Original article

Trends of Referrals Throughout the Kingdom, A Retrospective Analysis of the Saudi Medical Appointments and Referrals Centre Registry, Saudi Arabia

Abdulaziz Alnassar [*1], Nawfal Aljerian [2,3], Abdulaziz Alhosaini [2], Ali Alsultan [2], Lyla Ashry [2], Sawsan Alharthi [3], Mohammed Arafat [2], Abdulrahman Aldhabib [2], Ibrahim Almohaimeed [2], Ahmed Aloqayli [2], Sara Albanyan [2], Bader Alrabiah [2], Abdullah Salim [4]

[1]College of Medicine, Dar Al Uloom University, Riyadh, Saudi Arabia.
[2]Ministry of Health Medical Referrals Center, ITCC Compound, An Nakheel, Riyadh, Saudi Arabia, King Saud Bin Abdulaziz University, College of Medicine, Ar Rimayah, Riyadh, Saudi Arabia.
[3]College of Medicine, King Saud Bin Abdulaziz University for Health Sciences, Riyadh, Saudi Arabia.
[4]College of Medicine, Alfaisal University, Riyadh, Saudi Arabia.

*Corresponding author: Abdulaziz Alnassar, College of Medicine, Dar Al Uloom University, Riyadh, Saudi Arabia;
alnassar7@hotmail.com

Abstract

Background: The referral process has a central role within health care systems, acting as a gateway to those requiring certain methods of care and services. The main objective of our study was to assess the trends of referrals across the regions of Saudi Arabia during a four-year period from 2018 to 2021 involving a total of more than 1·6 million referrals. **Methods:** We conducted a retrospective observational study design of referral data submitted by practitioners from different facilities across all regions within Saudi Arabia. Data was obtained from the Saudi Medical Appointments and Referrals Centre (SMARC) over a four-year timeline from 2018 to 2021, with data including the type of referral, reason for referral, and the required specialty. **Results:** A total of 1,607,009 referrals across the Kingdom of Saudi Arabia were analyzed. The overall number of referrals have increased dramatically throughout the years with an increase of 55% from the year 2018 to 2021, with most referrals being routine (938,467) (58·3%) composed of inpatient and outpatient types of referrals (Figure 1A). Unavailability of required specialty by the primary provider was the most popular reason for referral (897,461) (55·8%), with General Surgery contributing to the majority of referrals (430,664) (26·7%) (Figures 2A, 3A). Referrals initiated from 2019 to 2021 had an acceptance rate of 55·3% with the remaining being either closed (43·3%) or rejected (0·5%). The nationality of the individual requiring a referral was most likely Saudi, contributing to a total of (1,109,254) (84.8%) referrals from 2019 to 2021 (Tables 4A-4B). **Conclusions:** Upon assessing trends of referrals across regions of Saudi Arabia, we observed a major increase in referrals starting from the year 2018 to 2021, potentially inflicting harm on the sustainability of high-quality health systems. Further actions should be taken to assess the appropriateness of referrals made, which could aid in identifying areas of inefficiencies and possible rate reduction.

Keywords: *Referrals, Health systems, Public health, Referral rates, Trends.*

Introduction

The referral system is established to deliver patients' healthcare needs and requirements by permitting the accessibility to certain resources which are needed and not available at the initial site of care. It's an integrated system linking a series of healthcare facilities including primary care centers, regional hospitals, and the national referral center providing a coordinated approach to patient care [1]. The referral process, along with its associated coordination in patient care are important determinants of healthcare quality and spending, raising the importance in the decision on whether the referral to secondary care is necessary or not, in order to avoid the potential risk of both referral overuse and underuse [2,3]. Referrals from primary care centers to specialists are likely associated with higher healthcare spending, which could act as an economic burden [4]. Throughout the past years, there has been an observed increase in referral rates, likely influenced by the increasing complexity of care required, insufficiency of resources and rising demand. Further understanding of current referral determinants and appropriate use of referrals is essential for enhancing care delivery, especially in rural areas lacking medical services [4-6]. Given the importance of referrals and its vital role in healthcare, the epidemiology and patterns of referrals have not been widely studied, and to our knowledge, national trends of referrals across regions of Saudi

Arabia have not been described in the past. Due to the significant role of referrals in healthcare, in addition to the lack of understanding in relation to certain trends of referrals occurring within the regions of Saudi Arabia, gaining further insight into the referral process and identifying trends nationally will be of great use to health officials, organizations, and policy makers in optimization of healthcare spending and delivery. In this study, we examined all medical and surgical referrals recorded nationwide from 2018 to 2021, using data obtained from the Saudi Medical Appointments and Referrals Centre (SMARC). Our focus in this study was to identify trends associated with referrals and assess for any significant changes occurring over the 2018-2021 period. We also examined referrals for specific patient groups and demographics, including an analysis of referrals using a wide set of variables including the type of referral, reason for referral, and the required specialty.

Materials and Methods

Study design and data collection
Design: We adopted a retrospective observational study design of referral trends occurring nationwide across regions of Saudi Arabia from different levels of care and facilities distributed across the country, involving primary care referrals to specialists, and required health services.

Study setting: All referrals were recorded within Saudi Arabia, across multiple regions involving the Central, Southern, Northern, Western, and Eastern regions with a total population of approximately 35 million people.

Data sources and variables: With permission from the Saudi Medical Appointments and Referrals Centre (SMARC), a governmental entity which accepts and coordinates national medical referrals within Saudi Arabia, all data were collected and obtained retrospectively from their database, which was later transferred and stored onto an Excel Sheet as a reference for further interpretation and analysis. Collected data were both coded and non-coded in nature, with variables involving the type of referral, reason for referral, the required specialty, status of the referral to identify its course throughout healthcare, the region in which the referral took place, and the nationality of the individual requiring a referral. All

of the mentioned variables were recorded in a qualitative and descriptive form of data (non-coded), with each variable being translated and linked to an individual code represented in a numerical format except the nationality of the individual requiring a referral which remained in a descriptive form.

Statistical analysis

SPSS software (version 23·0) was used for data analysis of referrals retrieved through the Saudi Medical Appointments and Referrals Centre (SMARC), with categorical data being reported as frequencies and percentages. We analyzed referrals by patient characteristics, physician characteristics and visit setting. Variables analyzed included the geographic location in which the referral arose, descriptive data which were analyzed to identify certain trends related to frequently accessed and required services, the type of referral, reason for referral, and the required specialty related to the referral. Analysis and distribution of patient nationality related to each referral was also made limited to the years 2019-2021, along with the rate of referral compliance occurring throughout regions of Saudi Arabia, mainly involving the acceptance and rejection of referrals. These limitations were due to the unavailability of data related to the year 2018.

Results

A total of 1,607,009 referrals recorded across regions of Saudi Arabia were gathered and analyzed from a four-year period starting from 2018 to 2021. Overall referral rates have seen a significant increase throughout the years, from a total of (299,465) referrals in 2018 to (464,052) in 2021, an increase of 55% (Figure 1A). A majority of referrals were routine (938,467) (58·3%), with an increase of 53·4% from 2018-2021 and a slightly similar peak occurrence within both western (238,975) (25·4%) and southern (215,226) (22·9%) regions (Figures 1A-1B). Emergency referrals (587,949) accounted for (36·5%) of total referrals mainly occurring in the southern region (202,624) (34·4%), with an increase of (38·8%) since 2018. Lifesaving referrals (80,593) (5%) mainly contributed from the central (27,015) (33·5%) and southern (23,390) (29%) regions have seen a high increase of (492%) (**Table 1, Figures 1A-1C**).

Table (1): Descriptive distribution of the referral type occurring nationwide among regions of Saudi Arabia throughout the years 2018-2021.

ROUTINE				
Region	**Year 2018**	**Year 2019**	**Year 2020**	**Year 2021**
Central Region	11,159	49,273	35,545	58,748
Eastern Region	23,341	40,418	27,541	48,479
Western Region	23,066	75,326	59,908	80,675
Southern Region	63,111	59,390	34,262	58,463
Northern Region	70,255	32,756	26,641	40,987
SUB-TOTAL	190,932	257,163	183,897	287,352
Blank/Unknown	1,637	4,900	4,483	8,103
TOTAL	192,569	262,063	188,380	295,455
Percentage	58·3%			
LIFE SAVING				
Region	**Year 2018**	**Year 2019**	**Year 2020**	**Year 2021**
Central Region	429	8,299	8,526	9,761
Eastern Region	244	2,358	2,011	2,438
Western Region	803	6,654	5,539	6,449
Southern Region	2,571	7,913	6,536	6,370
Northern Region	386	847	1,041	1,323
SUB-TOTAL	4,433	26,071	23,653	26,341
Blank/Unknown	22	23	24	26
TOTAL	4,455	26,094	23,677	26,367
Percentage	5%			

