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Demographic Characteristics of International Travelers Visiting Travel Clinics in Saudi Arabia: A Cross-Sectional Study

Dr. Abdalgader Mohammed Alzhrani[1], Dr. Fahad Abdullah Alzharani[2], Dr. Eman Elsayed Abd-Ellatif[3], Dr. Faisal Khalid Alkulaib[4], Dr. Adel Fahad Alotaibi[5]

[1]Dentist- ministry of health.

Email ID: AZHARNI@MOH.GOV.SA

[2]Family Medicine, Senior Registrar.

Email ID: FALZAHRANI118@MOH.GOV.SA

[3]consultant of public health.

Email ID: d_eman135@yahoo.com

[4]Preventive medicine senior registrar.

Email ID: fsku@hotmail.com

[5]General Supervisor of the Research Unit, Agency for Population Health, MOH.

Email ID: adfalotaibi@moh.gov.sa

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ABSTRACT

Background*:* The rise in international travel presents public health challenges, especially in infectious disease transmission. Travel clinics mitigate these risks through vaccinations, prophylaxis, and counseling. This study explores traveler demographics, the most frequently required services, and the relationship between travel-related factors and service utilization in Saudi Arabian clinics.

Methods: This cross-sectional study analyzed data from 1,807 international travelers who visited travel clinics in Saudi Arabia from January to December 2023. Data were obtained from the Communicable Disease Control General Department's records. Demographic variables included age, gender, nationality, occupation, and travel-related factors. Statistical analyses were performed using SPSS, including descriptive statistics and logistic regression models.

Results: Most travelers were male (74.3%) with a median age of 35 years. The most frequent age group was 18–39 years (54.6%). Saudi and non-Saudi nationals were nearly equally represented. White-collar workers comprised 36.1%, and Africa was the main destination (69.7%). Work was the primary travel purpose (37.4%), followed by tourism (32.6%). The most frequent travel duration was one month (38.1%), with peak travel in July. Vaccinations were the most utilized service (90.3%), with yellow fever being the most common vaccine (73.6%). Gender, nationality, age, and region were significantly associated with vaccination and prophylaxis use.

Conclusion: This study reveals key demographic patterns among travelers, with a predominance of male, work-related travel, and high vaccination uptake. Findings emphasize the necessity for customized travel health services to strengthen public health measures and curb disease spread.

Keywords: *International travelers, travel clinics, Saudi Arabia, demographics, vaccinations, prophylaxis, cross-sectional study.*

1. INTRODUCTION

The global population is projected to reach approximately 8.1 billion by 2024, with international travel anticipated to exceed 4 billion passengers within the same year. In Saudi Arabia, the General Authority of Civil Aviation reported that 61 million passengers utilized international flights in 2023, highlighting a significant increase in travel activity, with airports handling around 3,000 passengers per hour. Concurrently, the Saudi population grew to 34.2 million by the 2022 census, up from

32.175 million in 2010. This surge in international travel underscores the imperative to understand and manage the associated public health risks, particularly the transmission of infectious diseases globally [1].

Travel medicine is a multidisciplinary field that mitigates health risks associated with international travel through vaccinations, prophylaxis, and tailored health counseling. Pre-travel consultations assess risks and implement preventive strategies, particularly for high-risk travelers such as immunocompromised individuals, pregnant women, the elderly, and those with chronic conditions [2].

Despite the establishment of travel clinics in Saudi Arabia since 2017, national studies on their utilization and traveler demographics remain scarce. Understanding these patterns is essential for optimizing healthcare services, resource allocation, and policy adaptation [3]. These clinics provide critical preventive care, including meningococcal vaccination for high-risk groups and travelers to endemic areas. Additionally, international travel increases exposure to sexually transmitted infections [4] and travel-associated malaria, even in non-endemic regions [5], underscoring the need for comprehensive travel health services.

In light of emerging infectious threats, recent studies have broadened our understanding of travel-related health risks. For example, Ngeh et al. documented travel-associated SARS-CoV-2 transmission using whole genome sequencing following a long-haul international flight [6]. Similarly, Mellon et al. and Sridhar et al. have shown that international travelers often acquire antimicrobial-resistant bacteria, raising concerns about the global spread of resistant pathogens [7,8].

This study aims to explore the demographic characteristics of visitors to travel clinics in Saudi Arabia and to identify the most frequently required services. It also seeks to examine the relationship between travel-related factors—such as purpose, destination, and length of stay—and the services provided at these clinics.

Methodology

This cross-sectional study utilized secondary data collected from travel clinics affiliated with the Communicable Disease Control General Department across primary care centers in Saudi Arabia. Data were compiled using Google Drive Sheets, encompassing the period from January to December 2023.

Study Population

The study included all individuals traveling internationally from various regions of Saudi Arabia from January to December 2023. Participants with incomplete information (10%) in the secondary data were excluded from the analysis.

Statistical Analysis

Data were analyzed using the Statistical Package for the Social Sciences (SPSS) and Microsoft Excel for coding, cleaning, and analysis. Normality of continuous variables was assessed using the Kolmogorov-Smirnov test. Categorical variables were presented as frequencies and percentages, while continuous variables were expressed as means ± standard deviations or medians with interquartile ranges based on their distribution. Logistic regression models were employed to determine the adjusted odds ratios (OR) and assess associations between demographic factors and the utilization of travel clinic services. A p-value of less than 0.05 was considered statistically significant.

Ethical Considerations

As this study involved secondary data analysis, no direct interaction with participants was undertaken. Permissions were secured from the Data Management Office and the Central Institutional Review Board of the General Administration of Research and Studies (IRB Approval No: **[…..]**). Data obtained from the Saudi Ministry of Health were anonymized to ensure confidentiality, and no contact with participants was made.

Results

Demographic Profile

A total of 1,807 international travelers visited travel clinics in Saudi Arabia during 2023. Among them, 74.3% were male and 25.7% female. Nationals comprised 49.7% Saudis and 50.3% non-Saudis. The median age was 35 years (interquartile range [IQR] = 17), with 54.6% aged between 18-39 years, 31.9% between 40-59 years, 9.8% below 18, and 3.8% aged 60 and above. The Central Region had the highest proportion of travelers (36.8%), followed by the Eastern (28.7%), Western (25.6%), Southern (5.2%), and Northern (3.8%) regions.

