0.815	2.450
17	0.568	0.680	0.754	0.829	2.519
18	0.580	0.692	0.766	0.840	2.581
19	0.589	0.701	0.775	0.850	2.635
20	0.597	0.708	0.783	0.857	2.683
21	0.602	0.714	0.788	0.863	2.723
22	0.606	0.718	0.792	0.867	2.756
23	0.609	0.720	0.795	0.869	2.782
24	0.610	0.721	0.796	0.870	2.802
25	0.610	0.722	0.796	0.871	2.815
26	0.609	0.721	0.796	0.870	2.824
27	0.608	0.720	0.794	0.869	2.829
28	0.607	0.718	0.793	0.867	2.830
29	0.605	0.717	0.791	0.866	2.829
30	0.603	0.715	0.790	0.864	2.826
31	0.602	0.714	0.788	0.863	2.821
32	0.601	0.712	0.787	0.861	2.816
33	0.599	0.711	0.785	0.860	2.811
34	0.598	0.710	0.784	0.859	2.806
35	0.597	0.709	0.783	0.858	2.801
36	0.596	0.708	0.782	0.856	2.797
37	0.595	0.706	0.781	0.855	2.792
38	0.594	0.706	0.780	0.855	2.788
39	0.593	0.705	0.779	0.854	2.785
40	0.592	0.704	0.778	0.853	2.781
41	0.591	0.703	0.778	0.852	2.778
42	0.591	0.702	0.777	0.851	2.774
43	0.590	0.702	0.776	0.851	2.771
44	0.589	0.701	0.775	0.850	2.769
45	0.589	0.700	0.775	0.849	2.766
46	0.588	0.700	0.774	0.849	2.763
47	0.587	0.699	0.774	0.848	2.761
48	0.587	0.698	0.773	0.847	2.759
49	0.586	0.698	0.772	0.847	2.757
50	0.586	0.697	0.772	0.846	2.754
51	0.585	0.697	0.771	0.846	2.752
52	0.585	0.696	0.771	0.845	2.750
53	0.584	0.696	0.770	0.845	2.748
54	0.583	0.695	0.770	0.844	2.747
55	0.583	0.694	0.769	0.843	2.745
56	0.582	0.694	0.768	0.843	2.743
57	0.581	0.693	0.768	0.842	2.741
58	0.581	0.693	0.767	0.841	2.739
59	0.580	0.692	0.766	0.841	2.736
60	0.579	0.691	0.766	0.840	2.734
61	0.579	0.690	0.765	0.839	2.732
62	0.578	0.689	0.764	0.838	2.729
63	0.577	0.689	0.763	0.837	2.726
64	0.576	0.688	0.762	0.837	2.724
65	0.575	0.687	0.761	0.836	2.721
66	0.574	0.685	0.760	0.834	2.717
67	0.572	0.684	0.759	0.833	2.714
68	0.571	0.683	0.757	0.832	2.710
69	0.569	0.681	0.755	0.830	2.706
70	0.567	0.679	0.753	0.828	2.701
71	0.565	0.677	0.751	0.826	2.696
72	0.562	0.674	0.748	0.823	2.689
73	0.559	0.671	0.745	0.820	2.682
74	0.556	0.667	0.742	0.816	2.674
75	0.552	0.663	0.738	0.812	2.664
76	0.547	0.659	0.733	0.808	2.653
77	0.542	0.654	0.728	0.802	2.640
78	0.536	0.648	0.722	0.797	2.625
79	0.529	0.641	0.716	0.790	2.609
80	0.522	0.634	0.708	0.783	2.590

Table IV.9

Bone Mineral Density Z score values of pelvis for male population

Age	Z SCORE				
	-2.5	-1.0	0.0	1.0	2.5
7	0.318	0.520	0.654	0.789	0.991
8	0.394	0.595	0.730	0.864	1.066
9	0.464	0.666	0.800	0.934	1.136
10	0.529	0.731	0.865	1.000	1.202
11	0.590	0.791	0.926	1.060	1.262
12	0.645	0.847	0.981	1.116	1.317
13	0.696	0.897	1.032	1.166	1.368
14	0.741	0.943	1.077	1.212	1.414
15	0.782	0.984	1.118	1.253	1.454
16	0.818	1.019	1.154	1.288	1.490
17	0.849	1.050	1.185	1.319	1.521
18	0.874	1.076	1.211	1.345	1.547
19	0.895	1.097	1.231	1.366	1.568
20	0.911	1.113	1.247	1.382	1.584
21	0.923	1.125	1.259	1.394	1.595
22	0.931	1.132	1.267	1.401	1.603
23	0.935	1.137	1.271	1.406	1.607
24	0.937	1.138	1.273	1.407	1.609
25	0.936	1.138	1.272	1.407	1.608
26	0.933	1.135	1.270	1.404	1.606
27	0.930	1.131	1.266	1.400	1.602
28	0.925	1.127	1.261	1.396	1.597
29	0.921	1.122	1.257	1.391	1.593
30	0.916	1.118	1.252	1.387	1.588
31	0.912	1.114	1.248	1.383	1.584
32	0.908	1.110	1.244	1.379	1.580
33	0.905	1.106	1.241	1.375	1.577
34	0.901	1.103	1.237	1.372	1.573
35	0.898	1.100	1.234	1.369	1.570
36	0.895	1.097	1.231	1.366	1.568
37	0.893	1.094	1.229	1.363	1.565
38	0.890	1.092	1.226	1.361	1.563
39	0.888	1.090	1.224	1.359	1.560
40	0.886	1.088	1.222	1.356	1.558
41	0.884	1.086	1.220	1.354	1.556
42	0.882	1.084	1.218	1.353	1.554
43	0.880	1.082	1.216	1.351	1.553
44	0.879	1.080	1.215	1.349	1.551
45	0.877	1.079	1.213	1.348	1.549
46	0.875	1.077	1.212	1.346	1.548
47	0.874	1.076	1.210	1.344	1.546
48	0.872	1.074	1.209	1.343	1.545
49	0.871	1.073	1.207	1.341	1.543
50	0.869	1.071	1.205	1.340	1.542
51	0.868	1.069	1.204	1.338	1.540
52	0.866	1.068	1.202	1.337	1.538
53	0.864	1.066	1.200	1.335	1.537
54	0.863	1.064	1.199	1.333	1.535
55	0.861	1.062	1.197	1.331	1.533
56	0.859	1.060	1.195	1.329	1.531
57	0.856	1.058	1.193	1.327	1.529
58	0.854	1.056	1.190	1.325	1.526
59	0.852	1.053	1.188	1.322	1.524
60	0.849	1.050	1.185	1.319	1.521
61	0.846	1.048	1.182	1.316	1.518
62	0.843	1.044	1.179	1.313	1.515
63	0.839	1.041	1.175	1.310	1.511
64	0.836	1.037	1.172	1.306	1.508
65	0.832	1.033	1.168	1.302	1.504
66	0.827	1.029	1.163	1.298	1.499
67	0.822	1.024	1.159	1.293	1.495
68	0.817	1.019	1.153	1.288	1.489
69	0.811	1.013	1.147	1.282	1.483
70	0.804	1.006	1.141	1.275	1.477
71	0.797	0.999	1.133	1.268	1.469
72	0.789	0.990	1.125	1.259	1.461
73	0.780	0.981	1.116	1.250	1.452
74	0.769	0.971	1.105	1.240	1.441
75	0.758	0.960	1.094	1.228	1.430
76	0.745	0.947	1.081	1.216	1.418
77	0.732	0.933	1.068	1.202	1.404
78	0.716	0.918	1.052	1.187	1.389
79	0.700	0.901	1.036	1.170	1.372
80	0.682	0.883	1.018	1.152	1.354