| EMERGENCY				
Region	Year 2018	Year 2019	Year 2020	Year 2021
Central Region	6,292	27,044	33,689	24,209
Eastern Region	12,347	16,218	20,394	17,549
Western Region	18,235	42,142	48,657	39,683
Southern Region	37,705	56,731	64,102	44,086
Northern Region	27,605	15,972	17,885	16,405
SUB-TOTAL	102,184	158,107	184,727	141,932
Blank/Unknown	257	239	205	298
TOTAL	102,441	158,346	184,932	142,230
Percentage	36·5%			
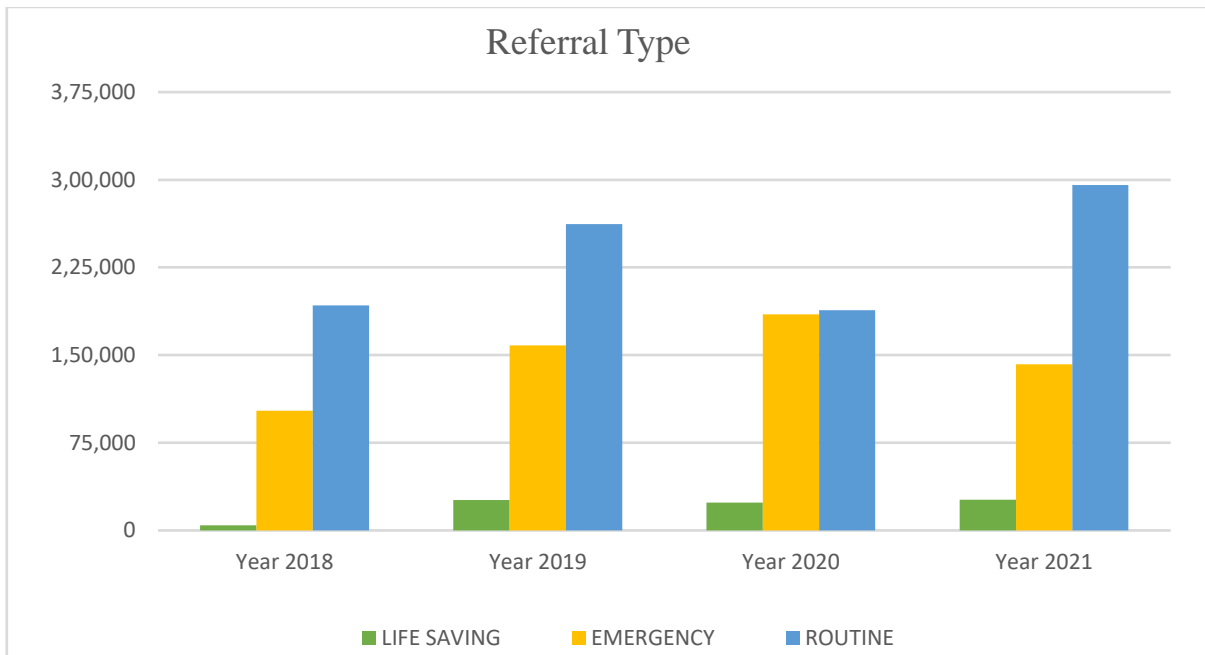
Figure (1A): Column figure presenting the number of each referral type and its variation throughout the years.
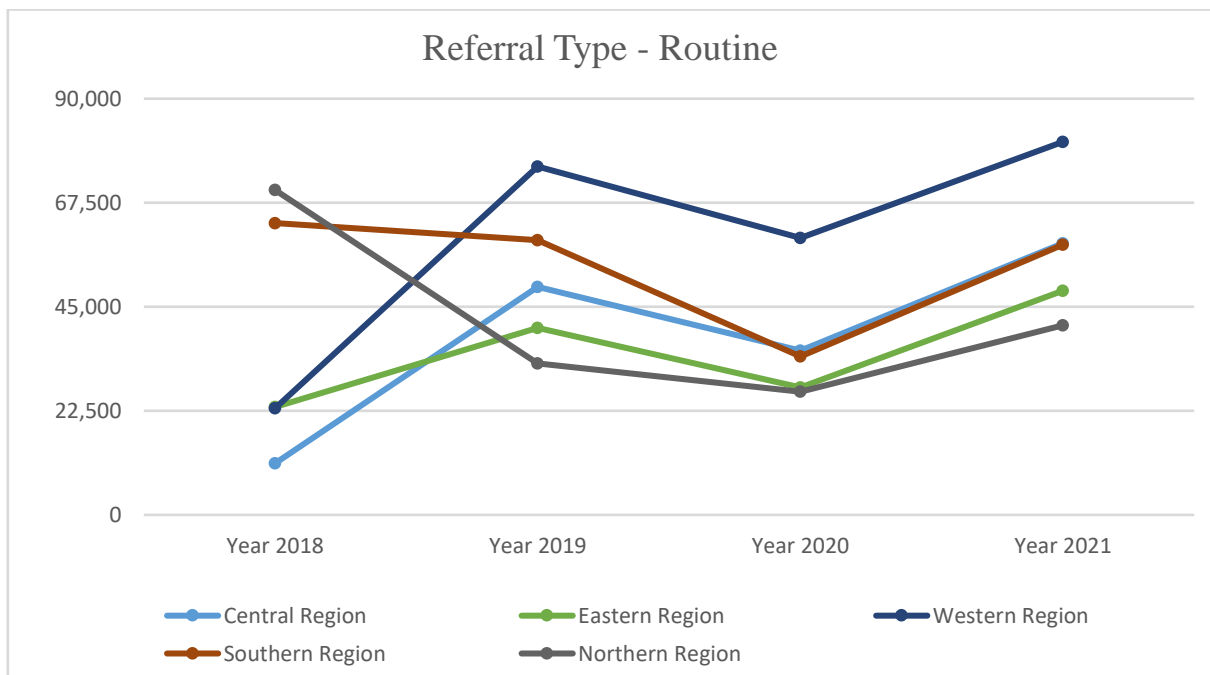

Figure (1B): Showing an overall trend evaluation and comparison of routine referrals throughout the years along with the corresponding regions.
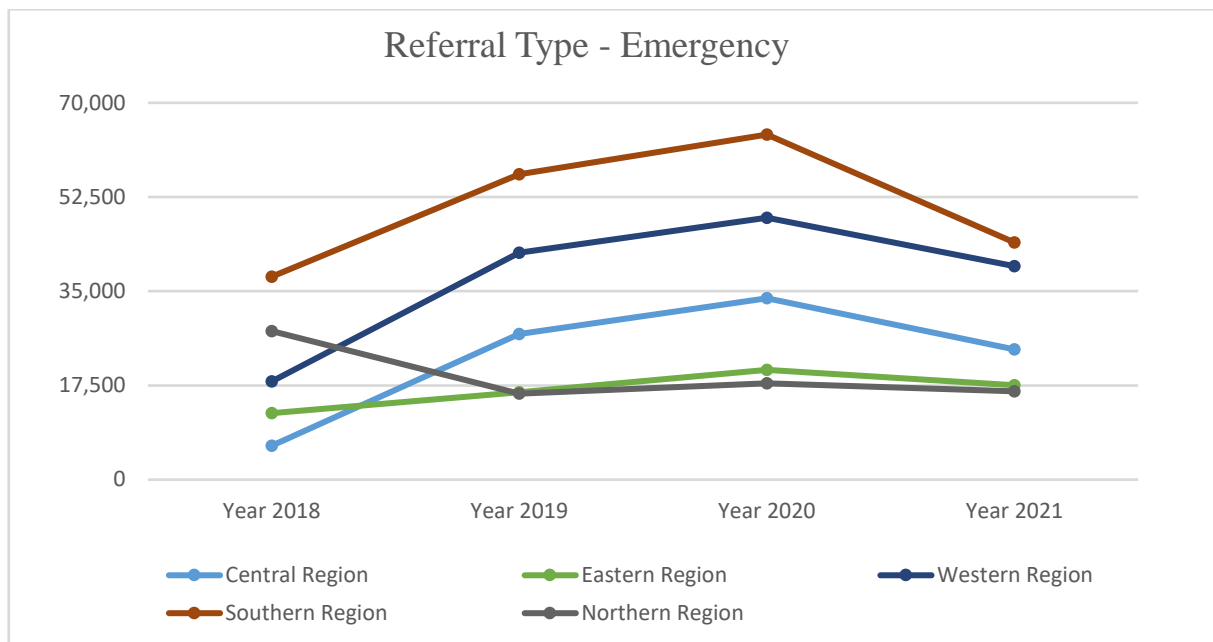
Figure (1C): Showing an overall trend evaluation and comparison of emergency referrals throughout the years along with the corresponding regions.

The top five reasons for referral included Unavailability of Speciality which contributed to the majority of reasons for referral (897,461) (55·8%) mainly involving both the southern (219,298) (24·4%) and western (228,039) (25·4%) regions with a high increase of (102·8%) since 2018. Unavailability of Specialist made up (314,222) (19·5%), mainly involving the southern region (83,460) (26·5%) with a decrease of (8·7%) from 2018 to 2021, Unavailability of Required Device (224,773) (13·9%) mainly

involving the Southern Region (83,088)(36·9%) showed a decrease of (4·1%), Unavailability of Bed (115,535) (7·1%) with a peak of occurrence within the western (44,846)(38·8%) and southern (37,609)(32·5%) regions, in addition to a high increase of (99%) throughout the years, Social Reasons (5,269) (0·3%) mostly from the Western Region (2,772)(52·6%) have also risen with a high increase of (209·7%), and other reasons such as injuries account for a total of (49,749) (3%) (**Table 2, Figures 2A-2C**).

