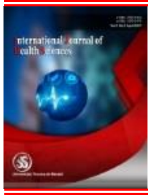

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PHC Visits Trends Effects on Control of Blood Pressure for Hypertensive Patients Following Up in PHCs in Makkah, Saudi Arabia

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blood pressure;
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visit pattern;

Abstract

Hypertension is a major risk factor for cardiovascular disease, stroke, and kidney disease. In Saudi Arabia, the prevalence of hypertension is estimated to be 14%. Primary health care centers (PHCCs) play a major role in the diagnosis, treatment, and follow-up of hypertensive patients in Saudi Arabia. This study employed a cross-sectional design to collect data from medical records of hypertension patients registered with primary health care centers (PHCCs) in Makkah, Saudi Arabia. The data was obtained through a comprehensive review of these medical records. Out of the 16,623 patients included in the study, the average annual visit frequency was 5.5 for females and 6 for males. 65.6% (10,910 patients) completed all four annual visits. There was no statistically significant difference in visit completion rates between males and females. The visit count was found to be negatively correlated with Systolic BP (-0.151, 95% CI [-0.195, -0.165]), Diastolic BP (-0.137, 95% CI [-0.147, -0.117]), and MAP (-0.176, 95% CI [-0.191, -0.161]), with a P-value < 0.001 for all parameters. Our findings indicate that the number of visits to Makkah Primary Health Centers positively influences blood pressure control in hypertensive patients.

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Contents

1 Introduction

The prevalence of hypertension in Saudi Arabia varies widely, with a recent study finding a prevalence of 9% (Alenazi & Alqahtani, 2023) and the national survey reporting a prevalence of 14% (World Health Survey-Saudi Arabia, n.d.). Worldwide, the prevalence of hypertension is estimated to be between 28% and 31% (Mills et al., 2020). Nevertheless, according to the World Health Organization (WHO), approximately 21% of people with hypertension have their blood pressure under control. This means that nearly 80% of people with hypertension do not have their blood pressure under control, which puts them at an increased risk of developing cardiovascular disease, stroke, and kidney disease (Kannel, 2000).

This study aims to investigate the patterns of visits of patients with hypertension diagnoses in PHCCs in Makkah, Saudi Arabia. It will also examine the relationship between the accessibility and compliance of annual and quarterly visits and blood pressure control in hypertensive patients. The study will use a cross-sectional design and collect data from patients registered with PHCCs in Makkah through medical record review (Skoog et al., 1996).

The study is expected to provide valuable insights into the patterns of visits of patients with hypertension diagnoses in PHCCs. The study's findings will improve the delivery of care to hypertensive patients in PHCCs and raise awareness of the importance of regular visits to PHCCs for managing hypertension.

Literature Review

Between 2000 and 2010, the number of people with hypertension increased by 440 million in low- and middle-income countries (LMICs) and 27 million in high-income countries (HICs) (Mills et al., 2016). In 2010, East Asia and the Pacific had the highest absolute burden of hypertension, with more people with hypertension than all HICs combined. The absolute burden of hypertension in men and women increased in all world regions between 2000 and 2010, except for the Middle East and North Africa, where the absolute burden in women decreased slightly (Zhou et al., 2017).

Furthermore, hypertension is a major risk factor for cardiovascular disease and death. According to the Heart and Stroke Statistics, 45% of cardiovascular deaths are potentially attributed to hypertension (Virani et al., 2020). Elevated blood pressure is a major risk factor for cardiovascular disease and premature death. In 2015, it was estimated that 10.7 million deaths were associated with systolic blood pressure ≥110–115 mmHg, and 7.8 million deaths were associated with systolic blood pressure ≥140 mmHg (Forouzanfar et al., 2017). In adults aged 35 years and older, systolic blood pressure (SBP) is a stronger predictor of cardiovascular disease (CVD) risk than diastolic blood pressure (DBP) (Martin et al., 1986).

A 2021 meta-analysis of observational studies found that variability in systolic blood pressure (SBP) over time, whether long-term or short-term, is associated with an increased risk of coronary heart disease (CHD), stroke, cardiovascular disease (CVD), and all-cause mortality. The analysis included data from over 1 million participants and found that a 1-mmHg increase in SBP variability was associated with a 1.1% increase in the risk of CHD, a 1.2% increase in the risk of stroke, a 1.3% increase in the risk of CVD, and a 1.4% increase in the risk of all-cause mortality. These findings suggest that SBP variability is an independent risk factor for CVD and mortality and that interventions to reduce SBP variability may be beneficial in preventing these outcomes (Jia et al., 2021).