Table IV.10

BONE MINERAL DENSITY Z SCORE VALUES OF SUBTOTAL BODY FOR FEMALE POPULATION

Age	Z SCORE				
	-2.5	-1.0	0.0	1.0	2.5
7	0.622	0.741	0.820	0.899	1.018
8	0.661	0.780	0.859	0.938	1.057
9	0.697	0.816	0.895	0.975	1.093
10	0.732	0.850	0.930	1.009	1.128
11	0.764	0.882	0.962	1.041	1.160
12	0.793	0.912	0.991	1.071	1.189
13	0.821	0.940	1.019	1.098	1.217
14	0.846	0.965	1.044	1.123	1.242
15	0.869	0.988	1.067	1.146	1.265
16	0.889	1.008	1.087	1.167	1.285
17	0.907	1.026	1.106	1.185	1.304
18	0.923	1.042	1.121	1.201	1.320
19	0.937	1.056	1.135	1.214	1.333
20	0.948	1.067	1.147	1.226	1.345
21	0.958	1.077	1.156	1.235	1.354
22	0.965	1.084	1.163	1.242	1.361
23	0.971	1.090	1.169	1.248	1.367
24	0.975	1.094	1.173	1.252	1.371
25	0.978	1.097	1.176	1.255	1.374
26	0.980	1.099	1.178	1.257	1.376
27	0.981	1.100	1.179	1.258	1.377
28	0.982	1.100	1.180	1.259	1.378
29	0.982	1.100	1.180	1.259	1.378
30	0.981	1.100	1.179	1.259	1.377
31	0.981	1.100	1.179	1.258	1.377
32	0.980	1.099	1.178	1.257	1.376
33	0.979	1.098	1.177	1.256	1.375
34	0.978	1.096	1.176	1.255	1.374
35	0.976	1.095	1.174	1.253	1.372
36	0.974	1.093	1.172	1.252	1.370
37	0.972	1.091	1.170	1.250	1.369
38	0.970	1.089	1.168	1.247	1.366
39	0.968	1.087	1.166	1.245	1.364
40	0.965	1.084	1.163	1.242	1.361
41	0.962	1.081	1.160	1.240	1.358
42	0.959	1.078	1.157	1.236	1.355
43	0.956	1.075	1.154	1.233	1.352
44	0.952	1.071	1.150	1.230	1.349
45	0.949	1.067	1.147	1.226	1.345
46	0.945	1.064	1.143	1.222	1.341
47	0.941	1.059	1.139	1.218	1.337
48	0.936	1.055	1.134	1.214	1.332
49	0.932	1.051	1.130	1.209	1.328
50	0.927	1.046	1.125	1.204	1.323
51	0.922	1.041	1.120	1.199	1.318
52	0.917	1.036	1.115	1.194	1.313
53	0.911	1.030	1.110	1.189	1.308
54	0.906	1.025	1.104	1.183	1.302
55	0.900	1.019	1.098	1.178	1.296
56	0.894	1.013	1.092	1.172	1.291
57	0.888	1.007	1.086	1.166	1.284
58	0.882	1.001	1.080	1.159	1.278
59	0.875	0.994	1.074	1.153	1.272
60	0.869	0.988	1.067	1.146	1.265
61	0.862	0.981	1.060	1.139	1.258
62	0.855	0.974	1.053	1.132	1.251
63	0.848	0.967	1.046	1.125	1.244
64	0.841	0.959	1.039	1.118	1.237
65	0.833	0.952	1.031	1.110	1.229
66	0.826	0.944	1.024	1.103	1.222
67	0.818	0.937	1.016	1.095	1.214
68	0.811	0.929	1.009	1.088	1.207
69	0.803	0.922	1.001	1.081	1.200
70	0.796	0.915	0.994	1.074	1.193
71	0.790	0.909	0.988	1.067	1.186
72	0.784	0.903	0.982	1.061	1.180
73	0.778	0.897	0.976	1.056	1.175
74	0.774	0.892	0.972	1.051	1.170
75	0.770	0.888	0.968	1.047	1.166
76	0.766	0.885	0.964	1.044	1.163
77	0.764	0.883	0.962	1.041	1.160
78	0.763	0.882	0.961	1.040	1.159
79	0.761	0.880	0.959	1.038	1.157
80	0.759	0.878	0.957	1.036	1.155