Table 1: Demographic Characteristics of International Travelers Visiting Travel Clinics in Saudi Arabia (2023)

Variable	N (1807)	%
Gender		

Male	1342	74.3
Female	465	25.7
Nationality		
Saudi	898	49.7
Non-Saudi	909	50.3
Age		
<18	177	9.8
18–39	986	54.6
40–59	576	31.9
≥60	68	3.8
Region		
Central Region	665	36.8
Eastern Province	518	28.7
Western Region	462	25.6
Northern Region	68	3.8
Southern Region	94	5.2

Ethnicity and Occupation

Middle Eastern ethnicity predominated at 75.6%, followed by African (11.1%), South Asian (7%), African (11.1%), Southeast and East Asian (2.5%), Caucasian (0.3%), and Others/Unknown (1.4%). Regarding occupation, white-collar workers were the most prevalent (36.1%), followed by unemployed individuals (31.9%), domestic workers (5.4%), blue-collar workers (7.6%), military personnel (1.7%), and Others/Unknown (17.2%).

Table 2: Ethnicity and Occupational Distribution of Travelers Attending Travel Clinics

Variable	N (1807)	%
Ethnicity		
Middle Eastern	1366	75.6
African	200	11.1
South Asian	127	7.0
Southeast/East Asian	37	2.0
European & N. American	46	2.5
Others/Unknown	25	1.4
Occupation		
White Collar	653	36.1
Not Working	576	31.9
Blue Collar	138	7.6
Domestic Workers	98	5.4

Others/Unknown	311	17.2

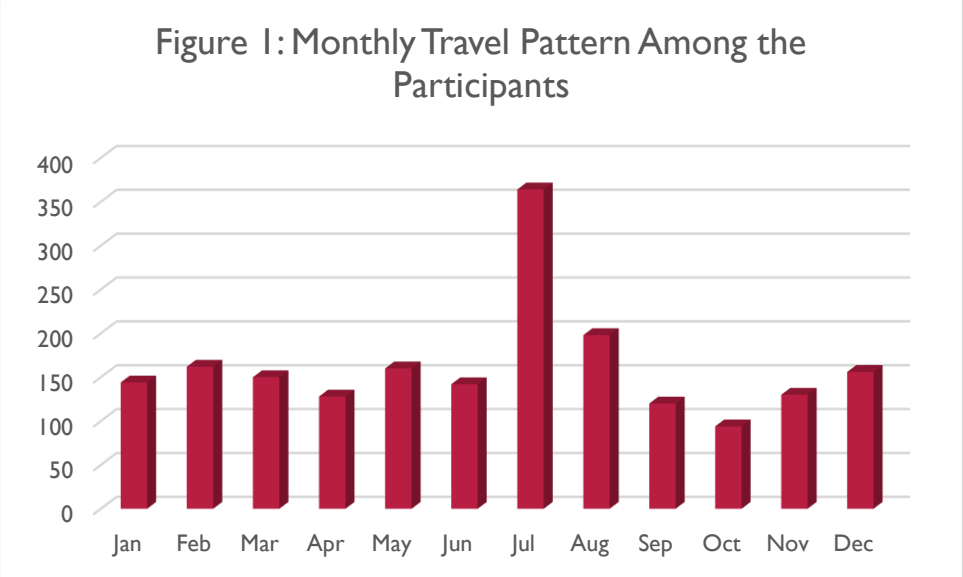
Travel Distention, Purpose, and Duration

Africa was the principal travel destination (69.7%), with South Asia (7.2%), Southeast and East Asia (4.4%), North America (6.5%), Oceania (5.4%), Europe (1.2%), South America (2%), and others constituting the remaining destinations. The primary purposes of travel were work (37.4%), tourism (32.6%), family visits (12%), education (10.6%), and others (7.4%). Travel durations varied, with 38.1% traveling for a month, 32.7% for a week, 11.8% for days, and 17.5% for years.

Additionally, Figure 1 illustrates the monthly travel pattern among the participants, highlighting peak travel periods.

Table 3: Travel Destinations, Purpose of Travel, and Duration of Stay Among Study Participants

Destination	**Percentage**
Africa	69.7%
South Asia	7.2%
Southeast/East Asia	4.4%
North America	6.5%
Oceania	5.4%
Europe	1.2%
South America	2.0%
Others	3.6%
Purpose	
Work	37.4%
Tourism	32.6%
Family Visits	12.0%
Education	10.6%
Others	7.4%
Duration	
1 month	38.1%
1 week	32.7%
Days	11.8%
Years	17.5%



Travel Clinic Services Utilized

Vaccinations were the most utilized service, sought by 90.3% of travelers, followed by travel counseling (71.1%) and prophylaxis medication (40.0%). Refill medication was minimally used (0.9%). Yellow fever vaccination was the most administered vaccine (73.6%), followed by typhoid (27.4%), hepatitis A (23.1%), influenza (8.9%), meningococcal (9.6%), and others**.**

Table 4: Utilization of Travel Clinic Services and Types of Vaccines Administered

Service	N (1807 Visitors)	%
Type of service:		
Vaccination	1631	90.3
Prophylaxis Medication (e.g., malaria prophylaxis, antibiotics for travel-related infections, other preventive medications)	723	40.0
Travel counselling	1284	71.1
Refill medication	17	0.9
Type of vaccine received:		
COVID-19	28	1.5
Influenza	160	8.9
Yellow fever	1326	73.6
Hepatitis A	418	23.1
Hepatitis B	37	4.0
Typhoid	496	27.4
Meningococcal	174	9.6
Varicella	51	2.8
MMR	73	4.0
Tdap	68	3.8

Polio	54	3.0
Others (e.g., Cholera, Rabies)	11	0.6

(Note: Categories are not mutually exclusive, as travelers may have received multiple services and vaccines.)

Logistic Regression Analysis of Factors Associated with Receiving Vaccination

Females were more likely to receive vaccinations than males (adjusted OR: 1.662, p=0.010). Non-Saudi nationals had lower odds of receiving vaccinations (adjusted OR: 0.477, p=0.002) compared to Saudi nationals. Travelers aged 40-59 had significantly higher odds of being vaccinated compared to those under 18 (adjusted OR: 3.486, p=0.001). Travelers from the Eastern Province had higher odds of vaccination compared to those from the Central Region (adjusted OR: 7.222, p<0.001). Travelers visiting Europe had higher odds of vaccination compared to those traveling to Africa (adjusted OR: 4.36, p=0.000).

