

THE PREVALENCE OF HYPERTENSION IN DIFFERENT GEOGRAPHICAL REGIONS OF SAUDI ARABIA

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Background: The results of the National Nutrition Survey of the people of the Kingdom of Saudi Arabia showed that the prevalence of arterial hypertension (BP \geq 160/95 mm Hg) among the adult population is 5.3% and 7.3% for systolic and diastolic hypertension, respectively. The objective of this study, which is part of the Survey, was to investigate if the diversified ecological nature of the life of the people of the Kingdom has an effect on the prevalence of arterial hypertension in adult population in the different geographical regions of the Kingdom.

Materials and Methods: The Survey was population-based, employing cluster sampling methods and household visits by health teams trained by the same investigators to avoid individual variations and ensure data validity. 2556 families with 17,892 individuals of all ages were randomly selected from 12 areas according to the population distribution all over the Kingdom. The total number examined for BP with complete data amounted to 13,700 individuals, of whom 6260 were adults (over 18 years of age). The WHO definition of arterial hypertension was used. Also used was the definition of 140/90 mm Hg.

Results: Systolic blood pressure hypertension (SBPH) showed a statistically significant difference ($P<0.001$) among the regions. The highest prevalence was found in Farasan (8.9%) and the lowest was reported from Asir (2.2%). There was a higher prevalence among females compared to males in the 40-75-year age group in all regions, except in the highlands of Al Taif and Asir. However, the difference was not statistically significant except in Makkah (25.9%, $P<0.001$) and Al Sharkia (22%, $P<0.03$). Diastolic blood pressure hypertension (DBPH) prevalence increased with age in all regions, except in males of Farasan, Makkah, and in females of Asir. The difference in the prevalence between regions was statistically significant ($P<0.001$). The highest DBPH prevalence (sexes combined) was reported from Al Qassim (10.6%) and the lowest from Makkah (4.2%). Using the definition of hypertension as \geq 140/90 mm Hg, the highest SBPH prevalence was reported from Makkah (sexes combined) (27.9%), while the lowest was found in Jeddah (14.9%). The highest prevalence of DBPH was reported from Al Taif (36.2%) and the lowest from Makkah and Asir (22% each). The prevalence of SBPH and DBPH was insignificantly higher among females than males in eight and seven of the 12 regions, respectively.

Conclusion: There is a statistically significant difference in the prevalence of SBPH and DBPH in the different regions of the Kingdom ($P<0.001$). The prevalence pattern tends to be fairly similar to that found in the affluent societies in the Western countries.

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Hypertension and other related complications are recognized as emerging clinical and public health problems in Saudi Arabia. Several recent reports have shown an increasing bed occupancy in hospitals from angina, myocardial infarction, nephropathy and stroke.¹⁻⁴ The emergence in Saudi Arabia of a pattern of chronic diseases similar to that of affluent societies, such as

coronary heart diseases, hypertension, stroke, diabetes mellitus and malignant diseases, has caused a lot of concern among health providers and policy makers. Lifestyle and dietary factors have been incriminated worldwide as being contributory factors of some of these diseases. The Kingdom has witnessed dramatic changes in these aspects during the last three decades that followed the economical development in the country.

The results of the National Nutrition Survey, which was carried out during the period 1989-1994, showed that the prevalence of hypertension among the population of the Kingdom, using the WHO definition of hypertension (BP 160/95 mm Hg),⁵ is 9.1% and 8.7%, for systolic and diastolic hypertension, respectively.⁶

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TABLE 1. Systolic blood pressure (SBP) by age, sex and region (³160 mm Hg).