Table IV.11

Bone Mineral Density Z score values of lumbar region for female population

Age	Z SCORE				
	-2.5	-1.0	0.0	1.0	2.5
7	0.315	0.517	0.652	0.787	0.988
8	0.368	0.570	0.705	0.839	1.041
9	0.418	0.620	0.755	0.889	1.091
10	0.465	0.667	0.802	0.936	1.138
11	0.509	0.711	0.846	0.980	1.182
12	0.550	0.752	0.887	1.021	1.223
13	0.589	0.791	0.925	1.060	1.262
14	0.624	0.826	0.961	1.095	1.297
15	0.657	0.859	0.993	1.128	1.330
16	0.686	0.888	1.023	1.158	1.359
17	0.713	0.915	1.050	1.184	1.386
18	0.737	0.939	1.074	1.208	1.410
19	0.758	0.960	1.095	1.229	1.431
20	0.776	0.978	1.113	1.247	1.449
21	0.792	0.994	1.128	1.263	1.465
22	0.805	1.007	1.141	1.276	1.478
23	0.816	1.018	1.152	1.287	1.489
24	0.825	1.026	1.161	1.296	1.498
25	0.831	1.033	1.168	1.303	1.504
26	0.837	1.039	1.173	1.308	1.510
27	0.841	1.042	1.177	1.312	1.514
28	0.843	1.045	1.180	1.314	1.516
29	0.845	1.047	1.181	1.316	1.518
30	0.845	1.047	1.182	1.317	1.519
31	0.845	1.047	1.182	1.317	1.518
32	0.845	1.047	1.181	1.316	1.518
33	0.843	1.045	1.180	1.314	1.516
34	0.841	1.043	1.178	1.312	1.514
35	0.838	1.040	1.175	1.309	1.511
36	0.835	1.037	1.171	1.306	1.508
37	0.831	1.033	1.167	1.302	1.504
38	0.826	1.028	1.163	1.297	1.499
39	0.821	1.023	1.158	1.292	1.494
40	0.816	1.018	1.152	1.287	1.489
41	0.810	1.012	1.146	1.281	1.483
42	0.803	1.005	1.140	1.274	1.476
43	0.796	0.998	1.133	1.268	1.469
44	0.789	0.991	1.126	1.260	1.462
45	0.782	0.984	1.118	1.253	1.455
46	0.774	0.976	1.111	1.245	1.447
47	0.766	0.968	1.102	1.237	1.439
48	0.758	0.960	1.094	1.229	1.431
49	0.749	0.951	1.086	1.220	1.422
50	0.741	0.942	1.077	1.212	1.414
51	0.732	0.934	1.068	1.203	1.405
52	0.723	0.925	1.059	1.194	1.396
53	0.714	0.916	1.051	1.185	1.387
54	0.705	0.907	1.042	1.176	1.378
55	0.696	0.898	1.033	1.167	1.369
56	0.687	0.889	1.024	1.158	1.360
57	0.678	0.880	1.015	1.149	1.351
58	0.670	0.871	1.006	1.141	1.343
59	0.661	0.863	0.997	1.132	1.334
60	0.652	0.854	0.989	1.124	1.325
61	0.644	0.846	0.981	1.115	1.317
62	0.636	0.838	0.973	1.107	1.309
63	0.628	0.830	0.965	1.099	1.301
64	0.621	0.823	0.957	1.092	1.294
65	0.614	0.815	0.950	1.085	1.287
66	0.607	0.809	0.943	1.078	1.280
67	0.600	0.802	0.936	1.071	1.273
68	0.594	0.795	0.930	1.065	1.267
69	0.587	0.789	0.924	1.058	1.260
70	0.581	0.783	0.918	1.052	1.254
71	0.575	0.777	0.912	1.046	1.248
72	0.570	0.771	0.906	1.041	1.243
73	0.564	0.766	0.900	1.035	1.237
74	0.558	0.760	0.895	1.029	1.231
75	0.553	0.755	0.889	1.024	1.226
76	0.547	0.749	0.884	1.018	1.220
77	0.541	0.743	0.878	1.012	1.214
78	0.536	0.738	0.872	1.007	1.209
79	0.530	0.732	0.866	1.001	1.203
80	0.524	0.726	0.860	0.995	1.197

Table IV.12

BONE MINERAL DENSITY Z SCORE VALUES OF HIP FOR FEMALE POPULATION

Age	Z SCORE				
	-2.5	-1.0	0.0	1.0	2.5
7	0.444	0.623	0.743	0.863	1.042
8	0.483	0.662	0.782	0.902	1.081
9	0.519	0.699	0.819	0.938	1.118
10	0.554	0.733	0.853	0.972	1.152
11	0.585	0.765	0.884	1.004	1.183
12	0.614	0.793	0.913	1.033	1.212
13	0.640	0.820	0.940	1.059	1.239
14	0.664	0.844	0.964	1.083	1.263
15	0.686	0.865	0.985	1.105	1.284
16	0.705	0.884	1.004	1.124	1.303
17	0.721	0.901	1.020	1.140	1.319
18	0.735	0.914	1.034	1.154	1.333
19	0.746	0.926	1.045	1.165	1.345
20	0.755	0.935	1.054	1.174	1.354
21	0.762	0.941	1.061	1.181	1.360
22	0.766	0.946	1.066	1.185	1.365
23	0.769	0.949	1.068	1.188	1.368
24	0.770	0.950	1.070	1.189	1.369
25	0.770	0.950	1.070	1.189	1.369
26	0.770	0.949	1.069	1.188	1.368
27	0.768	0.947	1.067	1.187	1.366
28	0.765	0.945	1.065	1.184	1.364
29	0.763	0.942	1.062	1.182	1.361
30	0.760	0.940	1.060	1.179	1.359
31	0.758	0.937	1.057	1.177	1.356
32	0.755	0.935	1.054	1.174	1.354
33	0.752	0.932	1.052	1.171	1.351
34	0.750	0.929	1.049	1.169	1.348
35	0.747	0.926	1.046	1.166	1.345
36	0.744	0.924	1.043	1.163	1.342
37	0.741	0.921	1.040	1.160	1.339
38	0.738	0.918	1.037	1.157	1.336
39	0.735	0.914	1.034	1.154	1.333
40	0.732	0.911	1.031	1.151	1.330
41	0.728	0.908	1.028	1.147	1.327
42	0.725	0.905	1.024	1.144	1.323
43	0.721	0.901	1.021	1.140	1.320
44	0.718	0.897	1.017	1.137	1.316
45	0.714	0.893	1.013	1.133	1.312
46	0.710	0.889	1.009	1.129	1.308
47	0.706	0.885	1.005	1.125	1.304
48	0.701	0.881	1.001	1.120	1.300
49	0.697	0.877	0.996	1.116	1.295
50	0.692	0.872	0.992	1.111	1.291
51	0.688	0.867	0.987	1.106	1.286
52	0.682	0.862	0.982	1.101	1.281
53	0.677	0.857	0.976	1.096	1.276
54	0.672	0.851	0.971	1.091	1.270
55	0.666	0.846	0.965	1.085	1.264
56	0.660	0.840	0.959	1.079	1.259
57	0.654	0.833	0.953	1.073	1.252
58	0.648	0.827	0.947	1.066	1.246
59	0.641	0.820	0.940	1.060	1.239
60	0.634	0.813	0.933	1.053	1.232
61	0.627	0.806	0.926	1.046	1.225
62	0.619	0.799	0.918	1.038	1.218
63	0.611	0.791	0.911	1.030	1.210
64	0.603	0.783	0.903	1.022	1.202
65	0.595	0.774	0.894	1.014	1.193
66	0.586	0.766	0.886	1.005	1.185
67	0.578	0.757	0.877	0.997	1.176
68	0.569	0.749	0.868	0.988	1.168
69	0.561	0.740	0.860	0.980	1.159
70	0.552	0.732	0.852	0.971	1.151
71	0.545	0.724	0.844	0.963	1.143
72	0.537	0.717	0.836	0.956	1.136
73	0.530	0.710	0.829	0.949	1.129
74	0.524	0.704	0.823	0.943	1.123
75	0.519	0.698	0.818	0.938	1.117
76	0.514	0.694	0.814	0.933	1.113
77	0.511	0.691	0.810	0.930	1.109
78	0.509	0.688	0.808	0.928	1.107
79	0.507	0.686	0.806	0.926	1.105
80	0.505	0.684	0.804	0.924	1.103