A Brazilian study found that a multidisciplinary team approach to controlling blood pressure (BP) was associated with an overall 68% BP control rate. The approach was more effective in people aged 60 years and older (OR 1.45; 95% CI [1.13-1.90]) and women (OR 1.36; 95% CI [1.09-1.88]). In contrast, patients with diabetes were less likely to reach the BP target than patients without diabetes. Interestingly, no significant differences in the number of anti-hypertensive drugs were observed between the groups that did and did not control BP (Pio-Abreu & Drager, 2020).

Saudi Arabia aims to make healthcare more accessible, affordable, and effective by linking Sustainable Development Goal (SDG) 1 with Vision 2030. To achieve this, the government will work with the private sector to: (1) Make healthcare easily accessible to all citizens and residents, regardless of their geographical location, income, or social status. (2) Empower citizens through the welfare system by providing them with financial assistance to access healthcare services. (3) Improve the living conditions of the expatriate community by providing them with access to quality healthcare services. (4) Improve the value of healthcare services by ensuring they are high quality, affordable, and available to all. (5) Strengthen the prevention program against health threats by improving the public health system and health crisis management. (6) Improve the effectiveness and efficiency of the social services system by ensuring that it is responsive to the needs of citizens and residents. These reforms are expected to improve the health of Saudi Arabia's population and reduce the financial burden of healthcare on the government (Rahman & Qattan, 2021).

The American Heart Association (AHA) has published a study on socioeconomically advantaged and disadvantaged neighborhoods. The study revealed that improved high blood pressure awareness and control were associated with better access to primary care. These associations were consistent across socioeconomic status, suggesting that blood pressure control programs that increase access to primary care may benefit people regardless of their residence (American Heart Association).

2 Materials and Methods

In this investigation, the authors analyzed the total visits made by individuals diagnosed with primary hypertension (ICD9 401.9 or 401.1) at Primary Healthcare Centers (PHCs) (Quan et al., 2009).

Research Question
What is the relationship between the number of annual visits to PHCCs and the control of blood pressure (BP) in hypertensive patients?

Aim
This study aims to investigate the patterns of visits of patients with hypertension diagnoses in PHCCs in Makkah, Saudi Arabia. It will also examine the relationship between the accessibility and compliance of annual and quarterly visits and the control of blood pressure in hypertensive patients.

Variables
The study examined age, nationality, sex, Type 2 Diabetes Mellitus, smoking status, healthcare utilization, BMI, and disability status from PHC records. Blood pressure metrics (average and mean arterial pressure) were the dependent variables.

Study design
Cross-sectional analytical
Population and Sample
Population: All adults registered and followed up in the PHCCs in Makkah city.
Sample: All patients with hypertension diagnosis registered and following up in Makkah PHCCs in 2022-2023.
Inclusion and Exclusion Criteria
Inclusion: Diagnosis includes hypertension for adults (+18) registered and following up in PHCCs in Makkah in the year 2023.

Exclusion criteria: pregnancy at any visit during 2023, any patient with missing data, not diagnosed with hypertension
Measures (tools)
Data collection sheet, Power BI, Raqeem file system (CSV format).

Data Analysis
The raw data was analyzed using the Statistical Package for the Social Sciences (SPSS) version 20.0 software for Windows, released in 2011 by SPSS Inc. in Chicago, ILL, USA. Descriptive statistics were applied to summarize the data on demographic characteristics and questionnaire responses. The data was carefully checked for accuracy and assessed for potential outliers and normal distribution. Categorical variables were presented as frequencies and percentages, while continuous variables, such as QNWL scores, were expressed as mean (S.D). Pearson's correlation was employed to assess the relationship between blood pressure (BP) and the frequency of visits. At the same time, ANOVA was utilized to explore the association between complete visits and BP levels. Confounding variables were addressed using ANCOVA.

3 Results and Discussions

3.1 Results

Descriptive Tables

In our dataset, both the total annual visits and appointments are tabulated. It is important to note the distinction between these metrics, primarily due to the inclusion of visits that occur without prior appointments, whether they are categorized as urgent or otherwise. Our Primary Healthcare Center (PHC) system accommodates unscheduled visits, thus contributing to the total annual visit count. Conversely, "completed annual visits" denote instances in which a patient has successfully undergone four visits, regardless of whether these visits were pre-planned or not. This distinction acknowledges the achievement of the annual visit completion criterion, independent of the visit's scheduling status (Mars, 2013; Rush et al., 2018).

