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Factors influencing telehealth awareness, utilization, and satisfaction in KSA: A national population-based study



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المخلص

أهداف البحث: تتضمن الخدمات الصحية عن بعد تقديم الرعاية الصحية من خلال المنصات الرقمية مثل مكالمات الهاتف والفيديو. وقد ارتفع اعتمادها خلال جائحة كوفيد-19 بسبب الحاجة إلى رعاية صحية بدون تلامس. ولقد أنشأت وزارة الصحة السعودية "مركز الاتصال الهاتفي للاستشارات الطبية 937" منذ ما يقرب من عشر سنوات. الهدف من هذه الدراسة هو تقييم مستويات الوعي العام والاستفادة والرضا عن خدمات مركز الاتصال 937 وتقييم العوامل المرتبطة بها.

طريقة البحث: هذه دراسة مجتمعية وطنية مقطعية أجريت باستخدام عينات متعددة المراحل مع تخصيص تناسب من 20 مديرية صحة. تم اختيار المشاركين من عامة السكان في الأماكن العامة وتمت مقابلتهم باستخدام استبيان تم التحقق من صلاحيته.

النتائج: من بين 7951 فرداً، وافق 7692 شخصاً على المشاركة (معدل الاستجابة 96.7%). وكان 78% من المشاركين على علم بخدمة 937، و56.4% سبق لهم الاستفادة من الخدمة. كان أغلبية مستخدمي الخدمة (86%) راضين عن الخدمة، في حين كان وقت الانتظار الطويل هو السبب الأكثر شيوعاً لعدم الرضا (46.6%). في التحليل متعدد المتغيرات، ارتبط الوعي بالخدمة واستخدامها بشكل كبير بعدة عوامل، وخاصة المستوى العالي من التعليم (نسبة الأرجحية المعدلة 4.03، فترات الثقة: 3.17-5.12) و نسبة الأرجحية المعدلة

3,42، فترات الثقة: 2,64-4,42؛ على التوالي). إن الانطباع الإيجابي عن خدمات الاستشارة الطبية الهاتفية، والجنسية السعودية، وإنجاب الأطفال، والتأمين الطبي، والتاريخ الطبي الإيجابي ارتبط بشكل كبير بالوعي والاستفادة والرضا عن الخدمة.

الاستنتاجات: كشفت نتائج الدراسة عن مستويات عالية من الوعي والاستفادة والرضا تجاه "مركز اتصال الاستشارة الطبية الهاتفية 937"، مما يشير إلى زيادة قبول الجمهور للخدمة. علاوة على ذلك، كشفت الدراسة عن بعض العوامل الاجتماعية والديموغرافية التي تؤثر على وعي الجمهور واستخدامه ورضاه عن الخدمات الصحية عن بعد. هناك حاجة إلى مزيد من الدراسات للحصول على فهم أفضل حول المسبرين والعوائق التي تحول دون استخدام الخدمة بين المجموعات السكانية المختلفة.

الكلمات المفتاحية: الوعي؛ الرضا؛ المملكة العربية السعودية؛ الصحة عن بعد؛ الاستخدام

Abstract

Background: Telehealth involves delivering healthcare remotely through digital platforms such as telephone and video calls. Use of telehealth surged during the COVID-19 pandemic because of the need for contactless healthcare. The Saudi Ministry of Health established the "937 telephone medical consultation call center" almost 10 years ago.

Objectives: The aim of this study was to examine public awareness of, utilization of, and satisfaction with the 937 call center service, and to assess associated factors.

Materials and methods: This national community-based, cross-sectional study was conducted through multistage sampling with proportional allocation from 20 health

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directorates. Participants were selected from the general population in public places and were interviewed with a validated questionnaire.

Results: Of 7951 approached individuals, 7692 agreed to participate (response rate 96.7%). Seventy-eight percent of participants were aware of the 937 service, and 56.4% had previously used the service. Most (86%) users were satisfied with the service. Long waiting times were the most frequent reason (46.6%) for dissatisfaction. In multivariable analysis, service awareness and utilization were both significantly associated with having higher education (aOR 4.03, 95%CI: 3.17–5.12 and aOR 3.42, 95%CI: 2.64–4.42, respectively). Positive impressions of telephone medical consultation services, Saudi nationality, having children, having medical insurance, and having a history of chronic disease were significantly associated with awareness of, utilization of, and satisfaction with the service.

Conclusion: The study revealed high awareness of, utilization of, and satisfaction with the 937 telephone medical consultation call center, thus suggesting increased public acceptance of the service. Moreover, the study identified socio-demographic factors influencing public awareness of, utilization of, and satisfaction with telehealth. Further studies are required to increase understanding of the facilitators of, and barriers to, the use of service among various population groups.