Age group (yrs)	Makkah		Riyadh		Al Sharkia		Al Qassim		Tabouk		Al Taif	
	No.	No. ≥160	No.	No. ≥160	No.	No. ≥160	No.	No. ≥160	No.	No. ≥160	No.	No. ≥160
18-29												
Male	75	0	200	0	71	2 (2.8%)	64	0	34	0	101	0
Female	134	5 (3.7%)	388	1 (0.3%)	130	2 (1.5%)	127	1 (0.8%)	61	0	151	1 (0.7%)
30-39												
Male	56	0	140	0	47	1 (2.1%)	45	0	25	0	61	1 (1.6%)
Female	89	6 (6.7%)	152	0	88	1 (1.1%)	56	1 (1.8%)	36	2 (5.6%)	95	5 (5.3%)
40-75												
Male	88	0	197	33 (16.7%)	95	9 (9.5%)	64	11 (17.2%)	49	6 (12.4%)	125	24 (19.2%)
Female	77	20 (25.9%)	183	34 (18.6%)	50	11 (22%)	47	11 (23.4%)	30	2 (20%)	113	19 (16.8%)
<i>P</i> -value (M vs. F)		0.001		NS		0.03		NS		NS		NS
Total												
Male	219	0	537	33 (6.2%)	213	12 (5.6%)	173	11 (6.4%)	108	6 (5.6%)	287	25 (8.7%)
Female	300	31 (10.3%)	723	35 (4.8%)	268	14 (5.2%)	230	13 (5.7%)	127	8 (6.3%)	359	25 (6.9%)
<i>P</i> -value		0.001		NS		0.001		NS		NS		NS
Total (M + F)	519	31 (5.9%)	1260	68 (5.4%)	481	26 (5.4%)	403	24 (5.9%)	235	14 (5.9%)	646	50 (7.7%)
<i>P</i> -value (by age)		0.01		0.001		0.01		0.001		0.01		0.001

Difference among regions is $P < 0.001$; NS=not significant.

TABLE 2. Systolic blood pressure (SBP) by age, sex and region (³160 mm Hg).

Age group (yrs)	Al Madinah		Asir		Farasan		Hail		Jeddah		Jizan	
	No.	No. ≥160	No.	No. ≥160	No.	No. ≥160	No.	No. ≥160	No.	No. ≥160	No.	No. ≥160
18-29												
Male	81	0	128	1 (0.80%)	7	0	36	0	26	1 (3.8%)	71	0
Female	157	0	212	0	10	0	101	0	111	2 (1.8%)	94	0
30-39												
Male	50	0	77	2 (2.6%)	8	0	29	0	25	0	56	2 (3.6%)
Female	76	0	116	1 (0.9%)	16	0	53	1 (1.9%)	88	1 (1.1%)	55	1 (1.8%)
40-75												
Male	123	13 (10.5%)	203	10 (4.9%)	16	1 (6.3%)	77	12 (15.6%)	39	5 (12.8%)	82	7 (8.5%)
Female	97	13 (13.4%)	170	6 (3.5%)	10	5 (50%)	69	13 (18.8%)	67	9 (13.4%)	77	9 (11.7%)
<i>P</i> -value (M vs. F)		NS		NS		0.01		NS		NS		NS
Total												
Male	254	13 (5.1%)	408	13 (3.2%)	31	1 (3.2%)	142	12 (8.5%)	90	6 (6.7%)	209	9 (4.3%)
Female	330	13 (3.9%)	498	7 (1.4%)	36	5 (13.9%)	223	14 (6.3%)	266	12 (4.5%)	226	10 (4.4%)
<i>P</i> -value		NS		NS		NS		0.001		NS		NS
Total (M + F)	584	26 (4.5%)	906	20 (2.2%)	67	6 (8.9%)	365	26 (7.1%)	356	18 (5.1%)	435	19 (4.4%)
<i>P</i> -value (by age)		0.001		0.01		0.01		0.001		0.001		0.001

Difference among regions is $P < 0.001$; NS=not significant.