Table 5: Logistic Regression Analysis of Factors Associated with Receiving Vaccination

Variable	**Vaccination**		**Univariate model**		**Multivariate model**	
Gender:	Yes	No	Crude OR (95% CI)	P value	Adjusted OR (95% CI)	P value
Male	1232	110	Reference		Reference	
Female	399	66	1.853 (1.338-2.565)	0.000*	1.662 (1.129-2.447)	0.010*
Nationality:						
Saudi	789	109	Reference		Reference	
Non-Saudi	842	67	0.576 (0.419-0.793)	0.000*	0.477 (0.3-0.759)	0.002*
Age:						
<18	156	21	Reference		Reference	
18-39	900	86	2.286 (1.110-4.706)	0.025*	2.571 (1.08-6.122)	0.033*
40-59	523	53	3.220 (1.763-5.881)	0.000*	3.486 (1.696-7.162)	0.001*
≥60	52	16	3.036 (1.621-5.687)	0.000*	2.438 (1.174-5.063)	0.017*
KSA Regions:						
Central Region	628	37	Reference		Reference	
Eastern Province	462	56	3.663 (2.434-5.511)	0.000*	7.222 (4.474-11.659)	0.000*
Northern Region	68	0	1.780 (1.235-2.567)	0.002*	3.733 (2.337-5.962)	0.000*
Southern Region	93	1	348602466.089 0-0	0.997	1031399807.27 (0-0)	0.996
Western Region	380	82	20.068 (2.757-146.060)	0.003*	35.599 (4.735-267.64)	0.001*†

Ethnicity:						
African	189	11	Reference		Reference	
Caucasian	6	0	2.083 (0.626-6.933)	0.232	2.526 (0.605-10.543)	0.204
European and North American	42	4	195815132.467 (0-0)	0.999	181689581.049 (0-0)	0.999
Middle Eastern	1223	143	1.273 (0.296-5.475)	0.746	1.669 (0.31-8.98)	0.551
Others	14	11	1.037 (0.362-2.968)	0.947	1.899 (0.52-6.936)	0.332
South Asian	124	3	0.154 (0.042-0.568)	0.005*	0.22 (0.048-1.001)	0.050*
Southeast and East Asian	33	4	5.010 (1.068-23.496)	0.041*	10.439 (1.789-60.903)	0.009*
Occupation:						
Blue Collar	133	5	Reference		Reference	
Domestic Workers	94	4	0.883 (0.231-3.378)	0.856	2.464 (0.863-7.037)	0.092*
Military Personnel	29	2	0.545 (0.101-2.949)	0.481	2.518 (0.762-8.315)	0.130
Not Working	502	74	0.255 (0.101-0.644)	0.004*	2.402 (0.498-11.577)	0.275
Others/Unknown	280	31	0.340 (0.129-0.893)	0.029*	0.841 (0.512-1.382)	0.495
White Collar	593	60	0.372 (0.146-0.943)	0.037*	0.707 (0.426-1.175)	0.181
Travel Distention:						
Africa	1153	106	Reference		Reference	
Europe	14	7	0.184 (0.073-0.465)	0.000*	4.36 (2.226-8.537)	0.000*
Middle East	56	8	0.644 (0.299-1.386)	0.260	0.413 (0.122-1.399)	0.155
North America	112	6	1.716 (0.737-3.995)	0.210	1.235 (0.445-3.425)	0.685
Oceania	80	18	0.409 (0.236-0.707)	0.001*	5.186 (1.74-15.458)	0.003*
South America	35	2	1.609	0.517	1.245	0.658

			(0.382-6.782)		(0.472-3.286)	
South Asia	118	12	0.904 (0.483-1.691)	0.752	8.387 (1.579-44.552)	0.013*
Southeast and East Asia	63	17	0.341 (0.192-0.603)	0.000*	3.666 (1.484-9.055)	0.005*
Purpose of Travel:						
Education	169	23	Reference		Reference	
Family	201	16	1.710 (0.875-3.341)	0.117	1.436 (0.682-3.023)	0.341
Leisure	527	62	1.157 (0.695-1.924)	0.575	0.989 (0.465-2.106)	0.978
Others	119	14	1.157 (0.572-2.340)	0.685	1.12 (0.702-1.786)	0.635
Work	615	61	1.372 (0.825-2.282)	0.223	1.465 (0.648-3.308)	0.359
Travel Period:						
Days	202	11	Reference		Reference	
Week	521	69	0.411 (0.213-0.793)	0.008*	3.07 (1.283-7.347)	0.012*
Month	634	54	0.639 (0.328-1.246)	0.189	2.161 (1.112-4.202)	0.023*
Years	274	42	0.355 (0.178-0.707)	0.003*	3.081 (1.633-5.812)	0.001*

† **Note:** The confidence interval for Western Region is notably wide, suggesting high variability, a small sample size, or an influential outlier.

Logistic Regression Analysis of Factors Associated with Receiving Prophylaxis Medication by Gender, Nationality, Region, and Ethnicity

Females were more likely to receive prophylaxis medication than males (adjusted OR: 1.669, p=0.001). Non-Saudi nationals had higher odds of receiving prophylaxis medication compared to Saudi nationals (adjusted OR: 1.857, p<0.001). Travelers from the Eastern Province had lower odds of receiving prophylaxis medication compared to those from the Central Region (adjusted OR: 0.286, p=0.000). Caucasian travelers had higher odds of receiving prophylaxis medication compared to African travelers (adjusted OR: 6.361, p=0.007).