Table 1 shows the count of males and females in our sample, 8262 (49.7%) and 8361 (50.3%), respectively Table 2 presents the descriptive statistics for various parameters. On average, females have a systolic blood pressure of 145.831 mmHg (SD = 17.136), while males have an average of 143.753 mmHg (SD = 16.144). For diastolic blood pressure, females average 77.428 mmHg (SD = 8.748), and males average 82.149 mmHg (SD = 9.049). The mean arterial pressure (MAP) is 100.229 mmHg (SD = 10.233) for females and 102.684 mmHg (SD = 10.214) for males. In terms of Body Mass Index (BMI), females have an average of 32.372 (SD = 6.178), whereas males have an average of 30.162 (SD = 5.612). The average age for females is 53.021 years (SD = 8.423), compared to 51.471 years (SD = 9.155) for males. The count of visits shows females averaging 5.462 visits (SD = 3.852), while males average 6.019 visits (SD = 5.447). Additionally, females have an average of 5.167 appointments (SD = 3.668), with males averaging 5.02 appointments (SD = 3.865).

Table 3 presents descriptive statistics in percentages, focusing on categorical variables such as smoking, diabetes status, disability, nationality, and completion of annual visits. These percentages help us understand the prevalence and distribution of these health-related attributes within our study population.

Table 4 shows significant negative correlations between visit annual counts and all three BP parameters, demonstrating that increased visit frequency is associated with lower blood pressure measures and mean arterial pressure (Systolic BP: 95% CI [-0.195, -0.165]; Diastolic BP: 95% CI [0.147, -0.117]; MAP: 95% CI [-0.191, -0.161]). The calculated upper and lower 95% confidence intervals (CI) confirm the statistical significance of these correlations

The results in Table 5 reaffirm the significant relationships observed in Table 6, even after adjusting for these confounding variables. Visit counts maintain statistically significant negative correlations with Systolic BP, Diastolic BP, and MAP. Including covariates in the analysis strengthens the consistency and strength of these associations (Fang et al., 2024; Guo et al., 2022).

Table 6 shows Significant negative correlations between appointment counts and all three parameters, with the following findings: Appointment counts were significantly inversely correlated with Systolic BP ($r = -0.147$, $p < .001$, 95% CI [-0.132, -0.095]). Similarly, appointment counts exhibited a significant negative correlation with Diastolic BP ($r = -0.11$, $p < .001$, 95% CI [-0.095, -0.13]).

Furthermore, appointment counts showed a significant negative correlation with MAP ($r = -0.145$, $p < .001$, 95% CI [-0.13, -0.11]).

Table 7 presents Pearson's partial correlation tests, which controlled for confounding variables such as Age, Smoking, DM II (Diabetes Mellitus Type II), disability, average BMI (Body Mass Index), Nationality, and Gender. The results in Table 9 reaffirm the significant negative correlations observed in Table 8, supporting the robustness of these associations even after adjusting for potential confounders.

Note. Results are averaged over the levels of Nationality, Gender, DM II, and Smoking.

In Table 8, 9,10 an adjusted ANCOVA analysis was conducted to compare the completion of annual visits and its impact on average systolic blood pressure while controlling for age, nationality, gender, diabetes status (DM II), and smoking status. The results demonstrate significant differences in systolic blood pressure among those who completed annual visits compared to those who did not. Age, nationality, and gender can affect systemic blood pressure. Additionally, post hoc comparisons reveal a substantial mean difference, indicating a noteworthy clinical impact. The standard error (SE) is 0.271, and the t-value is 14.72.

In the tables 11,12,13 an adjusted ANCOVA analysis was performed to evaluate the relationship between the completion of annual visits and its influence on average diastolic blood pressure while adjusting for age, nationality, gender, diabetes status (DM II), and smoking status. The table presents statistical data indicating significant differences in diastolic blood pressure among individuals who completed their annual visits compared to those who did not. Post hoc comparisons reveal a notable mean difference, signifying a clinically relevant impact, with those completing annual visits having an average diastolic blood pressure approximately 1.616 units lower than those who did not.