Table (2): Descriptive distribution of the referral reason occurring nationwide among regions of Saudi Arabia throughout the years 2018-2021.

UNAVAILABILITY OF SPECIALITY				
Region	Year 2018	Year 2019	Year 2020	Year 2021
Central Region	10,858	51,536	48,157	64,555
Eastern Region	14,184	34,772	29,436	43,681
Western Region	17,205	70,639	61,084	79,111
Southern Region	47,255	56,752	54,061	61,230
Northern Region	52,903	24,746	24,560	35,330
SUB-TOTAL	142,405	238,445	217,298	283,907
Blank/Unknown	1,144	3,196	3,857	7,209
TOTAL	143,549	241,641	221,155	291,116
Percentage	55·8%			
UNAVAILABILITY OF SPECIALIST				
Region	Year 2018	Year 2019	Year 2020	Year 2021
Central Region	3,331	15,922	11,822	13,071
Eastern Region	13,066	13,768	8,391	12,217
Western Region	10,849	25,906	16,350	18,692
Southern Region	27,098	26,124	14,670	15,568
Northern Region	25,126	16,303	11,243	12,956
SUB-TOTAL	79,470	98,023	62,476	72,504
Blank/Unknown	310	818	287	334
TOTAL	79,780	98,841	62,763	72,838
Percentage	19·5%			
UNAVAILABILITY OF REQUIRED DEVICE				
Region	Year 2018	Year 2019	Year 2020	Year 2021
Central Region	2,801	12,392	8,230	8,315
Eastern Region	4,788	7,312	5,180	7,765
Western Region	6,304	13,276	10,520	13,857
Southern Region	26,014	23,274	14,088	19,712

| Northern Region	19,931	6,816	5,700	7,965
SUB-TOTAL	59,838	63,070	43,718	57,614
Blank/Unknown	308	183	19	23
TOTAL	60,146	63,253	43,737	57,637
Percentage	13·9%			
UNAVAILABILITY OF BED				
Region	Year 2018	Year 2019	Year 2020	Year 2021
Central Region	846	4,688	5,232	4,713
Eastern Region	3,475	2,805	2,918	2,876
Western Region	7,447	13,560	12,791	11,048
Southern Region	2,948	13,516	11,142	10,003
Northern Region	239	1,685	1,988	1,272
SUB-TOTAL	14,955	36,254	34,071	29,912
Blank/Unknown	100	147	52	44
TOTAL	15,055	36,401	34,123	29,956
Percentage	7·1%			
SOCIAL REASON				
Region	Year 2018	Year 2019	Year 2020	Year 2021
Central Region	44	60	41	298
Eastern Region	277	284	282	501
Western Region	209	732	698	1,133
Southern Region	62	21	13	43
Northern Region	47	24	11	23
SUB-TOTAL	639	1,121	1,045	1,998
Blank/Unknown	54	100	164	148
TOTAL	693	1,221	1,209	2,146
Percentage	0·3%			
OTHERS				
	Year 2018	Year 2019	Year 2020	Year 2021
TOTAL	242	5,146	34,002	10,359
Percentage	3%			
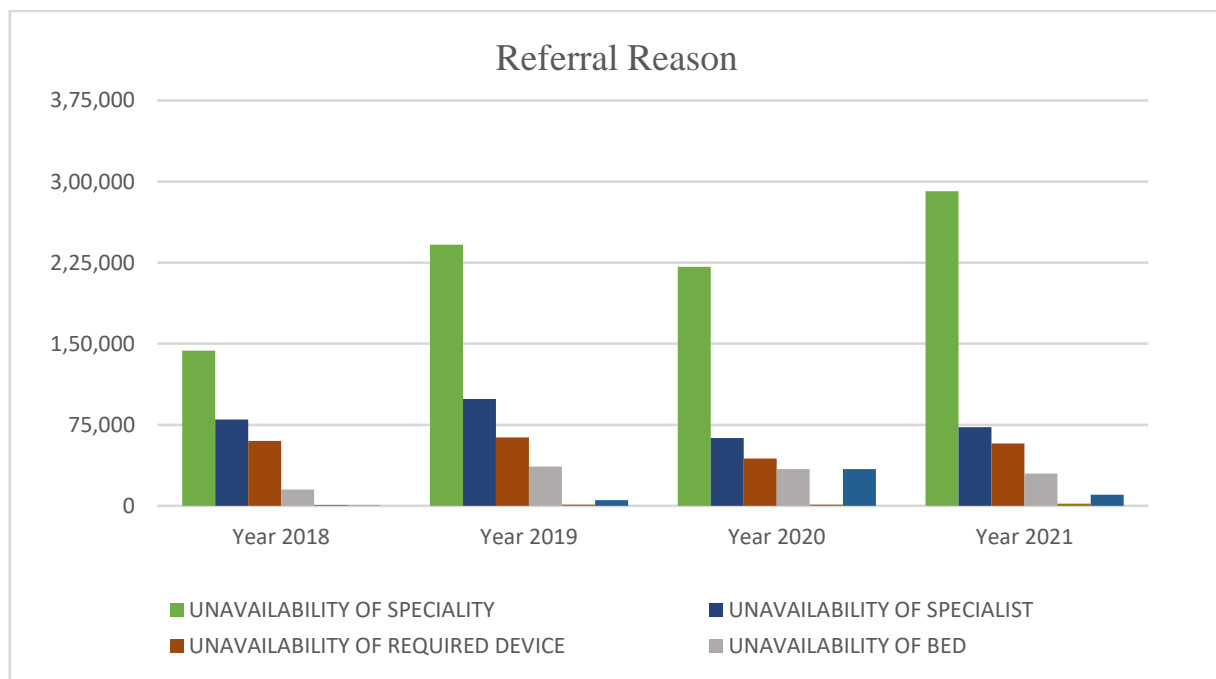
Figure (2A): Column figure presenting the number of each referral reason and its variation throughout the years.
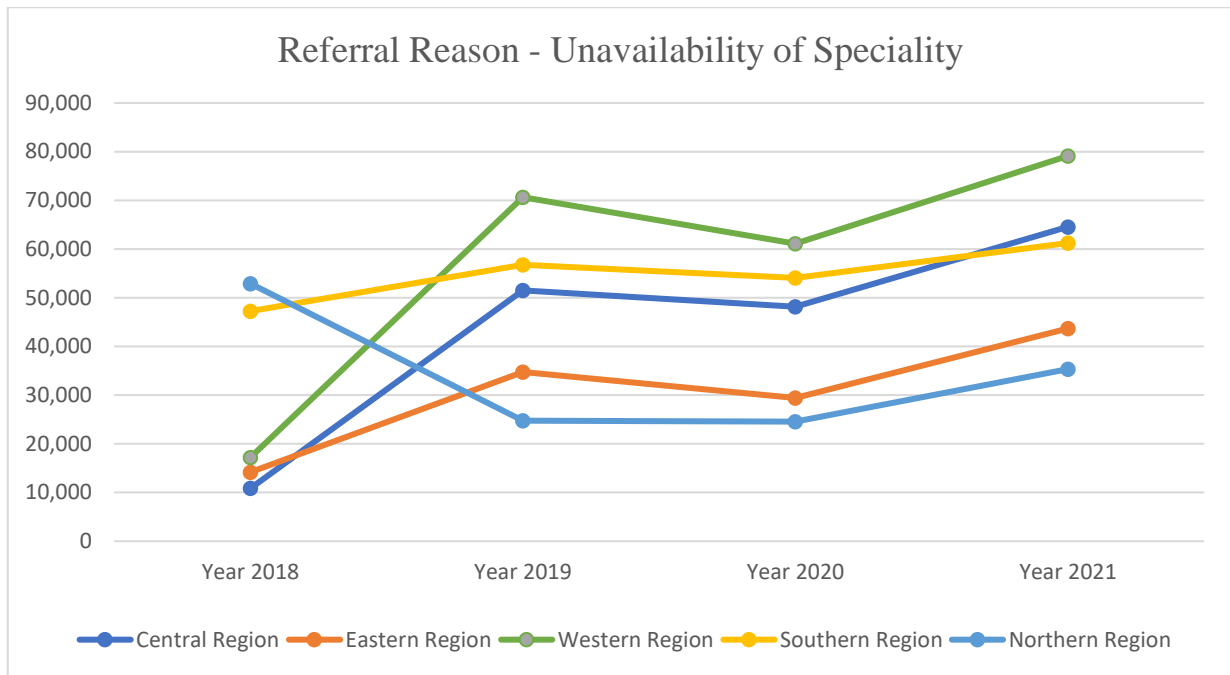
Figure (2B): Showing an overall trend evaluation and comparison of the referral reason related to Unavailability of Specialty throughout the years along with the corresponding regions.
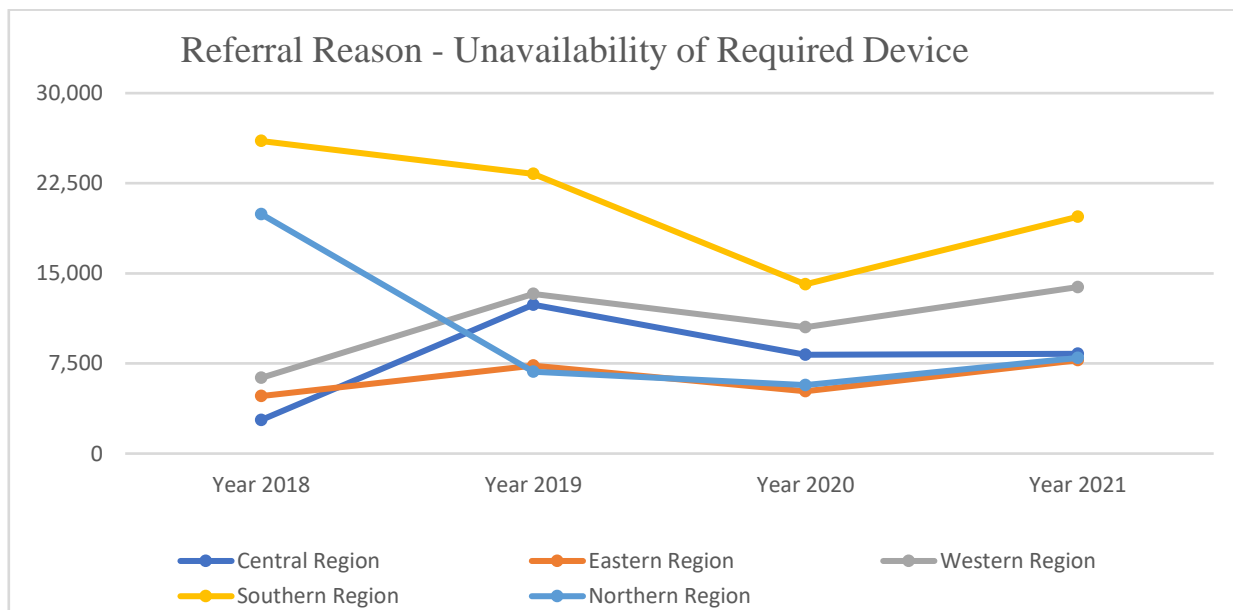