Table 6: Logistic Regression Analysis of Factors Associated with Receiving Prophylaxis Medication

Variable	**Prophylaxis Medication**		**Univariate model**		**Multivariate model**	
Gender:	Yes	No	Crude OR (95% CI)	P value	Adjusted OR (95% CI)	P value
Male	1232	110	Reference		Reference	
Female	399	66	2.156	0.000 *	1.669	0.001 *

			(1.711-2.717)		(1.229-2.266)	
Nationality:						
Saudi	789	109	Reference		Reference	
Non-Saudi	842	67	0.818 (0.678-0.988)	0.037 *	1.857 (1.343-2.567)	0.000 *
Age:						
<18	156	21	Reference		Reference	
18-39	900	86	0.317 (0.168-0.595)	0.000 *	0.426 (0.194-0.937)	0.034 *
40-59	523	53	1.112 (0.671-1.843)	0.681	1.166 (0.606-2.243)	0.645
≥60	52	16	1.386 (0.828-2.322)	0.215	1.27 (0.655-2.462)	0.480
KSA Regions:						
Central Region	628	37	Reference		Reference	
Eastern Province	462	56	0.182 (0.134-0.249)	0.000 *	0.286 (0.208-0.391)	0.000 *
Northern Region	68	0	0.501 (0.286-0.878)	0.016 *	0.062 (0.042-0.091)	0.000 *
Southern Region	93	1	0.451 (0.275-0.740)	0.002 *	0.222 (0.115-0.431)	0.000 *
Western Region	380	82	4.058 (3.130-5.262)	0.000 *	0.111 (0.062-0.197)	0.000 *
Ethnicity:					0.286 (0.208-0.391)	0.000 *
African	189	11	Reference		Reference	
Caucasian	6	0	0.000 (0-0)	0.999	6.361 (1.676-24.147)	0.007 *
European and North American	42	4	0.122 (0.058-0.257)	0.000 *	0 (0-0)	0.999
Middle Eastern	1223	143	0.247 (0.178-0.342)	0.000 *	3.959 (0.919-17.054)	0.065
Others	14	11	0.359 (0.154-0.834)	0.017 *	3.772 (1.045-13.609)	0.043 *
South Asian	124	3	0.086 (0.050-0.149)	0.000 *	5.454 (1.114-26.705)	0.036 *
Southeast and East Asian	33	4	0.034	0.000 *	3.658	0.062 *

			(0.010-0.116)		(0.939-14.257)	
Occupation:						
Blue Collar	133	5	Reference		Reference	
Domestic Workers	94	4	2.170 (1.225-3.843)	0.008 *	2.154 (1.255-3.698)	0.005 *
Military Personnel	29	2	0.245 (0.102-0.586)	0.002 *	5.151 (2.576-10.302)	0.000 *
Not Working	502	74	0.268 (0.183-0.394)	0.000 *	0.405 (0.154-1.064)	0.067
Others/Unknown	280	31	0.717 (0.478-1.076)	0.108	1.422 (0.977-2.069)	0.066
White Collar	593	60	0.420 (0.289-0.610)	0.000 *	1.533 (1.104-2.128)	0.011 *
Travel Distention:						
Africa	1153	106	Reference		Reference	
Europe	14	7	0.305 (0.111-0.838)	0.021	7.226 (3.35-15.586)	0.000 *
Middle East	56	8	0.181 (0.091-0.358)	0.000 *	2.545 (0.659-9.831)	0.175
North America	112	6	0.211 (0.130-0.343)	0.000 *	1.481 (0.511-4.292)	0.470
Oceania	80	18	0.031 (0.010-0.098)	0.000 *	1.808 (0.697-4.691)	0.223
South America	35	2	0.594 (0.303-1.166)	0.130	0.975 (0.223-4.258)	0.973
South Asia	118	12	0.221 (0.140-0.349)	0.000 *	2.563 (0.842-7.802)	0.098
Southeast and East Asia	63	17	0.124 (0.061-0.250)	0.000 *	2.449 (0.979-6.129)	0.056
Purpose of Travel:						
Education	169	23	Reference		Reference	
Family	201	16	4.762 (3.082-7.358)	0.305	0.411 (0.236-0.716)	0.002 *
Leisure	527	62	2.099 (1.434-3.071)	0.181	0.443 (0.263-0.747)	0.002 *
Others	119	14	0.387 (0.199-0.754)	0.211	0.693 (0.51-0.942)	0.019 *

Work	615	61	3.327 (2.289-4.835)	0.031 *	0.245 (0.114-0.527)	0.000 *
Travel Period:						
Days	202	11	Reference		Reference	
Week	521	69	0.871 (0.633-1.198)	0.397	0.758 (0.447-1.284)	0.303
Month	634	54	1.426 (1.045-1.945)	0.025 *	1.231 (0.758-1.998)	0.401
Years	274	42	0.320 (0.216-0.474)	0.000 *	1.715 (1.08-2.722)	0.022 *

Logistic Regression Analysis of Factors Associated with Receiving Travel Counseling by Nationality, Region, Travel Destination, and Purpose of Travel

Non-Saudi nationals had lower odds of receiving travel counseling compared to Saudi nationals (adjusted OR: 0.611, p=0.008). Travelers from the Eastern Province had lower odds of receiving travel counseling compared to those from the Central Region (adjusted OR: 0.021, p=0.000). Travelers visiting Europe had higher odds of receiving travel counseling compared to those visiting Africa (adjusted OR: 6.738, p=0.047). Travelers whose purpose of travel was for family visits had lower odds of receiving travel counseling compared to those traveling for educational purposes (adjusted OR: 0.289, p=0.001).

Table 7: Logistic Regression Analysis of Factors Associated with Receiving Travel Counseling

Variable	**Travel counseling**		**Univariate model**		**Multivariate model**	
Gender:	Yes	No	Crude OR (95% CI)	P value	Adjusted OR (95% CI)	P value
Male	973	369	Reference		Reference	
Female	311	154	0.766 (0.610-0.961)	0.021 *	0.877 (0.621-1.239)	0.456
Nationality:						
Saudi	674	224	Reference		Reference	
Non-Saudi	610	299	0.678 (0.552-0.832)	0.001 *	0.611 (0.425-0.878)	0.008 *
Age:						
<18	111	66	Reference		Reference	
18-39	706	280	1.499 (1.073-2.095)	0.018 *	0.838 (0.486-1.446)	0.525
40-59	422	154	1.629 (1.141-2.326)	0.007 *	1.129 (0.628-2.027)	0.686
≥60	45	23	1.163 (0.646-2.093)	0.614	1.128 (0.483-2.63)	0.781
KSA Regions:						