In Tables 14, 15, 16 an adjusted ANCOVA analysis was conducted to investigate the association between the completion of annual visits and its impact on Mean Arterial Blood Pressure (MAP). This analysis controlled for covariates such as age, nationality, gender, diabetes status (DM II), and smoking status. The table presents statistical results demonstrating significant differences in MAP among individuals who completed their annual visits compared to those who did not. Post hoc comparisons reveal a substantial mean difference, with those completing annual visits having an average MAP approximately 1.616 units lower than those who did not.

Table 17 shows no significant difference between males and females regarding completing their annual four visits.

3.2 Results Summary

Our dataset included 16,623 patients (8361 males, 8262 females), with visit frequencies ranging from 1 to 77 per patient. The average annual visit was 5.5 for females and 6 for males, with both genders averaging five appointments annually. Notably, 65.6% completed all four annual visits. A chi-square test showed no significant difference in visit completion rates between genders. ANCOVA and Spearman's correlation found that more visits significantly impacted systolic and diastolic blood pressure, while appointments impacted mean arterial pressure (MAP). Completing four annual visits significantly reduced blood pressure, especially SBP (Sembiring et al., 2022).

4 Conclusion

Our data revealed that the average annual number of visits for hypertensive patients at Makkah Primary Health Services (PHS) was approximately five. These visits encompassed all causes, including acute complaints such as upper respiratory tract infections (URTI), requests for referrals to secondary hospitals, and follow-ups for chronic diseases or laboratory tests and results. Although this visit count may appear sufficient, only 65.6% of our data indicated completion of four annual visits, while the remainder did not. The decrease in primary care visits per capita might be attributed, at least in part, to two significant enhancements in primary care practice. Firstly, primary care providers (PCPs) may offer more extensive care during each visit, reducing the necessity for in-person follow-up appointments. PCPs are allocating more time per visit and addressing a broader range of medications, diagnoses, and services, including vaccinations and wound care, which require in-person administration (Almalki et al., 2011).

Research by Levine et al. (2018), also compared the types of hypertension follow-up visits, including emergency, virtual, or in-person visits. The data showed no significant differences between them in decreasing blood pressure (BP). It also noted that the frequency of visits for hypertension had decreased, along with a decline in the proportion of hypertension-related visits with scheduled in-person follow-ups. This trend may indicate a shift toward virtual management of chronic illnesses. However, it does not necessarily impact disease control (Kjeldsen, 2018; Harrison et al., 2007).

The visit count had a more notable effect on systolic blood pressure (SBP) (-0.151) and diastolic blood pressure (DBP) (-0.137) in our sample; the count of visits decreased SBP more than other hypertension parameters. One explanation is that some health behaviors, including dietary counseling, exercise counseling, and obesity counseling, were the predominant discussion topics, as suggested by Tong et al. (2021). They also reported that the most frequently diagnosed conditions included high blood pressure, elevated blood sugar levels, and the need for statin chemoprevention.

While several findings from our study yielded statistical significance due to the large sample size, the effect sizes were small. As a result, some outcomes may lack meaningful real-world implications. Therefore, caution is advised when interpreting these findings, and further investigations are needed to either validate or challenge our conclusions.

Conclusions: The study provides valuable insights into the relationship between PHC visits and blood pressure control in Makkah, Saudi Arabia hypertensive patients. The findings suggest that increasing the number of PHC visits may help improve blood pressure control in hypertensive patients. However, further research is needed to confirm these findings and address the current study's limitations.

Limitations: The study has several limitations that should be considered when interpreting the findings. First, it was conducted in a single setting, limiting its generalizability to other settings. Second, it was cross-sectional, meaning it could not establish cause-and-effect relationships. Third, it used health records data that were subject to entry bias. Fourth, it did not check for other factors that could affect blood pressure control, such as socioeconomic status and medication adherence.

Declaration of generative AI and AI-assisted technologies in the writing process

During the preparation of this work, the authors used ChatGPT and Grammarly to check vocabulary choice, sentence structure, and English language correction. After using this tool/service, the authors reviewed and edited the content as needed and took full responsibility for the publication's content.

Conflict of Interest: The authors declare no conflict of interest.