Figure (2C): Showing an overall trend evaluation and comparison of the referral reason related to Unavailability of Required Device throughout the years along with the corresponding regions.

Needed Main Specialties were General Surgery (430,664), which accounted for the majority of required referral specialties (26·7%) with a majority of referrals being initiated from the southern region (133,486)(30·9%) and a high increase of (27·5%), Internal Medicine (356,395) (22·1%) with a peak occurrence mainly within the western (97,868)(27·4%) and southern (92,603)(25·9%) regions also presenting an increase of (87·5%) from 2018 to 2021, Cardiac Surgery (144,165) (8·9%) within the western region (40,904)(28·3%) was associated with an increase of (44·1%) throughout the years, while Pediatric referrals (141,178) (8·7%) mainly emerged from the southern region (43,344)(30·7%) and showed a minor decrease of (0·9%). Ophthalmology referrals (125,996) (7·8%) mainly raised within the southern (34,339) (27·2%) and western (33,323) (26·4%) regions, with an increase of (32·2%), Obstetrics and Gynaecology (OBGYN) referrals (98,112) (6·1%) mainly initiated within the southern region (29,006) (29·5%), associated with an increase of (58·4%). Radiology referrals

(79,418) (4·9%) mainly involved the southern region (29,435)(37%), with a high increase of (311·5%); Otorhinolaryngology (ENT) (62,364) (3·8%) with a major peak occurrence within the western (17,427)(27·9%) region showed a high increase of (64·6%), Oncology (45,389) (2·8%), mainly within the western region (12,831)(28·2%), had a minor increase of (4·3%); Dentistry (40,716) (2·5%) referrals rose mainly within the central region (13,887)(34·1%), and had a high increase of (219·4%). Psychiatry (21,592) (1·3%), mainly occurring within the western region (10,301) (47·7%), revealed a high increase of (258·5%), Medical Rehabilitation (20,986) (1·3%) mainly risen from southern (5,795)(27·6%) and western (5,074)(24·1%) regions, have shown an increase of (271·3%). Long term care (10,504) (0·6%) mainly involving the central region (4,837) (46%), with a very high increase of (1,212%), in addition to other required specialties such as Dermatology which account for an overall total of (55,683) (3·4%) referrals (**Table 3, Figures 3A-3D**

Table (3): Descriptive distribution of the referrals required Main Specialty occurring nationwide among regions of Saudi Arabia throughout the years 2018-2021.

INTERNAL MEDICINE				
Region	Year 2018	Year 2019	Year 2020	Year 2021
Central Region	3,265	14,992	19,836	19,025
Eastern Region	7,441	13,349	16,519	16,851
Western Region	7,934	22,140	41,378	26,416
Southern Region	17,161	21,438	31,263	22,741
Northern Region	16,750	9,278	13,153	12,819
SUB-TOTAL	52,551	81,197	122,149	97,852
Blank/Unknown	240	814	464	1,128
TOTAL	52,791	82,011	122,613	98,980
Percentage	22·1%			

GENERAL SURGERY				
Region	Year 2018	Year 2019	Year 2020	Year 2021
Central Region	6,214	24,518	21,031	25,153
Eastern Region	8,444	14,583	9,898	15,351
Western Region	9,143	30,771	22,832	30,933
Southern Region	36,164	39,455	28,872	28,995
Northern Region	32,047	14,028	11,345	15,786
SUB-TOTAL	92,012	123,355	93,978	116,218
Blank/Unknown	565	1,444	1,223	1,869
TOTAL	92,577	124,799	95,201	118,087
Percentage	26·7%			

CARDIAC SURGERY				
Region	Year 2018	Year 2019	Year 2020	Year 2021
Central Region	1,017	7,683	6,731	8,261
Eastern Region	4,176	6,268	4,872	6,750
Western Region	4,818	13,014	10,177	12,895
Southern Region	7,054	7,691	7,812	8,936
Northern Region	11,711	4,548	4,276	4,592
SUB-TOTAL	28,776	39,204	33,868	41,434
Blank/Unknown	243	158	109	373
TOTAL	29,019	39,362	33,977	41,807
Percentage	8·9%			

PEDIATRICS				
Region	Year 2018	Year 2019	Year 2020	Year 2021
Central Region	1,438	6,518	4,926	6,096
Eastern Region	5,174	4,245	2,974	3,779
Western Region	5,127	10,627	7,022	9,158
Southern Region	10,274	12,990	9,375	10,705
Northern Region	13,748	6,105	4,434	5,392
SUB-TOTAL	35,761	40,485	28,731	35,130
Blank/Unknown	164	241	197	469
TOTAL	35,925	40,726	28,928	35,599
Percentage	8·7%			

OBGYN				
Region	Year 2018	Year 2019	Year 2020	Year 2021
Central Region	776	5,555	5,447	5,813
Eastern Region	2,970	3,331	2,573	4,156
Western Region	2,247	8,237	5,529	8,604
Southern Region	5,679	10,268	7,120	5,939
Northern Region	5,589	2,440	2,067	2,647
SUB-TOTAL	17,261	29,831	22,736	27,159
Blank/Unknown	122	406	218	379
TOTAL	17,383	30,237	22,954	27,538
Percentage	6·1%			

OPHTHALMOLOGY				
Region	Year 2018	Year 2019	Year 2020	Year 2021
Central Region	1,857	5,442	3,892	5,324

	Year 2018	Year 2019	Year 2020	Year 2021
Eastern Region	3,113	5,766	3,922	6,733
Western Region	5,545	11,968	6,146	9,664
Southern Region	10,358	8,857	5,171	9,953
Northern Region	7,469	4,613	3,533	5,108
SUB-TOTAL	28,342	36,646	22,664	36,782
Blank/Unknown	150	265	269	878
TOTAL	28,492	36,911	22,933	37,660
Percentage	7·8%			

RADIOLOGY

Region	Year 2018	Year 2019	Year 2020	Year 2021
Central Region	555	4,411	3,676	5,061
Eastern Region	248	2,285	1,513	2,030
Western Region	919	7,888	6,668	8,201
Southern Region	4,035	10,392	6,732	8,276
Northern Region	589	1,871	1,457	2,570
SUB-TOTAL	6,346	26,847	20,046	26,138
Blank/Unknown	10	13	2	16
TOTAL	6,356	26,860	20,048	26,154
Percentage	4·9%			

ENT

Region	Year 2018	Year 2019	Year 2020	Year 2021
Central Region	682	3,982	2,444	3,434
Eastern Region	1,284	2,589	1,345	2,112
Western Region	1,094	6,818	3,396	6,119
Southern Region	4,585	4,617	2,322	4,283
Northern Region	3,886	2,336	1,426	3,057
SUB-TOTAL	11,531	20,342	10,933	19,005
Blank/Unknown	107	172	126	148
TOTAL	11,638	20,514	11,059	19,153
Percentage	3·8%			

ONCOLOGY

Region	Year 2018	Year 2019	Year 2020	Year 2021
Central Region	543	1,846	1,606	2,086
Eastern Region	2,091	1,603	1,847	2,450
Western Region	3,002	3,077	3,135	3,617
Southern Region	3,366	1,523	1,847	1,790
Northern Region	2,841	1,204	1,276	1,416
SUB-TOTAL	11,843	9,253	9,711	11,359
Blank/Unknown	159	1,180	722	1162
TOTAL	12,002	10,433	10,433	12,521
Percentage	2·8%			