Central Region	615	50	Reference		Reference	
Eastern Province	126	392	0.026 (0.018-0.037)	0.000 *	0.021 (0.014-0.032)	0.000 *
Northern Region	51	17	0.244 (0.131-0.453)	0.000 *	0.347 (0.175-0.689)	0.002 *
Southern Region	83	11	0.613 (0.307-1.225)	0.166	0.536 (0.26-1.102)	0.090
Western Region	409	53	0.627 (0.418-0.942)	0.024 *	0.531 (0.341-0.827)	0.005 *
Ethnicity:						
African	171	29	Reference		Reference	
Caucasian	2	4	0.085 (0.015-0.484)	0.006 *	0.456 (0.046-4.569)	0.504
European and North American	25	21	0.202 (0.100-0.407)	0.000 *	0.77 (0.288-2.054)	0.601
Middle Eastern	997	369	0.458 (0.304-0.691)	0.000 *	0.695 (0.373-1.296)	0.252
Others	19	6	0.537 (0.198-1.458)	0.222	3.307 (0.927-11.802)	0.065
South Asian	46	81	0.096 (0.056-0.164)	0.000 *	0.571 (0.267-1.217)	0.147
Southeast and East Asian	24	13	0.313 (0.143-0.684)	0.004 *	1.463 (0.512-4.18)	0.478
Occupation:						
Blue Collar	109	29	Reference		Reference	
Domestic Workers	85	13	1.740 (0.853-3.549)	0.128	0.842 (0.343-2.064)	0.706
Military Personnel	18	13	0.368 (0.162-0.839)	0.017 *	0.195 (0.063-0.61)	0.005 *
Not Working	375	201	0.496 (0.318-0.774)	0.002 *	0.526 (0.268-1.031)	0.062
Others/Unknown	242	69	0.933 (0.572-1.522)	0.781	0.779 (0.393-1.544)	0.474
White Collar	455	198	0.611 (0.393-0.951)	0.029 *	0.56 (0.302-1.038)	0.066
Travel Distention:						
Africa	955	304	Reference		Reference	

Europe	19	2	3.024 (0.700-13.057)	0.138	6.738 (1.023-44.394)	0.047 *
Middle East	39	25	0.497 (0.296-0.834)	0.008 *	0.46 (0.231-0.914)	0.027 *
North America	87	31	0.893 (0.581-1.373)	0.607	0.992 (0.524-1.878)	0.980
Oceania	30	68	0.140 (0.090-0.220)	0.000 *	1.374 (0.703-2.686)	0.353
South America	28	9	0.990 (0.462-2.122)	0.980	0.971 (0.332-2.842)	0.957
South Asia	71	59	0.383 (0.265-0.554)	0.000 *	0.804 (0.461-1.403)	0.443
Southeast and East Asia	55	25	0.700 (0.429-1.143)	0.154	0.989 (0.497-1.967)	0.974
Purpose of Travel:						
Education	146	46	Reference		Reference	
Family	173	44	1.239 (0.776-1.979)	0.370	0.289 (0.136-0.615)	0.001 *
Leisure	392	197	0.627 (0.432-0.910)	0.014 *	0.288 (0.153-0.541)	0.000 *
Others	56	77	0.229 (0.142-0.370)	0.000 *	0.198 (0.101-0.389)	0.000 *
Work	517	159	1.024 (0.703-1.492)	0.900	0.529 (0.282-0.995)	0.048 *
Travel Period:						
Days	167	46	Reference		Reference	
Week	381	209	0.502 (0.348-0.725)	0.000 *	1.502 (0.899-2.508)	0.120
Month	543	145	1.032 (0.709-1.500)	0.871	2.524 (1.466-4.346)	0.001 *
Years	193	123	0.432 (0.291-0.643)	0.000 *	1.533 (0.778-3.02)	0.217

Logistic Regression Analysis of Factors Associated with Medication Refill by Region (Southern Region) and Nationality (Non-Saudi Travelers)

Travelers from the Eastern Province had higher odds of utilizing medication refill services compared to those from the Central Region (adjusted OR: 3.904, **p=0.066**), this result was **not statistically significant** based on the conventional **p < 0.05** threshold. Travelers from the Southern Region also had higher odds of medication refills (adjusted OR: 6.508, p=0.034). No other factors were significantly associated with medication refills.

Table 8: Logistic Regression Analysis of Factors Associated with Medication Refill

Variable	Refill medication		Univariate model		Multivariate model	
Gender:	Yes	No	Crude OR (95% CI)	P value	Adjusted OR (95% CI)	P value
Male	13	1329	Reference		Reference	
Female	4	461	0.887 (0.288-2.734)	0.835	0.739 (0.217-2.521)	0.629
Nationality:						
Saudi	14	884	Reference		Reference	
Non-Saudi	3	906	0.209 (0.060-0.730)	0.014*	0.281 (0.056-1.425)	0.126
Age:						
<18	0	177	Reference		Reference	
18-39	13	973	21583969.598 (0-0)	0.996	18723089.61 (0-0)	0.995
40-59	3	573	8457995.336 (0-0)	0.996	6560525.568 (0-0)	0.995
≥60	1	67	24111598.644 (0-0)	0.996	19119377.171 (0-0)	0.995
KSA Regions:						
Central Region	3	662	Reference		Reference	
Eastern Province	8	510	3.461 (0.914-13.113)	0.068	3.904 (0.913-16.7)	0.066
Northern Region	1	67	3.294 (0.338-32.106)	0.305	3.973 (0.356-44.353)	0.262
Southern Region	3	91	7.275 (1.447-36.585)	0.016*	6.508 (1.156-36.637)	0.034*
Western Region	2	460	0.959 (0.160-5.765)	0.964	1.396 (0.22-8.859)	0.724
Ethnicity:						
African	0	200	Reference		Reference	
Caucasian	0	6	1.000 (0-0)	1.000	0.124 (0-0)	1.000
European and North American	1	45	35899473.238 (0-0)	0.995	10199005.759 (0-0)	0.994
Middle Eastern	16	1350	19146385.727	0.995	1648920.511	0.995