A few studies have reported the prevalence of hypertension, mostly in urban areas of the Kingdom, with rates ranging from 2.4% to 15.4%. These differences are due to the selection of target study groups in relation to gender, age, and other criteria used for the definition of hypertension.⁶⁻¹²

The Kingdom of Saudi Arabia has a diverse geographical distribution of inhabitants, ranging from dwellers of inland desert to coastal and mountainous regions, with populations of different ethnic origin and food habits. One of the objectives of this study was to determine the prevalence of hypertension in each of the regions of the Kingdom.

Materials and Methods

The study is part of a National Nutrition Survey of the people of the Kingdom of Saudi Arabia.¹³ Cluster

sampling technique was used to select the study sample, ensuring representation of rural and urban areas. The sample was estimated to be 17,892 individuals of all ages. Taking the average Saudi family size to be seven individuals, this gives a sample of 2556 families. The families representing the sample were chosen from each of the 12 study regions, according to the percentage distribution of the population all over the Kingdom. The data was collected by health teams who were trained by the same investigators in all regions. Household visits were arranged in advance and people were informed about the objectives of the survey.

The information collected consisted of anthropometric, clinical, biochemical and dietary components. The total number examined for BP with complete data amounted to 13,700 individuals of both sexes among all age groups, of whom 6260 were adults (above 18 years of age).

For adults, a hypertensive case was defined as one with

TABLE 3. Diastolic blood pressure (DBP) by age, sex and region (≥ 95 mm Hg).

Age group (yrs)	Makkah		Riyadh		Al Sharkia		Al Qassim		Tabouk		Al Taif	
	No.	No. ≥ 95	No.	No. ≥ 95	No.	No. ≥ 95	No.	No. ≥ 95	No.	No. ≥ 95	No.	No. ≥ 95
18-29												
Male	75	2 (2.7%)	198	2 (1%)	70	3 (4.3%)	64	1 (1.6%)	34	0	101	1 (1%)
Female	134	1 (1.8%)	384	3 (0.8%)	129	2 (1.6%)	126	4 (3.2%)	61	2 (3.3%)	151	0
30-39												
Male	56	0	139	2 (1.4%)	4	1 (2.1%)	45	3 (6.7%)	24	0	61	3 (4.9%)
Female	89	1 (1.1%)	152	2 (1.3%)	88	6 (6.8%)	56	5 (8.9%)	36	5 (13.9%)	95	3 (3.2%)
40-75												
Male	88	14	196	32	95	10	64	12 (18.8%)	49	4 (8.2%)	125	30 (24%)
Female	77	(15.9%)	182	(16.3%)	50	(10.5%)	48	13 (27.1%)	30	12 (40%)	113	26 (23%)
<i>P</i> -value (M vs. F)		4 (5.2%)		39		13 (26%)		NS		0.001		NS
		0.02		(21.4%)		0.01						
				NS								
Total												
Male	219	16 (7.3%)	533	36 (6.8%)	212	14 (6.6%)	173	16 (9.3%)	107	4 (3.7%)	287	34 (11.9%)
Female	300	6 (2%)	718	44 (6.1%)	267	21 (7.9%)	230	22 (9.6%)	127	19 (14.9%)	359	29 (8%)
<i>P</i> -value		0.003		NS		NS		NS		0.004		NS
Total (M + F)	519	22 (4.2%)	1250	80 (6.4%)	479	35 (7.3%)	403	38 (10.6%)	234	23 (9.8%)	646	63 (9.7%)
<i>P</i> -value (by age)		0.01		0.001		0.001		0.001		0.001		0.001

Difference among regions is $P < 0.001$; NS=not significant.

TABLE 4. Diastolic blood pressure (DBP) by age, sex and region (≥ 95 mm Hg).