Table IV.13

BONE MINERAL DENSITY Z SCORE VALUES OF HEAD FOR FEMALE POPULATION

Age	Z SCORE				
	-2.5	-1.0	0.0	1.0	2.5
7	0.637	1.048	1.322	1.597	2.008
8	0.744	1.156	1.430	1.704	2.116
9	0.846	1.258	1.532	1.806	2.217
10	0.942	1.354	1.628	1.902	2.314
11	1.033	1.444	1.719	1.993	2.404
12	1.118	1.529	1.804	2.078	2.489
13	1.197	1.608	1.883	2.157	2.568
14	1.271	1.682	1.956	2.231	2.642
15	1.339	1.750	2.024	2.298	2.710
16	1.401	1.812	2.086	2.361	2.772
17	1.457	1.869	2.143	2.417	2.828
18	1.508	1.919	2.194	2.468	2.879
19	1.553	1.965	2.239	2.513	2.925
20	1.593	2.004	2.278	2.553	2.964
21	1.627	2.039	2.313	2.587	2.998
22	1.657	2.068	2.342	2.616	3.028
23	1.682	2.093	2.367	2.641	3.053
24	1.703	2.114	2.388	2.662	3.074
25	1.720	2.131	2.406	2.680	3.091
26	1.734	2.145	2.420	2.694	3.105
27	1.745	2.157	2.431	2.705	3.117
28	1.754	2.166	2.440	2.714	3.125
29	1.761	2.172	2.447	2.721	3.132
30	1.766	2.178	2.452	2.726	3.138
31	1.770	2.181	2.456	2.730	3.141
32	1.772	2.184	2.458	2.732	3.144
33	1.773	2.185	2.459	2.733	3.144
34	1.773	2.184	2.458	2.733	3.144
35	1.771	2.182	2.457	2.731	3.142
36	1.768	2.179	2.454	2.728	3.139
37	1.764	2.175	2.450	2.724	3.135
38	1.759	2.170	2.444	2.719	3.130
39	1.753	2.164	2.438	2.712	3.124
40	1.745	2.157	2.431	2.705	3.117
41	1.737	2.149	2.423	2.697	3.108
42	1.728	2.140	2.414	2.688	3.099
43	1.718	2.130	2.404	2.678	3.090
44	1.708	2.119	2.394	2.668	3.079
45	1.697	2.108	2.382	2.657	3.068
46	1.685	2.096	2.371	2.645	3.056
47	1.673	2.084	2.358	2.633	3.044
48	1.660	2.071	2.346	2.620	3.031
49	1.647	2.058	2.332	2.607	3.018
50	1.633	2.045	2.319	2.593	3.005
51	1.620	2.031	2.305	2.579	2.991
52	1.605	2.017	2.291	2.565	2.977
53	1.591	2.003	2.277	2.551	2.962
54	1.577	1.988	2.263	2.537	2.948
55	1.563	1.974	2.248	2.522	2.934
56	1.548	1.960	2.234	2.508	2.919
57	1.534	1.945	2.219	2.494	2.905
58	1.520	1.931	2.205	2.480	2.891
59	1.506	1.917	2.191	2.466	2.877
60	1.492	1.903	2.178	2.452	2.863
61	1.479	1.890	2.164	2.439	2.850
62	1.466	1.877	2.151	2.426	2.837
63	1.453	1.865	2.139	2.413	2.824
64	1.441	1.853	2.127	2.401	2.812
65	1.430	1.841	2.115	2.390	2.801
66	1.419	1.830	2.104	2.378	2.790
67	1.408	1.819	2.093	2.368	2.779
68	1.397	1.809	2.083	2.357	2.768
69	1.387	1.798	2.072	2.346	2.758
70	1.376	1.787	2.061	2.336	2.747
71	1.365	1.776	2.050	2.324	2.736
72	1.353	1.764	2.039	2.313	2.724
73	1.341	1.752	2.027	2.301	2.712
74	1.328	1.739	2.014	2.288	2.699
75	1.314	1.726	2.000	2.274	2.686
76	1.300	1.711	1.985	2.259	2.671
77	1.284	1.695	1.969	2.244	2.655
78	1.266	1.678	1.952	2.226	2.638
79	1.248	1.659	1.933	2.208	2.619
80	1.227	1.639	1.913	2.187	2.599

Table IV.14

BONE MINERAL DENSITY Z SCORE VALUES OF ARM FOR FEMALE POPULATION

Age	Z SCORE				
	-2.5	-1.0	0.0	1.0	2.5
7	0.346	0.479	0.567	0.655	0.788
8	0.375	0.508	0.596	0.685	0.817
9	0.403	0.536	0.624	0.712	0.845
10	0.429	0.562	0.650	0.739	0.871
11	0.454	0.586	0.675	0.763	0.895
12	0.476	0.609	0.697	0.786	0.918
13	0.498	0.630	0.718	0.807	0.939
14	0.517	0.650	0.738	0.826	0.959
15	0.535	0.667	0.756	0.844	0.977
16	0.551	0.684	0.772	0.860	0.993
17	0.566	0.698	0.787	0.875	1.007
18	0.578	0.711	0.799	0.888	1.020
19	0.590	0.722	0.811	0.899	1.032
20	0.599	0.732	0.820	0.909	1.041
21	0.607	0.740	0.828	0.917	1.049
22	0.614	0.747	0.835	0.924	1.056
23	0.620	0.752	0.841	0.929	1.062
24	0.624	0.757	0.845	0.933	1.066
25	0.628	0.760	0.849	0.937	1.070
26	0.630	0.763	0.851	0.940	1.072
27	0.632	0.765	0.853	0.942	1.074
28	0.634	0.766	0.855	0.943	1.076
29	0.635	0.767	0.856	0.944	1.077
30	0.636	0.768	0.857	0.945	1.077
31	0.636	0.769	0.857	0.945	1.078
32	0.636	0.769	0.857	0.946	1.078
33	0.636	0.769	0.857	0.946	1.078
34	0.636	0.769	0.857	0.945	1.078
35	0.636	0.768	0.857	0.945	1.077
36	0.635	0.767	0.856	0.944	1.077
37	0.634	0.766	0.855	0.943	1.076
38	0.633	0.765	0.853	0.942	1.074
39	0.631	0.764	0.852	0.940	1.073
40	0.629	0.762	0.850	0.939	1.071
41	0.627	0.760	0.848	0.936	1.069
42	0.625	0.758	0.846	0.934	1.067
43	0.622	0.755	0.843	0.932	1.064
44	0.620	0.752	0.841	0.929	1.062
45	0.617	0.749	0.838	0.926	1.059
46	0.613	0.746	0.834	0.923	1.055
47	0.610	0.743	0.831	0.919	1.052
48	0.606	0.739	0.827	0.916	1.048
49	0.602	0.735	0.823	0.912	1.044
50	0.598	0.731	0.819	0.907	1.040
51	0.594	0.726	0.815	0.903	1.036
52	0.589	0.722	0.810	0.898	1.031
53	0.584	0.717	0.805	0.893	1.026
54	0.579	0.712	0.800	0.888	1.021
55	0.574	0.706	0.795	0.883	1.015
56	0.568	0.701	0.789	0.877	1.010
57	0.562	0.695	0.783	0.872	1.004
58	0.556	0.689	0.777	0.865	0.998
59	0.550	0.682	0.771	0.859	0.992
60	0.543	0.676	0.764	0.853	0.985
61	0.537	0.669	0.758	0.846	0.979
62	0.530	0.662	0.751	0.839	0.972
63	0.523	0.655	0.744	0.832	0.964
64	0.515	0.648	0.736	0.825	0.957
65	0.508	0.640	0.729	0.817	0.950
66	0.500	0.633	0.721	0.809	0.942
67	0.492	0.625	0.713	0.802	0.934
68	0.485	0.617	0.706	0.794	0.927
69	0.477	0.610	0.698	0.787	0.919
70	0.470	0.603	0.691	0.779	0.912
71	0.463	0.596	0.684	0.773	0.905
72	0.457	0.590	0.678	0.766	0.899
73	0.452	0.584	0.672	0.761	0.893
74	0.447	0.579	0.667	0.756	0.888
75	0.442	0.575	0.663	0.752	0.884
76	0.439	0.572	0.660	0.748	0.881
77	0.437	0.569	0.658	0.746	0.879
78	0.435	0.568	0.656	0.744	0.877
79	0.433	0.566	0.654	0.742	0.875
80	0.431	0.564	0.652	0.740	0.873