DENTISTRY

Region	Year 2018	Year 2019	Year 2020	Year 2021
Central Region	786	4,115	3,127	5,859
Eastern Region	336	1,710	1,151	2,283
Western Region	162	2,502	1,603	2,860
Southern Region	1,897	2,018	1,192	2,730
Northern Region	1,850	1,073	676	2,457
SUB-TOTAL	5,031	11,418	7,749	16,189
Blank/Unknown	75	67	67	120
TOTAL	5,106	11,485	7,816	16,309
Percentage	2·5%			

PSYCHIATRY

Region	Year 2018	Year 2019	Year 2020	Year 2021
Central Region	57	847	716	751
Eastern Region	51	885	791	990
Western Region	1,200	3,371	2,511	3,219
Southern Region	534	1,211	816	1,228
Northern Region	118	729	691	823

	Year 2018	Year 2019	Year 2020	Year 2021
SUB-TOTAL	1,960	7,043	5,525	7,011
Blank/Unknown	2	15	13	23
TOTAL	1,962	7,058	5,538	7,034
Percentage	1·3%			

MEDICAL REHABILITATION

Region	Year 2018	Year 2019	Year 2020	Year 2021
Central Region	121	1,175	811	1,185
Eastern Region	97	242	368	1,287
Western Region	387	1,207	1,415	2,065
Southern Region	1,130	1,163	1,507	1,995
Northern Region	554	295	445	645
SUB-TOTAL	2,289	4,082	4,546	7,177
Blank/Unknown	50	192	1,142	1,508
TOTAL	2,339	4,274	5,688	8,685
Percentage	1·3%			

LONG TERM CARE

Region	Year 2018	Year 2019	Year 2020	Year 2021
Central Region	84	1,180	1,613	1,960
Eastern Region	86	383	473	608
Western Region	76	638	901	932
Southern Region	52	299	169	482
Northern Region	15	128	140	188
SUB-TOTAL	313	2,628	3,296	4,170
Blank/Unknown	8	21	27	41
TOTAL	321	2,649	3,323	4,211
Percentage	0·6%			

OTHERS

	Year 2018	Year 2019	Year 2020	Year 2021
TOTAL	3,554	9,184	6,477	36,468
Percentage	3·4%			
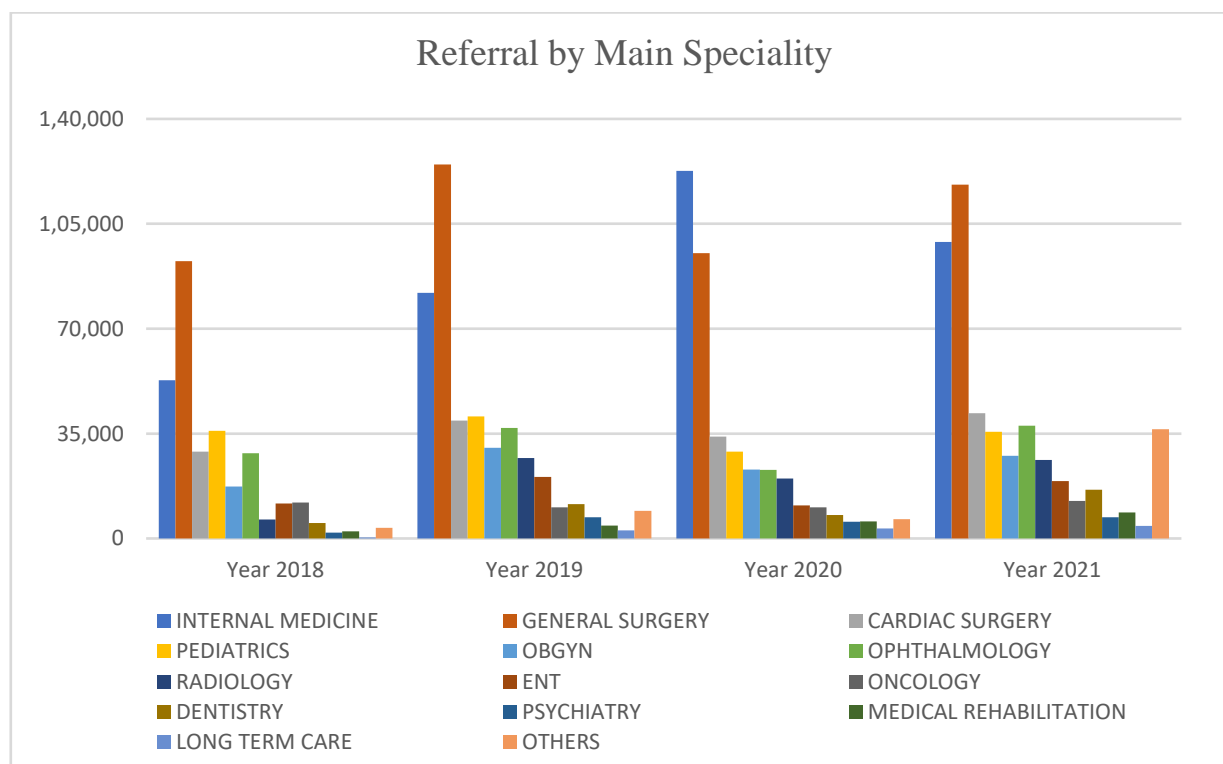
Figure (3A): Column figure presenting the number of each referrals required Main Specialty and its variation throughout the years.
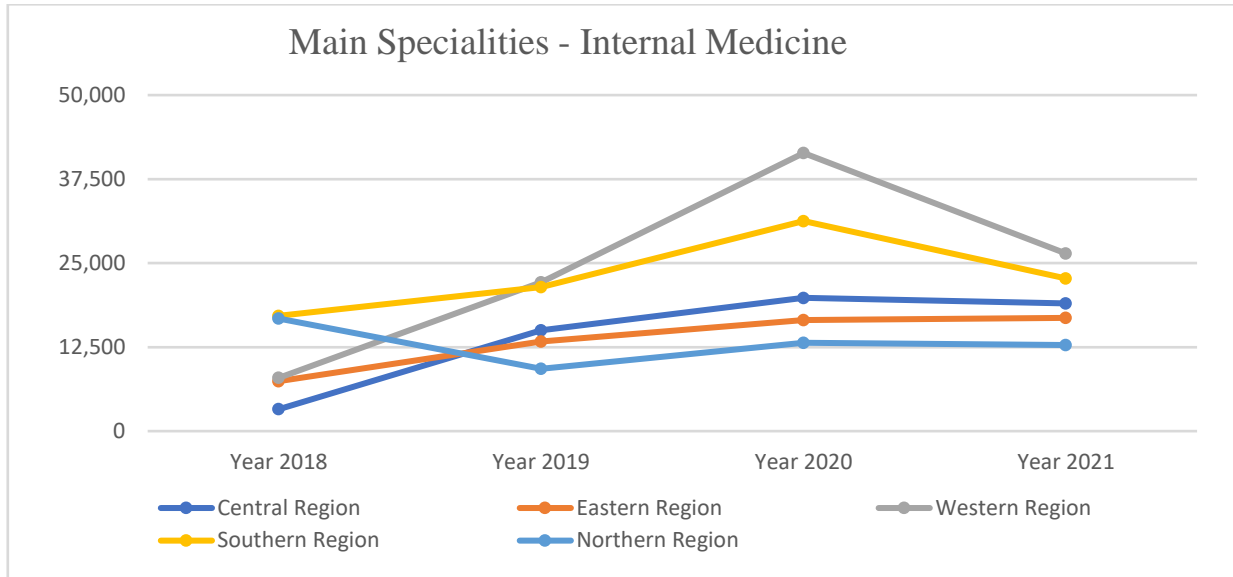
Figure (3B): Showing an overall trend evaluation and comparison of the referrals requiring the specialty of Internal Medicine throughout the years along with the corresponding regions.
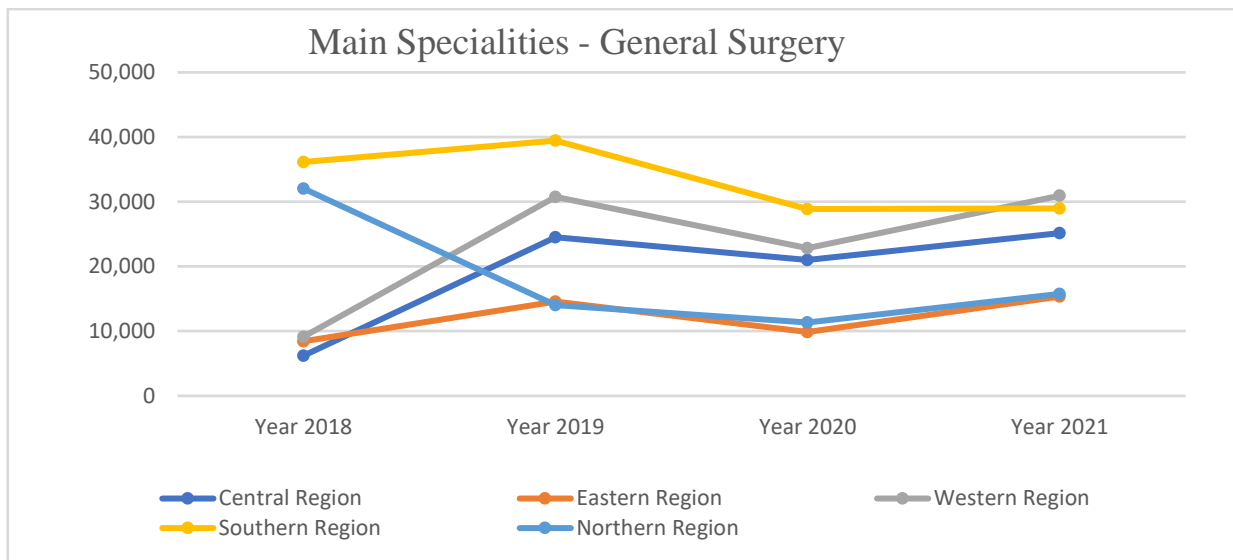