Keywords: Awareness; KSA; Satisfaction; Telehealth; Utilization

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Introduction

Primary healthcare has traditionally involved face-to-face encounters between patients and healthcare providers. However, telephones have been used as a routine initial approach for accessing healthcare services for more than two decades.¹ Since the COVID-19 pandemic, the healthcare sector has seen increasing implementation of innovative technologies, particularly in telehealth—a umbrella term comprising telemedicine, electronic medical records, e-health, and other facets of health information technology.²

Telephone consultation services are a type of telehealth providing health or medical advice or referral to more appropriate health services.³ Telephone consultation services have become an increasingly common feature and a central part of out-of-hours services in several countries.⁴ Several studies have shown that patients want to be able to consult specialists by telephone and are highly satisfied with this mode of communication. Cited benefits include shortened waiting times and travel times, and cost savings, particularly for patients living in rural areas and those whose health or social circumstances make visits to healthcare centers difficult.⁵

In KSA, the Ministry of Health (MoH) 937 call center provides a telephone medical consultation service. The center began operating in 2013 and provides 24/7 emergency and routine healthcare via telephone to every citizen and resident in KSA through a toll-free number (937).⁶ The 937 call center provides several services according to callers' needs, including medical consultations, appointment booking at primary healthcare centers, enquiries and complaints, and technical support for MoH e-applications. Moreover, in 2020, the call center began offering services for general enquires, consultations, and management of COVID-19.³

Although telephone services can improve healthcare quality, they can also waste resources if they are not used. Public awareness of such free services affects their utilization and ultimately the benefits gained.⁷

Although the 937 service was introduced early in 2013, our literature review identified only one study measuring the awareness and utilization of this service among the Saudi community.⁸ That study was conducted nationally through distribution of an online questionnaire, but had limitations including a non-homogeneous distribution of respondents: most (80.4%) were from the Eastern province, and 79.4% were women. Therefore, additional a nationally representative study was necessary.

Thus, the aim of this study was to assess the awareness of, utilization of, and satisfaction with the 937 call center among the Saudi public, as well as associated factors, to identify which population groups use the service and which groups should be targeted to further improve service reach.

Materials and Methods

KSA has a population of 36,990,027 people, 83.5% of whom live in urban areas.⁹ KSA has 13 administrative regions divided by the MoH into 20 health directorates.

Study design, setting, and participants

This cross-sectional, population-based survey assessed the awareness of, utilization of, and satisfaction with 937 call center telephone health services among a sample of the Saudi Arabian population 18 years or older.

Data were collected between June and September 2022 from the general population in public areas (parks, mosques, restaurants, governmental institutions, universities, and educational centers). The study sample was selected through a non-probability multistage sampling technique with proportional allocation for health directorates, purposive sampling of areas, and interviewing of the participants reached.

The sample size was calculated with Epi-Info STAT-CALC v7.2.5.0. Assumptions were based on a previous study by Al-rayes et al.,⁸ in which 46.1% of the Saudi population was found to be aware of, and 19.8% was found to use, MoH 937 call center telephone health services. According to a 95% confidence level, 5% margin of error, 60% expected awareness, and 20% utilization rate, we determined the appropriate sample size to be 246–369 participants from each of the 20 health directorates. To increase accuracy, the total sample was rounded to 5000–7500 participants from the entire KSA. The distribution

from each health directorate was tailored according to its percentage of the total population size.

The inclusion criteria were people (Saudi or non-Saudi) living in KSA, of any gender, who spoke Arabic and were ≥ 18 years of age.

Data collection

A comprehensive interview questionnaire was developed according to previously validated questionnaires,^{3,8} and several additional items were included to address the needs of the current study. The study questionnaire was developed in Arabic and was reviewed by the research team, relevant internal MoH departments, and external experts for both face and content validity (the mean individual and scale validity indices were 90%). The questionnaire was examined in a pilot study of 50 people from the general public.¹⁰ The data from the pilot study were not included in the main study data. The questionnaire required 4–7 min to complete. Data collectors were health educators trained via online sessions before the start of data collection.

The study questionnaires included the following independent variables: demographics (age, gender, nationality, marital status, number of children, province, employment, and education level), medical insurance, and beliefs regarding telephone medical consultation services. Three dependent variables were collected: awareness of, utilization of, and satisfaction with the 937 call center health services.