Table IV.15

Bone Mineral Density Z score values of proximal femur for female population

Age	Z SCORE				
	-2.5	-1.0	0.0	1.0	2.5
7	0.588	0.719	0.806	0.893	1.023
8	0.636	0.767	0.854	0.941	1.072
9	0.681	0.812	0.899	0.986	1.117
10	0.723	0.854	0.941	1.028	1.159
11	0.762	0.893	0.980	1.067	1.197
12	0.797	0.928	1.015	1.102	1.233
13	0.829	0.960	1.047	1.134	1.265
14	0.858	0.989	1.076	1.163	1.294
15	0.884	1.014	1.101	1.188	1.319
16	0.906	1.037	1.124	1.211	1.341
17	0.925	1.056	1.143	1.230	1.360
18	0.941	1.071	1.158	1.245	1.376
19	0.953	1.084	1.171	1.258	1.389
20	0.962	1.093	1.180	1.267	1.398
21	0.969	1.099	1.187	1.274	1.404
22	0.973	1.103	1.190	1.277	1.408
23	0.974	1.105	1.192	1.279	1.410
24	0.974	1.105	1.192	1.279	1.409
25	0.972	1.103	1.190	1.277	1.408
26	0.969	1.100	1.187	1.274	1.405
27	0.966	1.096	1.183	1.271	1.401
28	0.962	1.092	1.179	1.266	1.397
29	0.958	1.088	1.175	1.262	1.393
30	0.954	1.084	1.171	1.258	1.389
31	0.950	1.081	1.168	1.255	1.385
32	0.946	1.077	1.164	1.251	1.382
33	0.943	1.074	1.161	1.248	1.379
34	0.940	1.071	1.158	1.245	1.376
35	0.937	1.068	1.155	1.242	1.373
36	0.935	1.065	1.152	1.239	1.370
37	0.932	1.062	1.150	1.237	1.367
38	0.929	1.060	1.147	1.234	1.365
39	0.927	1.057	1.145	1.232	1.362
40	0.924	1.055	1.142	1.229	1.360
41	0.922	1.053	1.140	1.227	1.357
42	0.919	1.050	1.137	1.224	1.355
43	0.917	1.048	1.135	1.222	1.352
44	0.914	1.045	1.132	1.219	1.350
45	0.912	1.042	1.129	1.217	1.347
46	0.909	1.040	1.127	1.214	1.344
47	0.906	1.037	1.124	1.211	1.342
48	0.903	1.034	1.121	1.208	1.339
49	0.900	1.031	1.118	1.205	1.335
50	0.897	1.027	1.114	1.201	1.332
51	0.893	1.024	1.111	1.198	1.328
52	0.889	1.020	1.107	1.194	1.324
53	0.885	1.016	1.103	1.190	1.320
54	0.880	1.011	1.098	1.185	1.316
55	0.876	1.006	1.093	1.180	1.311
56	0.871	1.001	1.088	1.175	1.306
57	0.865	0.996	1.083	1.170	1.300
58	0.859	0.990	1.077	1.164	1.295
59	0.853	0.983	1.071	1.158	1.288
60	0.846	0.977	1.064	1.151	1.281
61	0.839	0.969	1.057	1.144	1.274
62	0.831	0.962	1.049	1.136	1.267
63	0.823	0.953	1.041	1.128	1.258
64	0.814	0.945	1.032	1.119	1.249
65	0.805	0.935	1.022	1.110	1.240
66	0.795	0.926	1.013	1.100	1.230
67	0.785	0.916	1.003	1.090	1.221
68	0.775	0.906	0.993	1.080	1.211
69	0.765	0.896	0.983	1.070	1.201
70	0.756	0.887	0.974	1.061	1.191
71	0.747	0.878	0.965	1.052	1.182
72	0.739	0.869	0.956	1.043	1.174
73	0.731	0.862	0.949	1.036	1.167
74	0.725	0.855	0.943	1.030	1.160
75	0.720	0.850	0.937	1.024	1.155
76	0.716	0.846	0.934	1.021	1.151
77	0.714	0.844	0.931	1.018	1.149
78	0.711	0.842	0.929	1.016	1.147
79	0.709	0.840	0.927	1.014	1.145
80	0.707	0.838	0.925	1.012	1.143