Age group (yrs)	Al Madinah		Asir		Farasan		Hail		Jeddah		Jizan	
	No.	No. ≥ 95	No.	No. ≥ 95	No.	No. ≥ 95	No.	No. ≥ 95	No.	No. ≥ 95	No.	No. ≥ 95
18-29												
Male	81	0	128	4 (3.1%)	7	0	36	0	26	1 (3.9%)	71	0
Female	157	1 (0.6%)	212	9 (4.3%)	10	0	101	0	111	2 (1.8%)	94	2 (2.1%)
30-39												
Male	50	1 (2%)	77	7 (9.1%)	8	1 (12%)	29	1 (3.5%)	25	2 (8%)	56	2 (3.6%)
Female	76	1 (1.3%)	116	2 (1.7%)	16	2 (12.5%)	53	5 (9.4%)	88	4 (4.6%)	55	0
40-75												
Male	123	21 (17%)	203	23 (11.3%)	16	1 (6.3%)	77	13 (16.9%)	39	11	82	11
Female	98	14	170	20 (11.7%)	10	2 (20%)	69	11 (15.9%)	67	(28.2%)	77	(13.4%)
<i>P</i> -value (M vs. F)		(14.3%)		NS		NS		NS		16		12
		0.02								(23.9%)		(15.6%)
										NS		NS
Total												
Male	254	22 (8.7%)	408	34 (8.3%)	31	2 (6.6%)	142	14 (9.9%)	90	14	209	13 (6.2%)
Female	331	16 (4.8%)	499	24 (4.8%)	36	4 (11.1%)	223	16 (7.2%)	266	(15.6%)	226	14 (6.2%)
<i>P</i> -value		NS		0.03		NS		NS		0.04		NS
Total (M + F)	585	38 (6.5%)	907	58 (6.4%)	67	6 (8.9%)	365	30 (8.2%)	356	36	435	27 (6.2%)
<i>P</i> -value (by age)		0.001		0.01		0.01		0.001		0.001		0.001
										(10.1%)		

Difference among regions is $P < 0.001$; NS=not significant.

DBP ≥ 95 mm Hg and SBP ≥ 160 mm Hg, or a patient with established hypertension who is receiving medication. The definition of BPH $\geq 140/90$ mm Hg was used as well, for ease of comparison with other studies that use this definition.

BP was measured by primary health care physicians who had had prior extensive training. Cross-check quality control procedures were employed to ensure validity of the results all over the country.

In systolic BP measurement, the first Kortokoff phase (K1) was defined as the appearance of two consecutive beats. For diastolic BP the fifth K5 was defined as the last beat before the disappearance of the sound.

The study subjects were seated and the right arm was laid on the table top. The appropriate cuff size was used. A standard sphygmomanometer was used to determine the pressure necessary to obliterate the radial pulse. BP was measured to the nearest even number. Three BPs were measured with a minimum of 30 seconds' rest between each determination, and values were used for calculation of the mean BP. Chi-squared test was exploited for frequency comparison in this study, using SAS package. $P < 0.05$ was considered statistically significant.

Results

Tables 1 and 2 show the prevalence of systolic BP among the population of the different regions by sex and age. Taif males showed the highest prevalence of systolic hypertension (8.7%), followed by Hail (8.5%), while the lowest prevalence was recorded in Makkah, where males

showed no SPB above 160 mm Hg, followed by Farasan and Asir (3.2% each), and Jizan (4.3%).

The highest SBP prevalence among females was reported from Makkah (10.3%), followed by Al-Taif (6.9%) and Tabouk (6.3%). The lowest prevalence was

TABLE 5. Systolic blood pressure (SBP) by age, sex and region (≥ 140 mm Hg).