			(0-0)		(0-0)	
Others	0	25	1.000 (0-0)	1.000	0.202 (0-0)	1.000
South Asian	0	127	1.000 (0-0)	1.000	0.608 (0-0)	1.000
Southeast and East Asian	0	37	1.000 (0-0)	1.000	0.694 (0-0)	1.000
Occupation:						
Blue Collar	0	138	Reference		Reference	
Domestic Workers	0	98	1.000 (0-0)	1.000	1.589 (0-0)	1.000
Military Personnel	0	31	1.000 (0-0)	1.000	0.06 (0-0)	1.000
Not Working	6	570	17005047.673 (0-0)	0.996	1591668.165 (0-0)	0.996
Others/Unknown	3	308	15735190.217 (0-0)	0.996	1749025.245 (0-0)	0.996
White Collar	8	645	20036955.398 (0-0)	0.996	1912885.252 (0-0)	0.996
Travel Distention:						
Africa	14	1245	Reference		Reference	
Europe	0	21	0.000 (0-0)	0.998	0 (0-0)	0.998
Middle East	1	63	1.412 (0.183-10.905)	0.741	1.278 (0.141-11.6)	0.828
North America	0	118	0.000 (0-0)	0.996	0 (0-0)	0.996
Oceania	1	97	0.917 (0.119-7.045)	0.933	0.295 (0.025-3.436)	0.330
South America	0	37	0.000 (0-0)	0.998	0 (0-0)	0.998
South Asia	1	129	0.689 (0.090-5.285)	0.720	0.639 (0.077-5.336)	0.679
Southeast and East Asia	0	80	0.000 (0-0)	0.997	0 (0-0)	0.997
Purpose of Travel:						
Education	4	188	Reference		Reference	

Family	0	217	0.000 (0-0)	0.995	0 (0-0)	0.994
Leisure	8	581	0.647 (0.193-2.170)	0.481	0.753 (0.096-5.88)	0.787
Others	0	133	0.000 (0-0)	0.996	0 (0-0)	0.996
Work	5	671	0.350 (0.093-1.310)	0.121	0.381 (0.047-3.086)	0.366
Travel Period:						
Days	1	212	Reference		Reference	
Week	8	582	2.914 (0.362-23.438)	0.315	2.383 (0.269-21.099)	0.435
Month	4	684	1.240 (0.138-11.152)	0.848	1.760 (0.172-17.982)	0.633
Years	4	312	2.718 (0.302-24.486)	0.373	5.061 (0.376-68.079)	0.221

2. DISCUSSION

The study found a significant male predominance among travelers, with 74.3% (1,342) being male and 25.7% (465) being female. This aligns with findings from other regional studies. Alkadi et al. reported that 66.1% of travelers at King Abdulaziz International Airport (KAIA) were male, while Abri et al. noted a similar male dominance among travelers at Muscat International Airport in Oman [9,10]. Similarly, Al-Dahshan et al. found that most international travelers visiting travel clinics were male (74.3%) [11]. This trend may be attributed to occupational factors, as work-related travel was the most common reason for travel in this study (37.4%). Additionally, cultural and socioeconomic factors may influence travel behavior, with men more likely to undertake international travel for employment or business purposes. Previous studies have also highlighted gender differences in health-seeking behavior, with Sharahili et al. reporting variations in travel medicine awareness among healthcare professionals in Saudi Arabia [12]. Ali similarly emphasized that travel health practices differ based on demographic factors, including gender [13].

The age distribution revealed that most travelers were in the 18–39 age group (54.6%), followed by those aged 40–59 years (31.9%), <18 years (9.8%), and ≥60 years (3.8%). These findings are consistent with Alkadi et al., who reported that the largest group of travelers at KAIA was aged 26–35 years (39.9%), followed by 18.6% in the 18–25 age group and 15.3% above 45 years [9]. Sharahili et al. similarly found that most healthcare providers were aged 30–49 years, reflecting a younger workforce, which aligns with the observation that younger individuals dominate traveler populations. Aw et al. further suggested that younger travelers are more likely to seek pre-travel consultations [2]. These findings are also supported by Kogelman et al. [14], who noted that a significant portion of primary care physicians see fewer than 50 travelers annually, highlighting the low frequency of travel consultations.

The study found an almost even split between Saudi (49.7%) and non-Saudi (50.3%) travelers, with the majority originating from the Central Region (36.8%). In comparison, Alkadi et al. reported that 55% of travelers at KAIA were Saudi nationals and 78.5% were residents of Saudi Arabia [9]. In contrast, Sharahili et al. found that non-Saudis made up 63% of healthcare providers, highlighting the essential role of expatriate professionals in travel health services. Moreover, their study indicated that travelers from the Eastern Province had higher odds of receiving vaccinations (adjusted OR: 7.222, $p < 0.001$), reinforcing the region's substantial contribution to travel activity [12].

The majority of travelers were of Middle Eastern ethnicity (75.6%, 1,366), with smaller proportions of African (11.1%, 200) and South Asian (7.0%, 127) travelers. While Sharahili et al. did not explicitly analyze ethnicity, the high proportion of non-Saudi healthcare providers indirectly reflects the diversity of ethnic backgrounds in travel medicine [12].

White-collar workers (36.1%, 653) and unemployed individuals (31.9%, 576) were the most common groups among

travelers. While few studies have analyzed traveler occupations explicitly, Sharahili et al. found that healthcare providers frequently offer travel-related advice to professionals, indicating that occupational status may influence clinic utilization. Almogbel et al., while focused on healthcare providers, highlighted that professional experience (5–10 years) was associated with pre-travel consultation practices, indirectly supporting the role of occupation in shaping travel medicine engagement [15].

The study found that Africa was the most frequent travel destination (69.7%, 1,259), followed by South Asia (7.2%, 130) and North America (6.5%, 118). By comparison, Alkadi et al. reported that the Middle East was the most common destination (40.1%), followed by Africa (26%) and Asia (17.1%) [9]. The differences in travel destinations may reflect varying travel purposes across populations. Aw et al. emphasized the need for region-specific vaccinations—such as yellow fever for Africa and typhoid for South Asia—which aligns with this study's findings regarding vaccine administration [2]. Sharahili et al. also noted that physicians frequently provide region-specific advice, such as malaria prophylaxis for African destinations [12].

Work-related travel (37.4%, 676) and tourism (32.6%, 589) were the most common reasons for travel. Similarly, Alkadi et al. found that tourism (36.6%), business (22%), and visiting friends or relatives (17.1%) were among the leading purposes of travel [9]. Sharahili et al. reported that 79.5% of healthcare providers offered travel-related advice, often for work- and leisure-related travel [12].