Table IV.16

BONE MINERAL DENSITY Z SCORE VALUES OF TRUNK FOR FEMALE POPULATION

Age	Z SCORE				
	-2.5	-1.0	0.0	1.0	2.5
7	0.446	0.565	0.644	0.724	0.843
8	0.483	0.602	0.682	0.761	0.880
9	0.518	0.638	0.717	0.797	0.916
10	0.551	0.671	0.750	0.830	0.949
11	0.582	0.701	0.781	0.860	0.980
12	0.611	0.730	0.809	0.889	1.008
13	0.637	0.756	0.836	0.915	1.034
14	0.661	0.780	0.860	0.939	1.058
15	0.683	0.802	0.881	0.961	1.080
16	0.702	0.821	0.901	0.980	1.099
17	0.719	0.838	0.918	0.997	1.117
18	0.734	0.853	0.933	1.012	1.132
19	0.747	0.866	0.946	1.025	1.144
20	0.757	0.876	0.956	1.035	1.155
21	0.766	0.885	0.964	1.044	1.163
22	0.772	0.891	0.971	1.050	1.170
23	0.777	0.896	0.976	1.055	1.174
24	0.781	0.900	0.979	1.059	1.178
25	0.783	0.902	0.981	1.061	1.180
26	0.784	0.903	0.983	1.062	1.181
27	0.784	0.904	0.983	1.063	1.182
28	0.784	0.903	0.983	1.062	1.182
29	0.784	0.903	0.982	1.062	1.181
30	0.783	0.902	0.982	1.061	1.180
31	0.782	0.901	0.981	1.060	1.179
32	0.781	0.900	0.980	1.059	1.178
33	0.780	0.899	0.978	1.058	1.177
34	0.778	0.897	0.977	1.056	1.175
35	0.776	0.896	0.975	1.055	1.174
36	0.775	0.894	0.973	1.053	1.172
37	0.773	0.892	0.971	1.051	1.170
38	0.771	0.890	0.969	1.049	1.168
39	0.768	0.887	0.967	1.046	1.166
40	0.766	0.885	0.964	1.044	1.163
41	0.763	0.882	0.962	1.041	1.161
42	0.760	0.880	0.959	1.039	1.158
43	0.757	0.877	0.956	1.036	1.155
44	0.754	0.874	0.953	1.032	1.152
45	0.751	0.870	0.950	1.029	1.148
46	0.748	0.867	0.946	1.026	1.145
47	0.744	0.863	0.943	1.022	1.141
48	0.740	0.860	0.939	1.019	1.138
49	0.737	0.856	0.935	1.015	1.134
50	0.733	0.852	0.931	1.011	1.130
51	0.728	0.848	0.927	1.007	1.126
52	0.724	0.843	0.923	1.002	1.121
53	0.720	0.839	0.918	0.998	1.117
54	0.715	0.834	0.914	0.993	1.112
55	0.710	0.830	0.909	0.989	1.108
56	0.706	0.825	0.904	0.984	1.103
57	0.701	0.820	0.899	0.979	1.098
58	0.695	0.815	0.894	0.974	1.093
59	0.690	0.809	0.889	0.968	1.088
60	0.685	0.804	0.884	0.963	1.082
61	0.679	0.799	0.878	0.957	1.077
62	0.674	0.793	0.872	0.952	1.071
63	0.668	0.787	0.867	0.946	1.065
64	0.662	0.781	0.861	0.940	1.059
65	0.656	0.775	0.855	0.934	1.053
66	0.650	0.769	0.849	0.928	1.047
67	0.644	0.763	0.843	0.922	1.041
68	0.638	0.757	0.837	0.916	1.035
69	0.632	0.751	0.831	0.910	1.029
70	0.626	0.745	0.825	0.904	1.023
71	0.620	0.740	0.819	0.899	1.018
72	0.615	0.734	0.814	0.893	1.012
73	0.610	0.729	0.809	0.888	1.007
74	0.605	0.724	0.804	0.883	1.002
75	0.601	0.720	0.799	0.879	0.998
76	0.597	0.716	0.795	0.875	0.994
77	0.593	0.712	0.792	0.871	0.991
78	0.590	0.710	0.789	0.868	0.988
79	0.588	0.707	0.787	0.866	0.985
80	0.586	0.706	0.785	0.865	0.984

Table IV.17

Bone Mineral Density Z score values of ribs for female population

Age	Z SCORE				
	-2.5	-1.0	0.0	1.0	2.5
7	0.400	0.492	0.553	0.614	0.706
8	0.423	0.515	0.576	0.637	0.729
9	0.444	0.536	0.598	0.659	0.751
10	0.465	0.556	0.618	0.679	0.771
11	0.483	0.575	0.636	0.698	0.790
12	0.500	0.592	0.654	0.715	0.807
13	0.516	0.608	0.669	0.730	0.822
14	0.530	0.622	0.683	0.745	0.837
15	0.543	0.635	0.696	0.757	0.849
16	0.554	0.646	0.707	0.768	0.860
17	0.564	0.656	0.717	0.778	0.870
18	0.572	0.664	0.725	0.786	0.878
19	0.578	0.670	0.732	0.793	0.885
20	0.584	0.676	0.737	0.798	0.890
21	0.588	0.680	0.741	0.802	0.894
22	0.590	0.682	0.744	0.805	0.897
23	0.592	0.684	0.745	0.806	0.898
24	0.593	0.685	0.746	0.807	0.899
25	0.593	0.685	0.746	0.807	0.899
26	0.592	0.684	0.745	0.807	0.899
27	0.591	0.683	0.744	0.806	0.898
28	0.590	0.682	0.743	0.804	0.896
29	0.589	0.681	0.742	0.803	0.895
30	0.587	0.679	0.740	0.802	0.894
31	0.586	0.678	0.739	0.800	0.892
32	0.584	0.676	0.738	0.799	0.891
33	0.583	0.675	0.736	0.798	0.889
34	0.582	0.674	0.735	0.796	0.888
35	0.580	0.672	0.734	0.795	0.887
36	0.579	0.671	0.732	0.793	0.885
37	0.578	0.669	0.731	0.792	0.884
38	0.576	0.668	0.729	0.791	0.883
39	0.575	0.667	0.728	0.789	0.881
40	0.573	0.665	0.726	0.788	0.880
41	0.572	0.664	0.725	0.786	0.878
42	0.570	0.662	0.723	0.785	0.877
43	0.568	0.660	0.722	0.783	0.875
44	0.567	0.659	0.720	0.781	0.873
45	0.565	0.657	0.718	0.780	0.872
46	0.563	0.655	0.717	0.778	0.870
47	0.562	0.653	0.715	0.776	0.868
48	0.560	0.652	0.713	0.774	0.866
49	0.558	0.650	0.711	0.772	0.864
50	0.556	0.648	0.709	0.770	0.862
51	0.553	0.645	0.707	0.768	0.860
52	0.551	0.643	0.704	0.766	0.858
53	0.549	0.641	0.702	0.763	0.855
54	0.546	0.638	0.700	0.761	0.853
55	0.544	0.636	0.697	0.758	0.850
56	0.541	0.633	0.694	0.756	0.848
57	0.538	0.630	0.692	0.753	0.845
58	0.536	0.627	0.689	0.750	0.842
59	0.532	0.624	0.686	0.747	0.839
60	0.529	0.621	0.683	0.744	0.836
61	0.526	0.618	0.679	0.741	0.832
62	0.523	0.615	0.676	0.737	0.829
63	0.519	0.611	0.672	0.733	0.825
64	0.515	0.607	0.668	0.730	0.822
65	0.511	0.603	0.665	0.726	0.818
66	0.507	0.599	0.661	0.722	0.814
67	0.503	0.595	0.656	0.718	0.810
68	0.499	0.591	0.652	0.713	0.805
69	0.494	0.586	0.648	0.709	0.801
70	0.490	0.582	0.643	0.705	0.796
71	0.485	0.577	0.639	0.700	0.792
72	0.481	0.573	0.634	0.695	0.787
73	0.476	0.568	0.629	0.691	0.783
74	0.471	0.563	0.625	0.686	0.778
75	0.467	0.559	0.620	0.681	0.773
76	0.462	0.554	0.615	0.677	0.769
77	0.457	0.549	0.611	0.672	0.764
78	0.453	0.545	0.606	0.667	0.759
79	0.448	0.540	0.601	0.663	0.755
80	0.443	0.535	0.597	0.658	0.750