Figure (3C): Showing an overall trend evaluation and comparison of the referrals requiring the specialty of General Surgery throughout the years along with the corresponding regions.
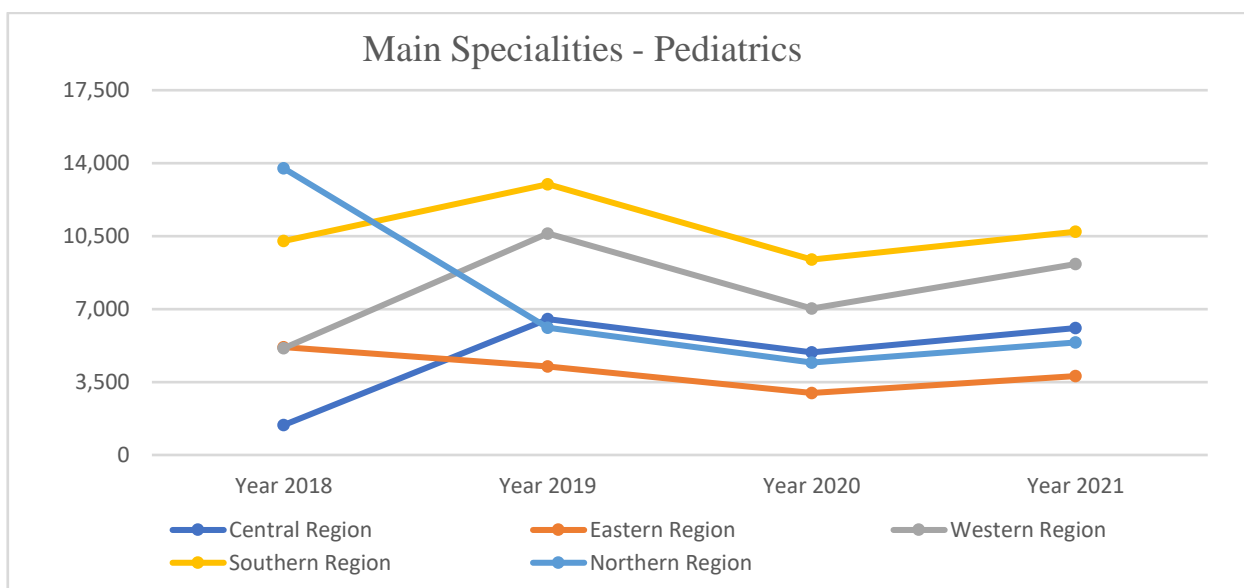

Figure (3D): Showing an overall trend evaluation and comparison of the referrals requiring the specialty of Pediatrics throughout the years along with the corresponding regions.

Nationalities related to the patient requiring a referral included Saudi Arabia (1,109,254) (84.8%) which was seen as the most involved nationality requiring a referral. Yemen (38,056) (2.9%), Egypt (19,195) (1.4%), Bangladesh (17,070) (1.3%), India (16,658) (1.2%), Pakistan (16,020) (1.2%), Sudan (15,246) (1.1%), Syria

(10,733) (0.8%), Philippines (6,200) (0.4%), Indonesia (3,362) (0.2%), and Displaced Tribes (3,062) (0.2%), which are the top involved nationalities after Saudi Arabia, and other nationalities (45,427) (3.4%) were all recorded from the year 2019 to 2021 (**Table 4A-4B, Figure 4**).

Table (4A): Descriptive distribution of the referral Nationality occurring nationwide from the years 2019-2021 (excluding Saudi Arabia).

NATIONALITY		Year 2019	Year 2020	Year 2021	Total
1	Yemen	13,400	13,784	10,872	38,056
2	Egypt	5,410	8,024	5,761	19,195
3	India	4,298	7,897	4,463	16,658
4	Bangladesh	3,653	8,532	4,885	17,070
5	Pakistan	5,007	6,730	4,283	16,020
6	Sudan	4,228	5,473	5,545	15,246
7	Syria	3,252	3,581	3,900	10,733
8	Philippines	1,487	2,920	1,793	6,200
9	Indonesia	1,437	1,117	808	3,362
10	Displaced Tribes	743	1,128	1,191	3,062
11	Others	17,178	11,871	16,378	45,427
Percentage		15.2%			

Table (4B): A breakdown of referrals involving Saudi Nationality and their distribution across regions.

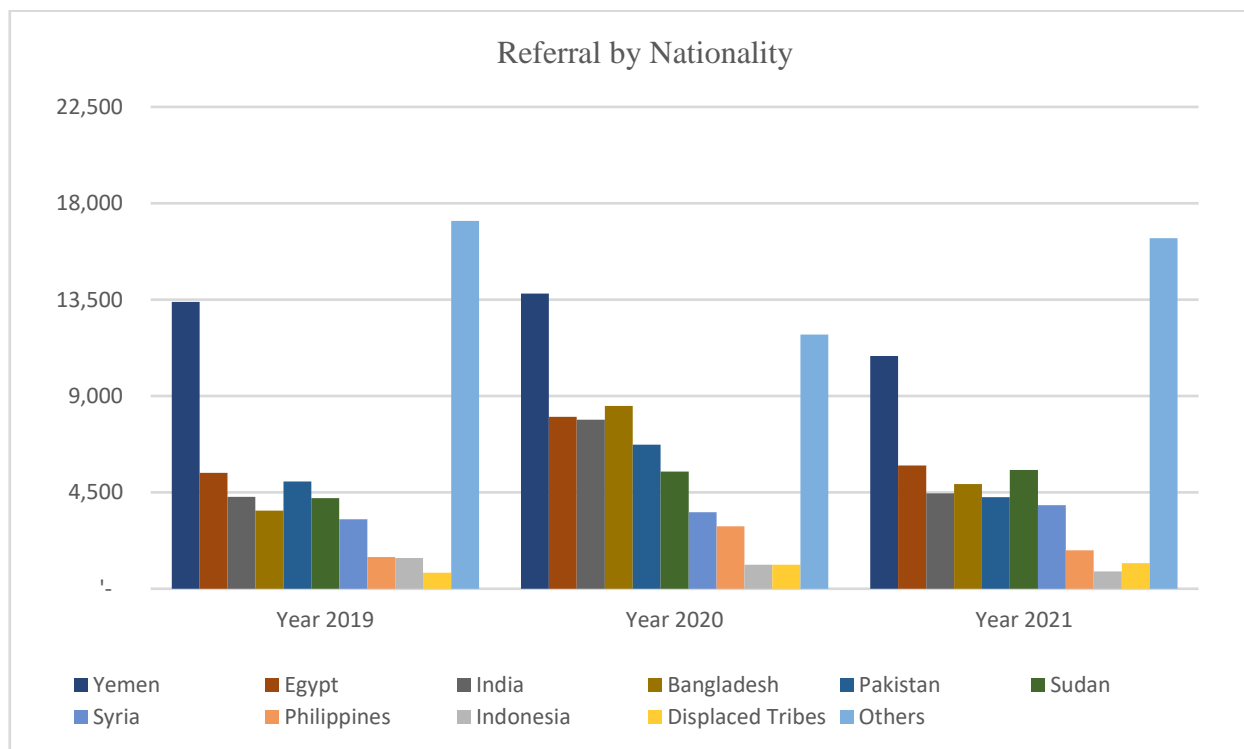| SAUDI ARABIA			
Regions	Year 2019	Year 2020	Year 2021
Central Region	73,781	62,052	78,792
Eastern Region	54,267	44,081	62,098
Western Region	101,790	83,691	106,260
Southern Region	105,574	84,686	95,423
Northern Region	46,020	39,633	53,453
Blank/Unknown	4,978	4,528	8,147
Sub-total	386,410	318,671	404,173
TOTAL	1,109,254		
Percentage	84.8%		

Figure (4): Column figure presenting the number of each referral by Nationality and its variation throughout the years 2019-2021.

Referral status recorded from 2019-2021 displayed a total of (1,300,469) referrals with the majority being Accepted (720,045) (55.3%) and an increased acceptance rate of (22.8%) from 2019 to 2021, Closed referrals (564,349) (43.3%) with a decrease of (21%),

Escalated referrals (9,137) (0.7%) with a major increase of (288%) year to year (**Table 5, Figures 5A-5B**). Rejected referrals (6,938) (0.5%) with a major increase of (93.6%) from 2019-2021.

Table (5): Descriptive distribution of the referral status occurring nationwide among regions of Saudi Arabia from the years 2019-2021.