Vaccination services were the most commonly utilized travel clinic service (90.3%), with yellow fever vaccination (73.6%) being the most frequently administered. This finding is consistent with Sharahili et al., who also identified yellow fever vaccination as a common service provided at travel clinics [12]. In contrast, Alkadi et al. found that hepatitis A and B vaccines were the most recognized by travelers (76.7% and 77.9%, respectively), while knowledge of typhoid (44.8%) and rabies (39.9%) vaccines was lower [9]. However, Ali identified significant gaps in travel medicine training, particularly regarding vaccines like yellow fever and typhoid [13]. Likewise, Kumar et al. reported that 85% of Indian physicians provided vaccination advice—a much higher rate than the 55% observed in this study—suggesting regional differences in travel medicine service delivery [16].

Travel counseling was widely utilized (71.1%). Similarly, Sharahili et al. found that most healthcare providers gave pre-travel advice, with 79.5% offering counseling [12]. However, Kurup et al. identified gaps in counseling services in Oman, emphasizing the need for better training to improve traveler outcomes [17]. Pavli et al. reported that 86% of Greek international travelers sought pre-travel consultations, a higher rate than observed in this study [18]. While the counseling uptake in this study (71.1%) is relatively high, expanding access and ensuring consistent delivery of travel advice remain important. Almogbel et al. further found that only 48% of physicians conducted pre-travel consultations and 43% conducted post-travel consultations, suggesting that counseling services could still be enhanced [15].

Prophylaxis medication was used by 40% of travelers, whereas refill medication accounted for only 0.9%. This is **notably higher** than the findings of Alkadi et al., who reported that only 18.1% of travelers received or purchased preventive medications—including vaccines and malaria prophylaxis [9]. Similarly, Omer et al. highlighted low uptake of travel vaccinations and malaria prophylaxis among Dubai travelers [19]. The higher utilization in this study may reflect differences in travel health awareness, clinic accessibility, or traveler risk profiles. However, gaps in prophylaxis counseling remain, as Sharahili et al. found that 55% of physicians did not advise travelers on prophylaxis for diarrhea, indicating inconsistencies in service delivery [12]. Almogbel et al. further noted that physicians with fair knowledge of travel medicine often had minimal exposure to travelers, underscoring the importance of improved training, particularly in prophylaxis counseling [15].

The study found significant associations between demographic factors (age, ethnicity, occupation) and services such as vaccinations and counseling. These findings are consistent with Sharahili et al., who also reported associations between demographic factors and service utilization—including age and vaccination (adjusted OR: 3.486, $p = 0.001$). Alkadi et al. found that male travelers were more knowledgeable about travel health than females (31.5% vs. 21.9%, $p = 0.043$); however, Abri et al. reported that females had higher percentages of good travel health practices than males in Oman [9,10]. Aw et al. emphasized the need for tailored health services based on demographic trends [2].

Recent literature underscores additional complications in travel health beyond traditional infectious disease risks. Ngeh et al. [6] demonstrated the potential for long-haul flights to contribute to SARS-CoV-2 transmission, thereby emphasizing the importance of robust in-flight and airport health interventions. In addition, studies by Mellon et al. [7] and Sridhar et al. [8] have revealed that international travel serves as a conduit for the acquisition of antimicrobial-resistant bacteria, highlighting the need for integrated surveillance and effective preventive counseling among travelers.

Furthermore, non-infectious complications such as travel-associated venous thromboembolism have gained prominence. McKerrow Johnson et al. [20] reported on the incidence and risk factors of venous thromboembolism in travelers, suggesting that prolonged immobility and individual predisposition can lead to significant morbidity. Adventure travel, with its unique

set of exposures, has been linked with both infectious and non-infectious risks, as reviewed by Gundacker et al. [21] and further corroborated by Worby et al. [22]. These additional findings reinforce the necessity for comprehensive travel medicine services addressing both infectious and non-infectious health risks. Moreover, enhanced surveillance efforts for diseases such as typhoid fever—as detailed by Hancuh et al. [23]—underscore the importance of robust vaccination programs and public health strategies in the context of increasing global travel.

In view of vaccination practices, the high uptake of yellow fever vaccination is in line with current recommendations, as detailed by Gershman and Staples [24]. Similarly, guidance on meningococcal vaccination from McNamara and Blain [25] informs targeted immunization strategies for the prevention of travel-associated infections.

This study highlights patterns in the utilization of preventative measures among Middle Eastern travelers. Studies from Europe, such as those by Pavli et al. [18] and Van Herck et al. [26], have reported significantly higher levels of travel health preparedness. While our study did not directly assess traveler awareness, the differences in vaccination and prophylaxis uptake suggest a potential need for targeted interventions to improve access to and utilization of travel health services in the Middle East

The limitations of the study include reliance on secondary data, which limited the ability to verify the accuracy of recorded information. Additionally, **10%** of the data was incomplete, leading to missing demographic and travel details and the exclusion of affected participants from analyses. Furthermore, the study focuses only on data from 2023, which may not capture trends over time

Based on the study findings, several recommendations can be made to enhance travel health services. First, targeted awareness campaigns should focus on increasing public awareness, particularly among younger travelers (18–39 years, 54.6%) and males (74.3%), who constituted the majority of travelers in this study. Second, region-specific health interventions should be developed, especially for travelers to Africa (69.7%), the most common destination, with a focus on improving yellow fever vaccination (73.6%) coverage and malaria prophylaxis uptake. Third, training for healthcare providers should be enhanced, specifically in pre-travel counseling, prophylaxis recommendations (malaria prevention, diarrhea prevention), and improving vaccination counseling to address identified gaps in prophylaxis prescription (40% uptake). Fourth, access to travel health services should be strengthened by expanding the availability of travel clinics and improving access to prophylaxis medications and vaccines, particularly for non-Saudi travelers (50.3%), who had lower odds of receiving vaccinations. Finally, future research should focus on conducting longitudinal studies to track trends in travel health service utilization and assess the long-term impact of travel clinics, particularly for work-related travelers (37.4%), who represent a significant portion of the traveling population.

3. CONCLUSION

This study highlights the demographic characteristics of international travelers visiting travel clinics in Saudi Arabia and the services they utilize. Vaccinations, especially for yellow fever, remain the cornerstone of travel health services, while counseling and prophylaxis are essential for risk mitigation. The significant associations between demographics and service utilization underscore the need for tailored public health strategies to optimize travel clinic services and reduce disease transmission risks. Addressing the identified limitations and implementing the proposed recommendations can further enhance the effectiveness of travel medicine programs in Saudi Arabia.