Age group (yrs)	Makkah		Riyadh		Al Sharkia		Al Qassim		Tabouk		Al Taif	
	No.	No. ≥ 140	No.	No. ≥ 140	No.	No. ≥ 140	No.	No. ≥ 140	No.	No. ≥ 140	No.	No. ≥ 140
18-29												
Male	75	4 (5.3%)	200	9 (4.5%)	71	7 (9.9%)	64	4 (6.3%)	1	1 (2.9%)	101	5 (4.9%)
Female	134	37 (27.6%)	388	14 (3.6%)	130	3 (2.3%)	127	6 (4.7%)	61	4 (6.6%)	151	8 (5.3%)
30-39												
Male	56	4 (7.1%)	140	6 (4.3%)	47	5 (10.6%)	45	7 (15.6%)	25	3 (12%)	61	9 (14.8%)
Female	89	29 (32.6%)	152	14 (9.2%)	88	7 (7.9%)	56	8 (14.3%)	36	8 (22.2%)	95	11 (11.6%)
40-75												
Male	88	26 (29.6%)	197	88 (44.7%)	95	50 (52.6%)	64	32 (50%)	49	23 (46.9%)	125	73 (58.4%)
Female	77	45 (58.4%)	183	97 (53%)	50	23 (46%)	47	26 (55.3%)	30	15 (50%)	113	52 (40.6%)
P-value (M vs. F)		0.001		NS		0.001		NS		NS		0.05
Total												
Male	219	34 (15.5%)	537	103 (19.2%)	213	62 (29.1%)	173	43 (24.9%)	108	27 (25%)	287	87 (30.3%)
Female	300	111 (37%)	723	125 (17.3%)	268	33 (12.3%)	230	40 (17.4%)	127	27 (21.3%)	359	71 (19.8%)
P-value		NS		NS		0.001		NS		NS		0.002
Total (M + F)	519	145 (27.9%)	1260	228 (18%)	481	95 (19.8%)	403	83 (20.6%)	235	54 (23%)	646	158 (24.5%)
P-value (by age)		0.01		0.001		0.01		0.001		0.01		0.001

Difference among regions is $P < 0.001$; NS=not significant.

recorded in Asir (1.4%), followed by Al-Madina (3.9%). However, males showed higher prevalence of SBPH than females, yet the difference was not statistically significant, except in Farasan, Makkah and Al Sharkia, where females showed highly significant differences of 50%, 25% and 22%, compared with 6.3%, 0%, and 9.5% in the age group of 40-75 years. The SBP rises significantly with age and the highest prevalence was seen in the 40-75-year age group in all regions. There is a statistically significant difference in SBPH (sexes combined) among the regions ($P < 0.001$). The overall prevalence for all ages showed that the highest prevalence was recorded in Farasan (8.9%), followed by Al-Taif (7.7%), and Hail (7.1%), and the lowest was shown in Asir (2.2%), followed by Jizan (4.4%) and Al-Madina (4.5%).

Tables 3 and 4 show the prevalence of diastolic BP among the populations of the different regions of the Kingdom by age and sex. The highest diastolic BP prevalence (sexes combined) was recorded in Al Qassim (10.6%), followed by Jeddah (10.1%), Tabouk (9.8%) and Al-Taif (9.7%). The difference between the regions was statistically significant ($P < 0.001$). The males of Jeddah showed the highest prevalence (15.6%), followed by Al-Taif (11.9%) and Hail (9.9%), while the lowest prevalence was recorded in Tabouk (3.7%), followed by Jizan (6.2%), and Al-Sharkia and Farasan, which showed a prevalence of 6.6% each. The females of Tabouk showed the highest prevalence (14.9%), followed by Farasan (11.1%) and Al Qassim (9.6%), while the lowest prevalence among the

females was reported from Makkah (2%), followed by Al-Madina and Asir (4.8% each). There was a significant increase in DBPH with age in all regions of the Kingdom, except in Farasan, where the prevalence in males decreases with age (6.3% versus 12% in the 40-75-year and 30-37-year age groups, respectively).

If hypertension was defined as 140/90 mm Hg, the highest prevalence of SBPH (sexes combined) was reported from Makkah (27.9%), Hail (27.1%) and Al-Taif (24.5%), while the lowest was found among the people of Jeddah (14.9%), Jizan (17.0%) and Asir (17.3%) (Tables 5 and 6).