Accepted			
Region	Year 2019	Year 2020	Year 2021
Central Region	33,435	37,886	71,586
Eastern Region	38,538	28,629	40,404
Western Region	41,497	63,248	83,061
Southern Region	54,420	51,696	56,256
Northern Region	56,906	29,898	28,099
Blank/Unknown	2,596	1,889	1
TOTAL	227,392	213,246	279,407
Percentage	55·3%		
Closed			
Region	Year 2019	Year 2020	Year 2021
Central Region	30,256	37,856	59,144
Eastern Region	37,487	21,198	23,400
Western Region	34,742	50,752	48,966
Southern Region	56,901	53,024	28,237
Northern Region	55,407	15,506	10,281
Blank/Unknown	601	539	52
TOTAL	215,394	178,875	170,080
Percentage	43·3%		
Rejected			
Region	Year 2019	Year 2020	Year 2021
Central Region	1	6	2,773
Eastern Region	0	1	173
Western Region	0	1	275
Southern Region	0	0	4
Northern Region	0	0	1
Blank/Unknown	1,665	2,038	0
TOTAL	1,666	2,046	3,226
Percentage	0·5%		
Escalated			
Region	Year 2019	Year 2020	Year 2021
Central Region	1,154	1,732	4,545
Eastern Region	38	49	37
Western Region	2	1	573
Southern Region	0	109	524
Northern Region	246	12	63
Blank/Unknown	40	12	0
TOTAL	1,480	1,915	5,742
Percentage	0·7%		
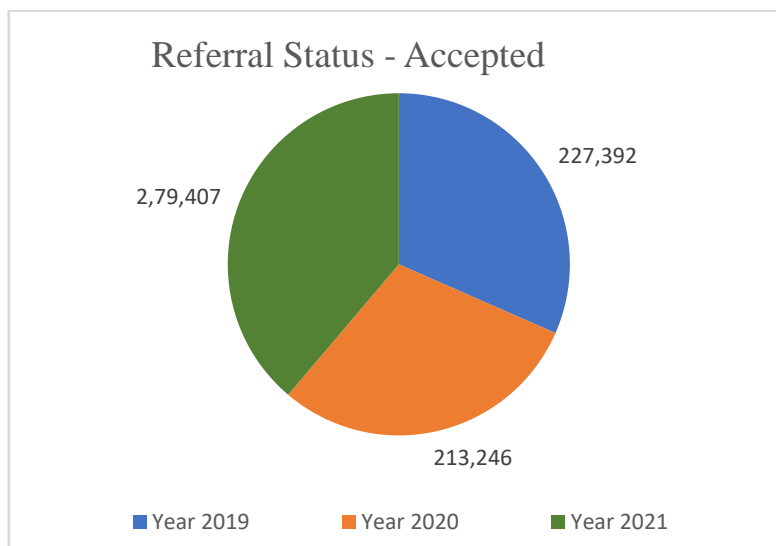
Figure (5A): Pie chart representing the number of Accepted referrals and its variation throughout the years 2019-2021.
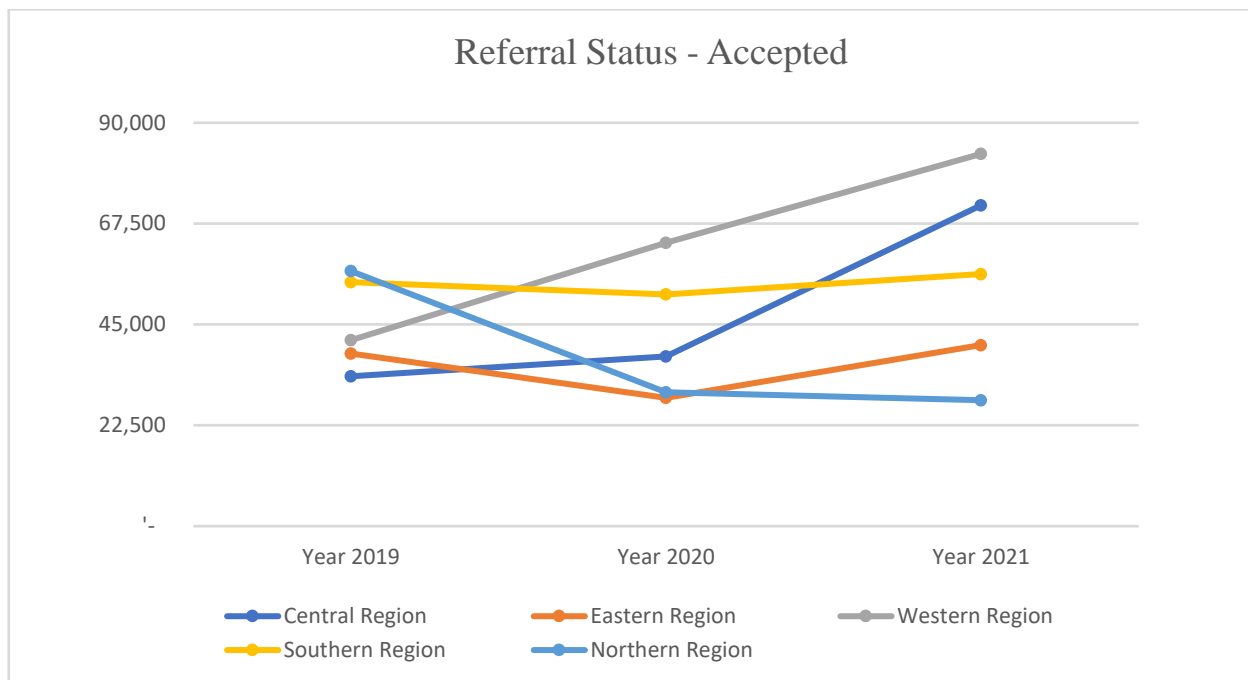
Figure (5B): Showing an overall trend evaluation and comparison of accepted referrals throughout the years of 2019-2021 along with the corresponding regions.

Discussion

In Saudi Arabia, the Saudi Medical Appointments and Referrals Centre (SMARC) aims to facilitate inter-hospital patient transfer by linking all governmental and private sector hospitals together, providing patients access to different levels of required care. In this paper, we aimed to identify certain trends in referrals occurring across the country, referral rates, characteristics, and reasons of inter-facility patient transfer as a preliminary stone to implement new strategies in order to maximize the safety of patients requiring a transfer and ensure definitive treatment.

The system classifies the requested referral into three main categories: life-saving, emergent, and routine (composed of inpatient and outpatient) cases [7,8]. In all types of referrals, we noticed an overall uptrend and major increase of these requests throughout the years, with routine referrals taking the lead. This increase might be related to many factors. One factor is inadequate facility infrastructure and financing resources of some district hospitals mostly in primary and secondary level centers, especially in rural areas. Another factor is the lack of skills, the specialization, or both to manage a given clinical condition; therefore, physicians in such hospitals will then seek the assistance of providers who are better equipped or specially trained to guide them in managing or to take over responsibility for a patient. This is particularly true as the complexity of care required for patients is increasing and the healthcare demands are rising. These results are consistent with findings of studies undertaken elsewhere [9,10]. Our findings in this study support the previous allegations, with the majority of referrals demanding specialist care involving specialties of complex management beyond the scope of primary care such as Internal Medicine, Ophthalmology, and Cardiac Surgery. The Unavailability of Specialist mentioned in our findings related to the reason for referral expresses that the referral has taken place due to the lack of expertise in providing care for patients needing certain forms of management which may be complex and out of the hand of a general practitioner, opposed to the referral reason involving the Unavailability of Specialty, in which the specialty required is not available for any reason at the initial site of care. In China, the high rates of patient referral and transfer was attributed to the overuse of tertiary hospitals and the underuse of primary and secondary facilities, which in turn, inflated health expenditures [11]. This is boosted by the fact that better-equipped hospitals with more specialized healthcare providers (often tertiary centers) become a preferred option for many patients. Other possible explanations attributed to the increased numbers of referrals are related to the non-adherence of referral system guidelines by practitioners and the lack of accountability in each level of care for controlling unnecessary referrals. In this study, we have also observed that the majority of referrals recorded throughout the Kingdom of Saudi Arabia from the year 2018 to 2021 contributed to both the Southern and Western regions compared to other regions. The reasoning behind the high number of referrals witnessed within these areas could be due to several influencing factors which involve: 1. Health workforce retention in certain medical and surgical specialties causing the difficulty in covering the demand for care, 2. An increase in the complexity of care for individuals requiring specialized centers in which these areas could possibly not provide, opposed to the central region where specialized centers may be highly accessible, 3. The dense population in the Western region with the important consideration that many individuals arrive from all over the country and world to attend the holy mosques of Medina and Mecca for religious purposes. The consistent rise of referral rates described in our findings could be an indicator of increased healthcare spending, mainly driven by referrals to specialists for further care and management. The economic burden inflicted by these rate increases raises suspicion as to whether the referrals made were necessary and actually in need of further management, or unnecessary regardless of the cause, which in turn may reflect a deficit occurring within the referral process, raising the question of referral appropriateness. Interestingly, we also noticed a remarkable drop in referrals starting from the year 2020, possibly influenced by the COVID-19 outbreak and pandemic. This notable drop could be the result of nationwide lockdowns which have occurred in the Kingdom of Saudi Arabia and across nations worldwide, along with the fear of attending the healthcare setting due to the risk of catching the infection. Similar drops have been witnessed across countries during the same period including the United Kingdom (UK) and Italy, increasing the likelihood of it being outbreak related [12-14].