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Data Availability: The data will be made available upon request

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Appendix

Table 1
Count of Male and Female patients in our sample

Gender		
Female	**male**	**Total**
8262	8361	16623

Table 2
Descriptive statistics in means and SD

Category	Gender	count	Mean	SD	Minimum	Maximum
Average Systolic BP	female	8262	145.831	17.136	95	218.5
	male	8361	143.753	16.144	93.167	217
Average Diastolic BP	female	8262	77.428	8.748	42	109
	male	8361	82.149	9.049	41	109
Average MAP	female	8262	100.229	10.233	62.667	141.333
	male	8361	102.684	10.214	68.5	143
BMI	female	8262	32.372	6.178	11.61	59.82
	male	8361	30.162	5.612	0.31	58.64
Age	female	8262	53.021	8.423	19	64
	male	8361	51.471	9.155	19	64
Count of visits	female	8262	5.462	3.852	1	74
	male	8361	6.019	5.447	1	77
Count of appointments	female	8262	5.167	3.668	1	32
	male	8361	5.02	3.865	1	41

BP, Blood Pressure; MAP, Mean Arterial Pressure; BMI, Basal Metabolic Rate.

Table 3
Descriptive statistics in percentage

Category	Status	Female	Male	Total
Smoking	no	8076	6591	14667
		97.749 %	78.830 %	88.233 %
	yes	186	1770	1956
		2.251 %	21.170 %	11.767 %
Diabetes Miletus	no	3974	3365	7339
		48.100 %	40.246 %	44.150 %
	yes	4288	4996	9284
		51.900 %	59.754 %	55.850 %
Disability	no	8072	8057	16129
		97.700 %	96.364 %	97.028 %
	yes	190	304	494
		2.300 %	3.636 %	2.972 %
Nationality	non-Saudi	768	2013	2781
		9.296 %	24.076 %	16.730 %
	Saudi	7494	6348	13842
		90.704 %	75.924 %	83.270 %
completed annual visit	no	2853	2860	5713
		34.532 %	34.206 %	34.368 %
	yes	5409	5501	10910
		65.468 %	65.794 %	65.632 %

Table 4
Pearson's Correlation test between Visit annual count and (systolic BP, Diastolic BP, MAP)

Variable	category	Systolic BP	Diastolic BP	MAP	Visits
1 . Systolic BP	n	—			
	Pearson's r	—			
	p-value	—			
	Upper 95% CI	—			
	Lower 95% CI	—			
2 . Diastolic BP	n	16623	—		
	Pearson's r	0.549	—		
	p-value	< .001	—		
	Upper 95% CI	0.559	—		
	Lower 95% CI	0.538	—		
3 . MAP	n	16623	16623	—	
	Pearson's r	0.867	0.892	—	
	p-value	< .001	< .001	—	
	Upper 95% CI	0.871	0.895	—	
	Lower 95% CI	0.863	0.889	—	
4 . visits	n	16623	16623	16623	—
	Pearson's r	-0.18	-0.132	-0.176	—
	p-value	< .001	< .001	< .001	—
	Upper 95% CI	-0.165	-0.117	-0.161	—
	Lower 95% CI	-0.195	-0.147	-0.191	—

BP, Blood Pressure; MAP, Mean Arterial Pressure.

Table 5
Pearson's partial correlation (adjusting for Age, Smoking, DM II, disability, average BMI, Nationality, and Gender)

Category	**Systolic BP**	**Diastolic BP**	**MAP**	**Visits**
n	—			
Pearson's r	—			
p-value	—			
n	16623	—		
Pearson's r	0.618	—		
p-value	< .001	—		
n	16623	16623	—	
Pearson's r	0.894	0.905	—	
p-value	< .001	< .001	—	
n	16623	16623	16623	—
Pearson's r	-0.151	-0.137	-0.16	—
p-value	< .001	< .001	< .001	—

BP, Blood Pressure; MAP, Mean Arterial Pressure; BMI, Basal Metabolic Rate.

Table 6
Pearson's Correlation test between Appointment count and (systolic BP, Diastolic BP, MAP)

Variable	category	Systolic BP	Diastolic BP	MAP	Appointments
1. Systolic BP	n	—			
	Pearson's r	—			
	p-value	—			
	Upper 95% CI	—			
	Lower 95% CI	—			
2. Diastolic BP	n	16623	—		
	Pearson's r	0.549	—		
	p-value	< .001	—		
	Upper 95% CI	0.559	—		
	Lower 95% CI	0.538	—		
3. MAP	n	16623	16623	—	
	Pearson's r	0.867	0.892	—	
	p-value	< .001	< .001	—	
	Upper 95% CI	0.871	0.895	—	
	Lower 95% CI	0.863	0.889	—	
4. Appointments	n	16623	16623	16623	—
	Pearson's r	-0.147	-0.11	-0.145	—
	p-value	< .001	< .001	< .001	—
	Upper 95% CI	-0.132	-0.095	-0.13	—
	Lower 95% CI	-0.162	-0.125	-0.16	

BP, Blood Pressure; MAP, Mean Arterial Pressure; BMI, Basal Metabolic Rate.