The highest overall prevalence of DBPH was reported from Al-Taif (36.2%), Al-Qassim (34.2%) and Tabouk (28.2%), while the lowest prevalence was found in Makkah (22.0%), Asir (22.0%) and Riyadh (22.1%). The highest prevalence of SBPH and DBPH was found among females of eight and seven regions, respectively, out of twelve, as compared with males among the 40-75-year age groups (Table 5, 6, 7 and 8). However, the difference was not statistically significant except for SBPH of females from Farasan.

Discussion

Hypertension is an important independent risk factor for large vessel disease, frequently resulting in death or disability from myocardial infarction, stroke and peripheral vascular disease. With the improved health

services in the Kingdom over the last three decades, the average life expectancy for both sexes has increased from 53.9 years in 1970-75 to 69.2 in 1990-95.¹⁴ This increase in life expectancy could lead to the emergence of non-communicable chronic diseases.

There is a statistically significant difference in hypertension prevalence among the different regions of the Kingdom ($P < 0.001$).¹⁵ The prevalence of hypertension in the Asir region, as shown by this study, is similar to that reported by Mahfouz and Al-Erian (2.4%).¹⁶ In the young age groups (18<29 and 30<39), systolic hypertension (SBP ≥ 160 mm Hg) is rarely seen among the males, except in Asir, Jizan, Al-Sharkia and Al-Taif. However, the females showed a higher prevalence than males in all regions in the 40-75-year age group, except in the highlands of Al-Taif and Asir.

TABLE 6. Systolic blood pressure (SBP) by age, sex and region (≥ 140 mm Hg).

Age group (yrs)	Al Madinah		Asir		Farasan		Hail		Jeddah		Jizan	
	No.	No. ≥ 140	No.	No. ≥ 140	No.	No. ≥ 140	No.	No. ≥ 140	No.	No. ≥ 140	No.	No. ≥ 140
18-29												
Male	81	2 (2.5%)	128	18 (14.1%)	7	0	36	1 (2.8%)	26	2 (7.7%)	71	1 (1.4%)
Female	157	7 (4.5%)	212	3 (1.4%)	10	0	101	4 (3.9%)	111	2 (1.8%)	94	5 (5.3%)
30-39												
Male	50	3 (6%)	77	15 (19.5%)	8	1 (12.5%)	29	5 (17.2%)	25	2 (8%)	56	6 (10.7%)
Female	76	3 (3.9%)	116	4 (3.5%)	16	4 (25%)	53	9 (16.9%)	88	6 (6.8%)	55	6 (10.9%)
40-75												
Male	123	64 (52%)	203	78 (19.5%)	16	1 (6.3%)	77	48 (62.3%)	39	13 (33.3%)	82	28 (34.2%)
Female	97	40 (41.2%)	170	39 (22.9%)	10	7 (70%)	69	32 (46.3%)	67	28 (41.8%)	77	28 (36.4%)
P-value (M vs. F)		NS		NS		0.001		0.05		NS		NS
Total												
Male	254	69 (27.1%)	408	111 (27.2%)	31	2 (6.5%)	142	54 (38%)	90	17 (18.9%)	209	35 (16.8%)
Female	330	50 (15.1%)	498	46 (9.2%)	36	11 (30.6%)	223	45 (20.2%)	266	36 (13.5%)	226	39 (17.3%)
P-value		0.001		0.001		0.01		0.001		NS		NS
Total (M + F)	584	119 (20.4%)	906	157 (17.3%)	67	13 (19.4%)	365	99 (27.1%)	356	53 (14.9%)	435	74 (17%)
P-value (by age)		0.001		0.01		0.01		0.001		0.001		0.001

Difference among regions is $P < 0.001$; NS=not significant.