Referral compliance & acceptance
An important aspect and indicator of an efficient referral system contributing to successful referral use and improving health outcomes is the caretakers will and high compliance to accept

referral recommendations provided by primary care, with questions raised to identify factors influencing referral compliance and acceptance across health care settings. Previous literature has addressed possible determinants affecting referral compliance, which include the severity of disease and its need for a referral, qualities related to facilities distributed across various settings, and proper costs involving time and resources. On the contrary, poor compliance and adherence to guidelines result in a cascade of consequences which include delays in disease diagnosis and management, eventually resulting in poorer outcomes [15-17]. In our study, we found high compliance regarding the acceptance of referrals occurring across regions of Saudi Arabia with an acceptance rate of 55·3% of total referrals throughout a three-year span with variations across individual regions. Efforts to improve overall referral compliance and health care delivery amongst micro, meso, and macro levels of facilities within the coming years is vital in strengthening overall health systems.

Sustaining high quality health systems in an era of growing demand

The goal of achieving high quality health systems is an area of interest to governments globally, with the desired effort to deliver high standard health care services across different communities with optimal utilization of available resources at a sensible cost. The goal could possibly be achieved starting with a national-led vision towards the desire of delivering high quality health care services, mainly embraced by ministers and policy makers [18]. A great example is the Kingdoms vision 2030, with an aim of transforming the health sector in Saudi Arabia and increasing its efficiency substantially. Health systems within some settings witness a variety of challenges hindering delivery of health services especially in rural areas, varying from difficulties in accessing care due to geographic limitations, struggles in receiving care potentially due to resource deficits in low-resource settings, and provider unavailability [19]. Previous studies have addressed the need of overcoming such obstacles, with propositions on strengthening the health network focusing on pre-hospital services which involve primary care centers and emergency medical services, potentially aiding health care accessibility, along with proper allocation of investments dedicated towards facilities in need of basic medicines or equipment to resolve any infrastructure-related deficits [19]. Interventions showing a positive impact on referral rates have also been mentioned, involving coordination between primary and secondary care prior to referral [19,20]. Another major concern amongst health systems globally is health worker shortage and retention occurring within some settings, highly contributing to sub-optimal health care delivery, especially in rural areas. The health workforce is an essential component of the overall health system, possessing the capability of influencing the quality of health care delivery both positive and negative aspects, demanding the need of attention towards this area in order to achieve high quality health systems and prevent negligence. Many modern-day health workforces composed of trainees and practitioners across health care settings avoid prioritizing practice within peripheral areas and smaller cities assuming that their practice and lifestyle would be inferior to those in metropolitan areas, developing the

desire of continuing their practice and training within major cities due to its assumed accompanied luxuries involving high wages, advanced centers, and possibly due to environmental factors, ultimately pushing the workforce and manpower centrally causing an uneven distribution of health workers across different settings, potentially resulting in deficits within peripheries and rural areas in need. Interventions and actions towards improving areas of health worker retention and attracting workforces to areas in need is important in achieving evenly distributed high quality health care services across populations. Introducing various strategies to combat workforce retention occurring within settings could involve focusing on medical education linked with certain communities to attract continuing practice within the needed setting, a selective approach of undergraduates with certain rural backgrounds which could in relation influence them in continuing their training at the needed area, and providing incentives acting as a motive for practice continuity among personnel [21]. The World Health Organization (WHO) has also introduced guidelines and proposed recommendations related to solving this matter, which include: 1. Enrolling undergraduates or trainees with a rural background to health education programs, 2. Aligning health worker education with health needs mainly involving rural settings, and 3. Providing incentives to health workers practicing in remote locations, which would possibly attract health workers to these settings in need [22].

Strengths and limitations of the study

Strengths of our study include the large sample size which involves wide geographic coverage of all regions within Saudi Arabia, providing reliability to detect variance in referral distribution in relation with specific populations and practices. Another strength is that the referrals were recorded on a day-to-day basis by a multidisciplinary team, preventing any time-related bias. Our study also has some limitations. One limitation is that the data was manually inputted by providers in a non-structured free text format, which in relation resulted in incomplete data within some areas related to specific variables presenting as (null) findings. Unfortunately, this limitation could cause an underestimate of our findings. Another limitation is that the recorded data did not provide in-depth clinical findings related to the patient's presentation or chief complaint, preventing the assessment of referral appropriateness. A limitation also worth mentioning is that no specific start or end date was included in the derived data, with the assumption of the data being relevant to the beginning of January of each year.

Conclusion

In conclusion, we observed a substantial increase in referrals within Saudi Arabia starting from the year 2018 to 2021, potentially causing a burden of increased health care spending among the country's health system. Further measures should be taken to promote optimal referral utilization by practitioners in alignment to the patients' needs, along with strategies developed to assess referral appropriateness which could aid in overall health care delivery and spending.
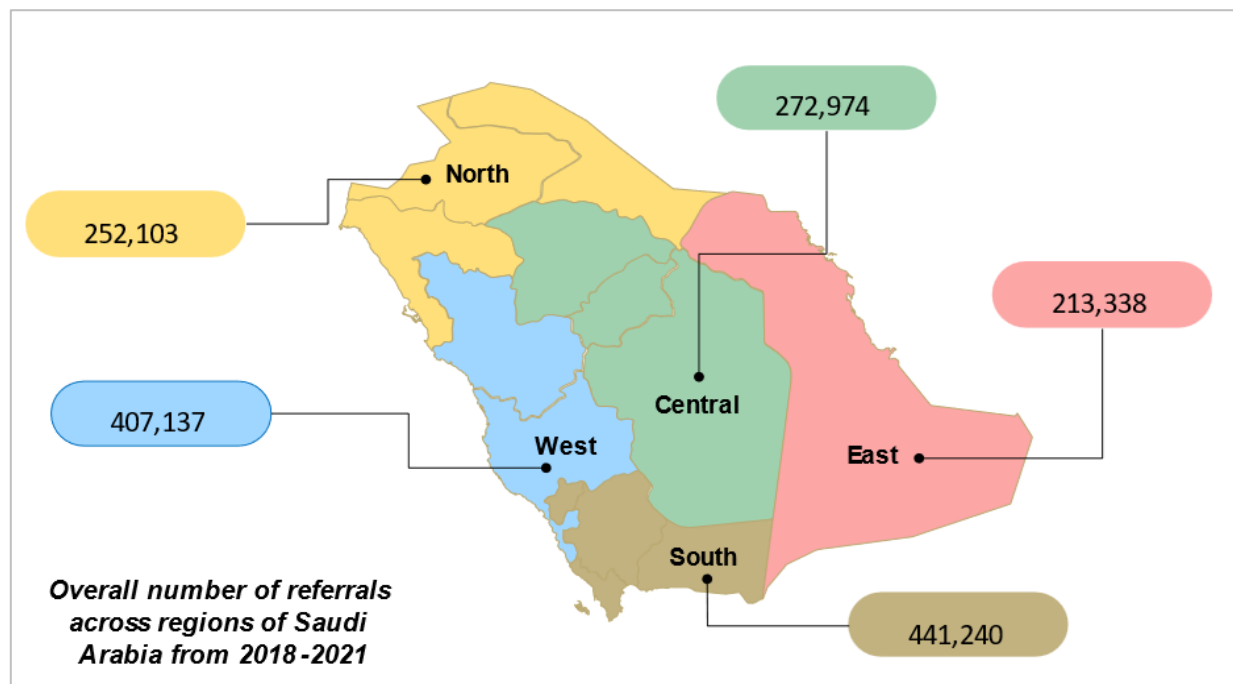
Figure (6): Geographic map representing the overall number of referrals across regions of Saudi Arabia from the year 2018 to 2021.

Abbreviations

SMARC: Saudi Medical Appointments and Referrals Centre
OBGYN: Obstetrics and Gynaecology
ENT: Otorhinolaryngology

Conflict of interest

The authors declare that there is no conflict of interest regarding the publication of this article.

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N/A

Consent

The study is exempt from consent

Ethical approval

The Saudi Central Institutional Review Board at the Ministry of Health, KSA, has approved this study. Ethics Committee approval document number: 21-94 M

Authors' contributions

Abdulaziz Alnassar, Nawfal Aljerian, Abdulaziz Alhosaini, Ali Alsultan, and Lyla Ashry all contributed to the study design, data collection, data analysis and interpretation along with supervision of the study.
Mohammed Arafat, Abdulrahman Aldhabib, Ibrahim Almohaimeed, Ahmed Aloqayli, Bader Alrabiah, and Sara Albanyan all contributed to the data collection.
Abdulaziz Alnassar, Abdulaziz Alhosaini, Ali Alsultan, and Lyla Ashry all contributed to the figures and visuals.
Abdulaziz Alnassar, Sawsan Alharthi, and Abdullah Salim all contributed to the writing of the original draft.

Abdulaziz Alnassar, Sawsan Alharthi, Abdulaziz Alhosaini, and Lyla Ashry all contributed to the review and editing of the draft.

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