Table 7
275 Pearson's partial correlation (adjusting for Age, Smoking, DM II, disability, average BMI, Nationality, and Gender)

Variable	category	Systolic BP	Diastolic BP	MAP	Appointments
1. Systolic BP	n	—			
	Pearson's r	—			
	p-value	—			
2. Diastolic BP	n	16623	—		
	Pearson's r	0.618	—		
	p-value	< .001	—		
3. MAP	n	16623	16623	—	
	Pearson's r	0.894	0.905	—	
	p-value	< .001	< .001	—	
4. Appointments	n	16623	16623	16623	—
	Pearson's r	-0.149	-0.096	-0.136	—
	p-value	< .001	< .001	< .001	—

BP, Blood Pressure; MAP, Mean Arterial Pressure.

Table 8
Adjusted ANCOVA Adjusted ANCOVA, Levene's test, and post hoc test. Comparing 279 Annual Visit Completion and SBP

Cases	Sum of Squares	df	Mean Square	F	p
completed annual visits	58135.227	1	58135.227	216.677	< .001
Age	62515.021	1	62515.021	233.001	< .001
Nationality	18667.971	1	18667.971	69.578	< .001
Gender	13935.94	1	13935.94	51.941	< .001
DM II	531.488	1	531.488	1.981	0.159
Smoking	792.378	1	792.378	2.953	0.086
Residuals	$4.458 \times 10^{+6}$	16616	268.303		

DM II, Diabetes Mellitus type 2.

Table 9
Levene's test of normality

Test for Equality of Variances (Levene's)			
F	df1	df2	p
420.635	1.000	16621.000	< .001

Table 10
Post Hoc Comparison

		Mean Difference	**SE**	**t**	**ptukey**
no	yes	3.983	0.271	14.72	< .001

Table 11
Adjusted ANCOVA, Levene's test, and post hoc test. Comparing Annual Visit 286 Completion DBP

Cases	**Sum of Squares**	**df**	**Mean Square**	**F**	**p**
completed annual visits	9570.202	1	9570.202	130.099	< .001
Age	33711.989	1	33711.989	458.286	< .001
Nationality	12083.544	1	12083.544	164.266	< .001
Gender	65942.351	1	65942.351	896.43	< .001
DM II	13715.917	1	13715.917	186.456	< .001
Smoking	26.581	1	26.581	0.361	0.548
Residuals	$1.222\times10^{+6}$	16616	73.561		

DM II, Diabetes Mellitus type 2.

Table 12
Levene's test of normality

Test for Equality of Variances (Levene's)			
F	df1	df2	p
306.357	1.000	16621.000	< .001

Table 13
Post Hoc Comparison

		Mean Difference	**SE**	**t**	**ptukey**
no	yes	1.616	0.142	11.406	< .001

Table 14
Adjusted ANCOVA, Levene's, and post hoc tests, Comparing Annual Visit Completion 293 and MAP

Cases	Sum of Squares	df	Mean Square	F	p
completed annual visits	21196.186	1	21196.186	209.235	**< .001**
Age	1525.852	1	1525.852	15.062	**< .001**
Nationality	14119.866	1	14119.866	139.382	**< .001**
Gender	17383.04	1	17383.04	171.594	**< .001**
DM II	7355.005	1	7355.005	72.604	**< .001**
Smoking	164.358	1	164.358	1.622	0.203
Residuals	$1.683\times10^{+6}$	16616	101.303		

294 DM II, Diabetes Mellitus type 2.

Table 15
Levene's test of normality

Test for Equality of Variances (Levene's)			
F	df1	df2	p
328.339	1.000	16621.000	< .001

Table 16
Post Hoc Comparison

		Mean Difference	SE	t	ptukey
no	yes	1.616	0.142	11.406	< .001

Table 17
Chi-squared tests between males and females and completion of 4 annual visits

	Value	df	p
X^2	0.195	1	0.659
N	16623		

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