REFERENCES

[1] García-García D, Fernández-Martínez B, Bartumeus F, et al. Modeling the regional distribution of international travelers in Spain to estimate imported cases of dengue and malaria: statistical inference and validation study. JMIR Public Health Surveill. 2024;10:e51191.

[2] Aw B, Boraston S, Botten D, Cherniwchan D, Fazal H, Kelton T, et al. Travel medicine: what's involved? When to refer? Can Fam Physician. 2014;60(12):1091–103.

[3] Alfozan KS, et al. Assessment of knowledge, attitude, and practice in relation to travel health among travelers in Qassim Region. Majmaah J Health Sci. 2020;7(2):22.

[4] Matteelli A, Schlagenhauf P, Carvalho AC, et al. Travel-associated sexually transmitted infections: an observational cross-sectional study of the GeoSentinel surveillance database. Lancet Infect Dis. 2013;13(3):205–13.

[5] Alanazi A, et al. A decade of travel-associated malaria at King Fahad Hospital of the University in the Eastern Province of Saudi Arabia. Sci Rep. 2022;12(1):966.

[6] Ngeh S, Vogt F, Sikazwe CT, et al. Travel-associated SARS-CoV-2 transmission documented with whole genome sequencing following a long-haul international flight. J Travel Med. 2022;29.

[7] Mellon G, Turbett SE, Worby C, et al. Acquisition of antibiotic-resistant bacteria by U.S. international travelers.

N Engl J Med. 2020;382:1372–1374.

[8] Sridhar S, Turbett SE, Harris JB, et al. Antimicrobial-resistant bacteria in international travelers. Curr Opin Infect Dis. 2021;34:423–431.

[9] Alkadi W, Salih S, Al Darbi M. Assessment of knowledge, attitudes, and practices regarding travel health among King Abdulaziz International Airport travelers in Jeddah, Kingdom of Saudi Arabia. J Family Med Prim Care. 2021;10(8):3013–20.

[10] Abri SS, Abdel-Hady DM, Al-Abaidani IS. Knowledge, attitudes, and practices regarding travel health among Muscat International Airport travelers in Oman: identifying the gaps and addressing the challenges. J Epidemiol Glob Health. 2016;6(2):67–75.

[11] Al-Dahshan A, Selim N, Al-Kubaisi N, Mahfoud Z, Kehyayan V. Scope and predictors of travel medicine practice among primary care physicians in Qatar. Prev Med Rep. 2023;35:102337.

[12] Sharahili AA, AL-Eanzi F, Ghzwany AA, Alazmi AM, Alhwsawi EA. Knowledge, attitude, and practice of travel medicine among primary health care physicians in the Cluster-1, Riyadh City, Saudi Arabia: a cross-sectional study. J Family Med Prim Care. 2021;10(7):2587–93.

[13] Ali AM. Knowledge and self-reported practice of travel medicine among primary health care physicians, Jeddah, Saudi Arabia. Fam Med Residents Res. 2014.

[14] Kogelman L, Barnett ED, Chen LH, et al. Knowledge, attitudes, and practices of U.S. practitioners who provide pre-travel advice. J Travel Med. 2014;21(2):104–14.

[15] Almogbel ES, Almutairi SM, Almuzaini AS, Alduraibi AA, Almutairi A, Almarshad AS, Altwaijri M, Alharbi S. The knowledge, attitudes, and practices of primary healthcare physicians in the Al Qassim Region, Saudi Arabia regarding travel medicine: a cross-sectional study. Cureus. 2024 Jan;16(1).

[16] Kumar A, Rajendran A, Usman M, et al. Development and validation of a questionnaire to evaluate knowledge, attitude, and practices regarding travel medicine amongst physicians in an apex tertiary hospital in Northern India. Trop Dis Travel Med Vaccines. 2022;8:13.

[17] Kurup P, Al Abri S, Al Ajmi F, Khamis H, Singh J. Knowledge, attitude and practice of travel medicine among primary care physicians in Oman: the need for intervention. East Mediterr Health J. 2019;25:40–6.

[18] Pavli A, Silvestros C, Patrinos S, Maltezou HC. Vaccination and malaria prophylaxis among Greek international travelers to Asian destinations. J Infect Public Health. 2015;8(1):47–54.

[19] Omer F, Hassan N, Hussain H, Mana S, Awad O. Travel health, gaps in knowledge, attitudes, and practices among Dubai travelers, Dubai UAE. Int J Prev Med Res. 2015;1(2):126–31.

[20] McKerrow Johnson I, Shatzel J, Olson S, et al. Travel-associated venous thromboembolism. Wilderness Environ Med. 2022;33:169–178.

[21] Gundacker ND, Rolfe RJ, Rodriguez JM. Infections associated with adventure travel: a systematic review. Travel Med Infect Dis. 2019;16:3–10.

[22] Worby CJ, Earl AM, Turbett SE, Becker M, Rao SR, Oliver E, Taylor Walker A, Walters M, Kelly P, Leung DT, Knouse M. Acquisition and long-term carriage of multidrug-resistant organisms in US international travelers. InOpen Forum Infectious Diseases 2020 Dec (Vol. 7, No. 12, p. ofaa543). US: Oxford University Press.

[23] Hancuh M, Walldorf J, Minta AA, et al. Typhoid fever surveillance, incidence estimates, and progress toward typhoid conjugate vaccine introduction—worldwide, 2018–2022.

[24] Gershman MD, Staples JE. Yellow fever. CDC Yellow Book 2024. Centers for Disease Control and Prevention. Accessed July 12, 2023.

[25] McNamara L, Blain A. Meningococcal Disease. Map 5-01: The meningitis belt & other areas at risk for meningococcal meningitis epidemics. CDC Yellow Book 2024. Centers for Disease Control and Prevention. Accessed July 12, 2023.

[26] Van Herck K, Zuckerman J, Castelli F, Van Damme P, Walker E, Steffen R. Travelers' knowledge, attitudes, and practices on prevention of infectious diseases: results from a pilot study. J Travel Med. 2003;10(2):75-8.