Table IV.18

BONE MINERAL DENSITY Z SCORE VALUES OF PELVIS FOR FEMALE POPULATION

Age	Z SCORE				
	-2.5	-1.0	0.0	1.0	2.5
7	0.476	0.636	0.742	0.849	1.009
8	0.523	0.683	0.790	0.897	1.057
9	0.568	0.728	0.835	0.942	1.102
10	0.610	0.770	0.877	0.983	1.144
11	0.649	0.809	0.916	1.022	1.182
12	0.685	0.845	0.952	1.058	1.218
13	0.718	0.878	0.985	1.091	1.251
14	0.748	0.908	1.015	1.121	1.281
15	0.775	0.935	1.042	1.148	1.309
16	0.799	0.959	1.066	1.173	1.333
17	0.820	0.980	1.087	1.194	1.354
18	0.839	0.999	1.105	1.212	1.372
19	0.854	1.014	1.121	1.227	1.388
20	0.866	1.026	1.133	1.240	1.400
21	0.876	1.036	1.143	1.250	1.410
22	0.883	1.044	1.150	1.257	1.417
23	0.889	1.049	1.156	1.262	1.422
24	0.892	1.052	1.159	1.266	1.426
25	0.894	1.054	1.161	1.268	1.428
26	0.895	1.055	1.162	1.268	1.429
27	0.895	1.055	1.161	1.268	1.428
28	0.894	1.054	1.161	1.267	1.427
29	0.892	1.052	1.159	1.266	1.426
30	0.891	1.051	1.158	1.265	1.425
31	0.889	1.049	1.156	1.263	1.423
32	0.888	1.048	1.155	1.261	1.421
33	0.886	1.046	1.153	1.259	1.420
34	0.884	1.044	1.151	1.257	1.418
35	0.882	1.042	1.149	1.255	1.416
36	0.880	1.040	1.146	1.253	1.413
37	0.877	1.037	1.144	1.251	1.411
38	0.875	1.035	1.142	1.248	1.409
39	0.872	1.032	1.139	1.246	1.406
40	0.869	1.029	1.136	1.243	1.403
41	0.866	1.027	1.133	1.240	1.400
42	0.863	1.023	1.130	1.237	1.397
43	0.860	1.020	1.127	1.234	1.394
44	0.857	1.017	1.123	1.230	1.390
45	0.853	1.013	1.120	1.226	1.387
46	0.849	1.009	1.116	1.223	1.383
47	0.845	1.005	1.112	1.219	1.379
48	0.841	1.001	1.108	1.214	1.374
49	0.836	0.996	1.103	1.210	1.370
50	0.832	0.992	1.099	1.205	1.365
51	0.827	0.987	1.094	1.201	1.361
52	0.822	0.982	1.089	1.195	1.356
53	0.817	0.977	1.083	1.190	1.350
54	0.811	0.971	1.078	1.185	1.345
55	0.805	0.965	1.072	1.179	1.339
56	0.799	0.960	1.066	1.173	1.333
57	0.793	0.953	1.060	1.167	1.327
58	0.787	0.947	1.054	1.160	1.320
59	0.780	0.940	1.047	1.154	1.314
60	0.773	0.933	1.040	1.147	1.307
61	0.766	0.926	1.033	1.140	1.300
62	0.758	0.919	1.025	1.132	1.292
63	0.751	0.911	1.018	1.124	1.284
64	0.743	0.903	1.010	1.116	1.276
65	0.734	0.895	1.001	1.108	1.268
66	0.726	0.886	0.993	1.100	1.260
67	0.717	0.878	0.984	1.091	1.251
68	0.709	0.869	0.976	1.082	1.243
69	0.700	0.861	0.967	1.074	1.234
70	0.692	0.852	0.959	1.066	1.226
71	0.684	0.844	0.951	1.058	1.218
72	0.677	0.837	0.944	1.050	1.210
73	0.670	0.830	0.937	1.043	1.203
74	0.663	0.823	0.930	1.037	1.197
75	0.658	0.818	0.924	1.031	1.191
76	0.653	0.813	0.919	1.026	1.186
77	0.649	0.809	0.915	1.022	1.182
78	0.645	0.806	0.912	1.019	1.179
79	0.643	0.803	0.910	1.017	1.177
80	0.641	0.801	0.908	1.015	1.175