The difference in SBPH between males and females among all age groups is not significant except in Farasan, Makkah and Al-Sharkia, where females showed higher prevalence (Tables 1 and 2). The results of this study are different from those of Mohsen et al.¹⁷ in Egypt, in terms of the younger age group, where it was reported that males were more systolic hypertensive than females, however, similar results are found in the older age group, where females were more systolic hypertensive than males.

In Farasan, Al Madinah, Jizah, Hail and Tabouk, no DBPH was reported among males in the young age group of 18<29 years, while the females of Farasan, Hail and Al-Taif showed no hypertension in this young age group. In the age group of 40-75 years, males were found to have a low prevalence of DBPH in seven out of twelve regions, a result that is different from that of Mohsen et al.,¹⁷ who reported a consistently higher prevalence of DBPH in males than females in that age group in Egypt. Ahmed and Mahmoud¹⁹ reported that the prevalence of hypertension (160/95 mm Hg) among males and females of 50-60 years in Al Madina is 6.8% and 14.6%, respectively, a result that is lower than what we found for the males, but similar to that of the females (14.3%) in the 40-75-year age group. Wahid et al.⁷ showed that among adults of Riyadh, the hypertension ($\geq 160/95$ mm Hg) prevalence is 15.4%, a figure three times higher than our findings, while Soyannwo et al.¹⁰ showed that for 19 year olds and above in Al Qassim, SBPH and DBPH (140/90 mm Hg) prevalence is 1.5 times higher than that reported in our findings for SBPH, but similar to our findings in relation to DBPH.

In the highlands of Asir, Khalid et al.¹⁹ reported that the prevalence of hypertension (160/95 mm Hg) was 1.4%,

while no hypertension was detected among the lowland inhabitants of 10 to 72 years of age, a result similar to that reported in this study in the female population in the Asir

region. However, Mahfouz and Al-Erian¹⁶ reported hypertension prevalence among Saudis of 45 years and above in the Asir region to be about 50% less than that of our findings.

The prevalence of hypertension (160/95 mm Hg) in three districts in France²⁰ was found to be 40.2%, 43.8% and 27.7% among males and 31.5%, 33.8% and 18.9% among females, respectively, indicating a higher prevalence than that of this report. However, the pattern is different, as the prevalence in French males is higher than that of the females. The prevalence of DBPH (≥ 90 mm Hg) in the different regions of the Kingdom (sexes combined) ranges between 22.0% and 36.2%, which tends to be similar to the prevalence of DBPH (32.7%) in Americans.²¹

In conclusion, this study reveals that in adult Saudis there are differences in the prevalence of hypertension in relation to gender, age and geographical regions. The prevalence increases with age, and it is highest among the 40-75-year age group. The females tend to have insignificantly higher prevalence than males in that age group. The prevalence of SBPH is higher in Taif, Farasan and Hail, and lower in Asir, Jizan and Al Madinah, while the prevalence of DBPH is higher in Al Qassim, Jeddah, Tabouk and Al Taif, and lower in Makkah, compared with other regions of the Kingdom.

The diversified ecological life of the people of the Kingdom has definitely led to the differences in the pattern and degree of the prevalence of diseases. Work is being

done now to elucidate the risk factors for hypertension in the Kingdom.

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TABLE 7. Diastolic blood pressure (DBP) by age, sex and region (≥ 90 mm Hg).