References

1. Zingmond DS, Melton III LJ, Silverman SL. Increasing hip fracture incidence in California Hispanics; 1983 to 2000. Osteoporos Int 2004;15:603–610.
2. Chang KP, Center JR, Nguyen TV, Eisman JA. Incidence of hip and other osteoporotic fractures in elderly men and women: Dubbo osteoporosis epidemiology study. Journal Bone and Min Res 2004;19.
3. Eisman J, Clapham S, Kehoe L. Osteoporosis prevalence and levels of treatment in primary care: the australian bone care study. J Bone Miner Res 2004;19:1969-1975.
4. Siris ES, Brenneman SK, Miller PD, Barrett-Connor E, Chen YT, Sherwood LM, *et al*. Predictive value of low BMD for 1-year fracture outcomes is similar for postmenopausal women ages 50–64 and 65 and older: results from the National Osteoporosis Risk Assessment (NORA). J Bone Miner Res 2004;19:1215-1220.
5. Barrett-Connor E, Siris ES, Wehren LE, Miller PD, Abbott TA, Berger ML, *et al*. Osteoporosis and fracture risk in women of different ethnic groups. J Bone Miner Res 2005;20:185-194.
6. Nevitt MC, Cummings SR, Stone KL, Palermo L, Black DM, Bauer DC, *et al*. Risk factors for a first-incident radiographic vertebral fracture in women > 65 Years of Age: the study of osteoporotic fractures. J Bone Miner Res 2005;20:131-140.
7. Velasco-Murillo V. Fracturas en mujeres posmenopáusicas en el IMSS: frecuencia y costos de su atención hospitalaria. Gac Méd Méx. 2003;139:453-458.
8. Morales Torres J, Hernández Ochoa C, Hernández Paz R, Hernández Morales G. Fracturas de cadera en egresos de hospitales de León, Gto. un indicador econométrico de osteoporosis. Rev Mex Reumat. 1997;12:119–124.
9. Gómez García F. Morbimortalidad de fracturas de cadera en el hospital de traumatología magdalena de las salinas, IMSS. Rev Mex Ortop Traum 1998;2:48-52.
10. Clark P, de la Peña F, Gomez-Garcia F, Orozco JA, Tugwell P. Risk factors for osteoporotic hip fractures in mexicans. Arch Med Res 1998;29:253-257.
11. Espino DV, Palmer RF, Miles TP *et al*. Prevalence, incidence, and risk factors associated with hip fractures in community-dwelling older Mexican Americans: results of the Hispanic EPESE study. Establish Population for the Epidemiologic Study for the Elderly. J Am Geriatr Soc 2000;48:1252-126.
12. Clark P, Lavielle P, Salmerón J Y, Cummings S. Tasas de incidencia de fracturas de cadera en población mexicana mayor de 50 años (abstract). Rev Metab Oseo Min. 2003;1:41.
13. Clark P, Delezé M, Cons-Molina F, Salmerón J, Palermo L, Cummings SR, *et al*. Prevalencia de fracturas vertebrales en población Mexicana (abstract). Rev Metab Oseo Min. 2003;1:41.
14. Kanis JA for the WHO Study Group (1994) Assessment of fracture risk and its application to screening for postmenopausal osteoporosis: Synopsis of a WHO report. Osteoporos Int 4:368-381.
15.-The Writing Group for the ISCD Position Development Conference. Nomenclature and Decimal Places in Bone Densitometry (2004) JClin Densit, 7: 45-49.
16. Leib ES, Lewiecki EM, Binkley N, Hamdy RC. Official Positions of the International Society for Clinical Densitometry. JClin Densit. 2004;7:1-5.
17. Melton III LJ, Chrischilles EA, Cooper C, Lane AW, Riggs BL. How Many Women Have Osteoporosis?. J Bone Min Res. 1992;7:1005-1010.
18. Arzac P, Tamayo J. How many women have osteoporosis in medica sur osteoporosis clinic. J Bone Miner Res. 1996;11:S361.
19. Melton III LJ, Beck TJ, Amin S, Khosla S, Achenbach SJ, Oberg AL, Riggs BL. Contributions of bone density and structure to fracture risk assessment in men and women. Osteoporos Int. 2005;16:460-467.
20. Heaney RP, Abrams S, Dawson-Hughes B, Looker A, Marcus R, Matkovic V, Weaver C. Peak bone mass. Osteoporosis Int. 2000;11:985-1009.
21. Chevalley T, Rizzoli R, Hans D, Ferrari S, Bonjour JP. Interaction between calcium intake and menarcheal age on bone mass gain: an eight-year follow-up study from prepuberty to postmenarche. J Clin Endocrinol Metab. 2005;90:44-51.
22. Richy F, Ethgen O, Bruyere O, Mawet A, Reginster JY. Primary prevention of osteoporosis: mass screening scenario or prescreening with questionnaires? an economic perspective. J Bone Min Res. 2004;19:1955-1960.
23. Kanis JA., Johnell O. Requirements for DXA for the management of osteoporosis in Europe Osteoporos Int. 2005;16:229-238.
24. Gourlay ML, Miller WC, Richy F, Garrett JM, Hanson LC, Reginster JY. Performance of osteoporosis risk assessment tools in postmenopausal women aged 45–64 years. Osteoporos Int. 2005;16:921-927.
25. Cummings,S.R. Bone Density Screening: A New Level of Evidence?. Ann Intern Med. 2005;142:217-219.
26. Raisz L. Screening for Osteoporosis. New Eng J Med. 2005;353:164-171.
27. Owner's Manual, LUNAR Corp.
28. Lazcano-Ponce E, Tamayo J, Cruz-Valdez A, Díaz R, Hernández B, Del Cueto R, Hernández-Avila M. Peak bone mineral area density and determinants among females aged 9 to 24 years in Mexico. Osteoporos Int. 2003;14: 539-547.
29. Delezé M, Cons-Molina F, Villa AR, Morales-Torres J, *et al*. Geographic Differences in Bone Mineral Density of Mexican Women. Osteoporos Int. 2000;11:562-569.
30. Morales-Torres J, Gutiérrez-Ureña S. The burden of osteoporosis in Latin America. Osteoporos Int. 2004;15:625-632.
31. Johnell O, Kanis JA. An estimate of the worldwide prevalence, mortality and disability associated with hip fracture. Osteoporos Int. 2004;15:897-902.
32. Melton III LJ, Johnell O, Lau E, Mautalen CA, Seeman E. Osteoporosis and the Global Competition for Health Care Resources. J Bone Miner Res. 2004;19:1055-1058.
33. Binkley N, Kiebzak GM, Lewiecki EM, Krueger D, Gangnon RE, Miller PD, *et al*. Recalculation of the NHANES database SD improves T-score agreement and reduces osteoporosis prevalence. J Bone Miner Res. 2005;20:195-201.
34. Api M. Letter to the Editor, Are We Treating Women with Postmenopausal Osteoporosis for their low BMD or high fracture risk? J Bone Miner Res. 2005;20:1480-1481.
35. Hui SL, Slemenda CW, Johnston Jr CC, *et al*. Age and bone mass as predictors of fracture in a prospective study. J Clin Invest. 1988;81:1804-1809.
36. Lindsay R, Pack S, Li Z. Longitudinal progression of fracture prevalence through a population of postmenopausal women with osteoporosis. Osteoporos Int. 2005;16:306-312.
37. Porias H, Morales Torres J, *et al*. Consenso Mexicano de Osteoporosis. Rev Metab Oseo Min. 2003;1:1-24.
38. Reza Albarran AA, Vergara López A, Mendoza Zubieta V, Martínez Sobaja C, Zúñiga González S, Porias Cuellar HL, Arechavaleta Granell R. Osteoporosis, Posición de la Sociedad Mexicana de Nutrición y Endocrinología. Rev Endoc y Nutr. 2004;12:123-163.

Appendix

Table A.1

COMPARISON FOR L2-L4 BETWEEN THE DELEZE, CONS *ET AL*. CLASSIFICATION USING THE MANUFACTURER'S REFERENCE VALUES AND OUR MEXICAN DATABASE USING T-SCORES CALCULATED WITH DATA FOR AGES 20-39, 30-40 OR PBM

			Groups according to Mexican data base			*Total*
			Normal	*Osteopenia*	*Osteoporosis*	
Groups according to Deleze, Cons *et al.*	Normal	Count	1 930	163	0	2 093
		% of total	45.1%	3.8%	0.0%	48.9%
	Osteopenia	Count	103	1 361	152	1 616
		% of total	2.4%	31.8%	3.6%	37.8%
	Osteoporosis	Count	0	86	484	570
		% of total	0.0%	2.0%	11.3%	13.3%
Total		Count	2 033	1 610	636	4 279
		% of total	47.5%	37.6%	14.9%	100.0%

Table A.2

STATISTICAL ANALYSIS FOR L2-L4

	Percentage		*Percentage of differences*	*Exact probability*	*Significance of differences*
	Deleze Cons et al	*Mexican*			
Normal	48.9%	47.5%	1.2981	0.0971	Not significant
Osteopenia	37.8%	37.6%	0.1338	0.4468	Not significant
Osteoporosis	13.3%	14.9%	-2.0510	0.0201	Significant

Table A.3

COMPARISON OF CLASSIFICATION OF FEMORAL NECK DENSITY BETWEEN THE DELEZE, CONS *ET AL*. CLASSIFICATION USING THE MANUFACTURER'S REFERENCE VALUES AND OUR MEXICAN DATABASE USING T-SCORES CALCULATED FOR AGES 20-39, 30-40 OR PBM

			Groups according to Mexican data base			*Total*
			Normal	*Osteopenia*	*Osteoporosis*	*Normal*
Groups according to Deleze Cons *et.al.*	Normal	Count	1 600	651	0	2 251
		% of total	36.8%	15.0%	.0%	51.8%
	Osteopenia	Count	0	1 428	326	1 754
		% of total	.0%	32.8%	7.5%	40.3%
	Osteoporosis	Count	0	0	343	343
		% of total	.0%	.0%	7.9%	7.9%
Total		Count	1 600	2 079	669	4 348
		% of total	36.8%	47.8%	15.4%	100.0%

Table A.4

STATISTICAL ANALYSIS FOR FEMORAL NECK

	Percentage		*Percentage of differences*	*Exact probability*	*Significance of differences*
Group	*Deleze Cons et al*	*Mexican*			
Normal	51.8	36.8	14.1218	0.0000	Significant
Osteopenia	40.3	47.8	-7.0043	0.0000	Significant
Osteoporosis	7.9	15.4	-10.8836	0.0000	Significant