Age group (yrs)	Makkah		Riyadh		Al Sharkia		Al Qassim		Tabouk		Al Taif	
	No.	No. ≥ 90	No.	No. ≥ 90	No.	No. ≥ 90	No.	No. ≥ 90	No.	No. ≥ 90	No.	No. ≥ 90
18-29												
Male	75	9 (12%)	198	10 (5%)	70	12 (17.1%)	64	9 (14.1%)	34	1 (2.94%)	101	18 (17.8%)
Female	134	11 (8.2%)	384	28 (7.3%)	129	12 (9.3%)	126	26 (20.6%)	61	15 (24.6%)	151	151 (19.3%)
30-39												
Male	56	10 (17.9%)	139	24 (17.3%)	4	8 (17%)	45	17 (37.8%)	24	2 (8.3%)	61	9 (14.8%)
Female	89	22 (24.7%)	152	28 (18.4%)	88	20 (22.7%)	56	22 (39.3%)	36	12 (33.3%)	95	27 (28.4%)
40-75												
Male	88	41 (46.6%)	196	80 (40.8%)	95	39 (41%)	64	34 (53.1%)	49	19 (38.8%)	125	83 (66.4%)
Female	77	21 (27.3%)	182	106 (58.4%)	50	32 (64%)	48	30 (62.5%)	30	17 (56.7%)	113	80 (70.8%)
<i>P</i> -value (M vs. F)		0.01		0.001		0.009		NS		NS		NS
Total												
Male	219	60 (46.6%)	533	114 (21.4%)	212	59 (27.8%)	173	60 (34.7%)	107	22 (20.6%)	287	110 (38.3%)
Female	300	54 (18%)	718	162 (22.6%)	267	64 (24%)	230	78 (33.9%)	127	44 (34.6%)	359	124 (34.5%)
<i>P</i> -value		0.01		NS		NS		NS		0.01		NS
Total (M + F)	519	114 (22%)	1251	276 (22.1%)	479	123 (25.6%)	403	138 (34.2%)	234	66 (28.2%)	646	234 (36.2%)
<i>P</i> -value (by age)		0.01		0.001		0.01		0.001		0.01		0.001

Difference among regions is $P < 0.001$; NS=not significant.

TABLE 8. Diastolic blood pressure (DBP) by age, sex and region (≥ 90 mm Hg).

Age group (yrs)	Al Madinah		Asir		Farasan		Hail		Jeddah		Jizan	
	No.	No. ≥ 90	No.	No. ≥ 90	No.	No. ≥ 90	No.	No. ≥ 90	No.	No. ≥ 90	No.	No. ≥ 90
18-29												
Male	81	8 (9.9%)	128	25 (19.5%)	7	1 (14.3%)	36	2 (5.6%)	26	4 (15.4%)	71	10 (14.1%)
Female	157	15 (9.6%)	212	9 (4.3%)	10	1 (10%)	101	7 (6.9%)	111	6 (5.4%)	94	9 (9.6%)
30-39												
Male	50	6 (12%)	77	23 (29.9%)	8	1 (12.5%)	29	6 (20.7%)	25	12 (48%)	56	15 (26.8%)
Female	76	11 (14.4%)	116	13 (11.2%)	16	6 (37.5%)	53	15 (28.3%)	88	15 (17.1%)	55	7 (12.7%)
40-75												
Male	123	69 (56.1%)	203	74 (36.5%)	16	5 (31.3%)	77	36 (46.8%)	39	24 (61.5%)	82	35 (42.7%)
Female	98	38 (38.8%)	170	56 (32.8%)	10	4 (40%)	69	34 (49.3%)	67	34 (50.8%)	77	32 (41.6%)
<i>P</i> -value (M vs. F)		0.01		NS		NS		NS		NS		NS
Total												
Male	254	83 (32.7%)	408	122 (29.9%)	31	7 (22.6%)	142	44 (31%)	90	40 (44.4%)	209	60 (28.7%)
Female	331	64 (19.3%)	499	78 (15.6%)	36	11 (30.6%)	223	56 (25.1%)	266	55 (20.7%)	226	48 (21.2%)
<i>P</i> -value		NS		0.03		NS		NS		0.04		NS
Total (M + F)	585	147 (25.1%)	907	200 (22%)	67	18 (26.8%)	365	100 (27.4%)	356	95 (26.7%)	435	108 (24.8%)
<i>P</i> -value (by age)		0.001		0.01		0.01		0.001		0.001		0.001

Difference among regions is $P < 0.001$; NS=not significant.

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