Statistical analysis

The collected data were verified for completeness and consistency of responses, and statistical analyses were conducted in SPSS v22.0 (IBM Statistics, Armonk, NY). Means and standard deviations were calculated for continuous variables, and frequencies (n) and percentages were calculated for categorical variables. The chi-square test was used for comparison of proportions, and odds ratios (ORs) and 95% confidence intervals (CIs) were further calculated. Multivariable binary logistic regression with the enter selection method was used to assess associations between independent and dependent variables. Adjusted odds ratios (aORs) and 95% CIs were calculated, and the threshold for statistical significance was set at $p < 0.05$.

Results

Of the 7951 participants approached, 7692 agreed to participate and adequately completed the survey, thus resulting in a response rate of 96.7%. The study population had an equal gender distribution; 89.1% were Saudis; and most (80%) were 21–50 years of age. A total of 60.4% of participants had a positive beliefs that telephone medical consultation services could decrease hospital visits (Table 1).

As shown in Table 2, 78.1% of the study participants were aware of the MoH 937 call center service, and 56.4% had used the service. In univariable analysis, awareness and utilization were significantly associated with all study variables. Participants who were male, Saudi, married,

Table 1: Demographic characteristics.

Socio-demographic data	N = 7692	%
Gender		
Female	3855	50.1
Male	3837	49.9
Nationality		
Saudi	6851	89.1
Non-Saudi	841	10.9
Age group (years)		
≤ 20	563	7.3
21–30	2786	36.2
31–40	2404	31.3
41–50	1266	16.5
≥ 51	673	8.7
Marital status		
Married	4414	57.4
Single	2790	36.3
Divorced	340	4.4
Widowed	148	1.9
Number of children		
No children	3529	45.9
1–2	1496	19.4
3–5	1856	24.1
≥ 6	811	10.5
Living area		
City	6978	90.7
Village	714	9.3
Education level		
Bachelor's degree or higher	4411	57.3
High school	2525	32.8
Intermediate	414	5.4
Primary	180	2.3
Illiterate	162	2.1
Employment		
Employed	4266	55.5
Not employed	1950	25.4
Student	1126	14.6
Retired	350	4.6
Health insurance		
No health insurance	831	10.8
Governmental	4816	62.6
Private	1137	14.8
Both governmental and private	908	11.8
Medical history^a		
Negative history	4593	59.7
Positive history	3099	40.3
Belief that TMCS can decrease hospital visits		
Yes	4644	60.4
Somewhat	2077	27.0
No	971	12.6

^a The medical history “chronic disease” list included diabetes, hypertension, obesity, bronchial asthma/chest disease, heart disease, thyroid disease, and anemia.

parents, urban, educated, employed, and medically insured, and those who had a positive medical history and positive beliefs regarding telephone medical consultation, were more likely to be aware of and/or to have used the service than participants in their reference groups. Service awareness and utilization differed among studied health directorates; the lowest levels were observed in Asir and Qunfudah.

Table 2: Public awareness and utilization of the MoH 937 service according to participant characteristics (n = 7692).

Socio-demographic and other characteristics/ awareness/utilization	Aware 6008 (78.1%) n (%)	Not aware 1684 (21.9%) n (%)	χ^2 , p value	OR (95% CI)	Used 4337 (56.4%) n (%)	Not used 3355 (43.6%) n (%)	χ^2 , p value	OR (95% CI)
Gender								
Female	2852 (47.5)	985 (58.5)	53.6, p < 0.001	Reference	1984 (45.7)	1853 (55.2)	68.1, p < 0.001	Reference
Male	3156 (52.5)	699 (41.5)		1.56 (1.40–1.74)	2353 (54.3)	1502 (44.8)		1.46 (1.34–1.60)
Nationality								
Saudi	5434 (90.4)	1417 (84.1)	53.6, p < 0.001	1.78 (1.53–2.09)	3914 (90.2)	2937 (87.5)	14.2, p < 0.001	1.32 (1.14–1.52)
Non-Saudi	574 (9.6)	267 (15.9)		Reference	423 (9.8)	418 (12.5)		Reference
Age group (years)								
≤20	354 (5.9)	209 (12.4)	145.9, p < 0.001	Reference	208 (4.8)	355 (10.6)	201.0, p < 0.001	Reference
21–30	2122 (35.3)	664 (39.4)		1.89 (1.56–2.29)	1452 (33.5)	1334 (39.8)		1.86 (1.54–2.24)
31–40	1983 (33.0)	421 (25.0)		2.78 (2.28–3.40)	1508 (34.8)	896 (26.7)		2.87 (2.38–3.47)
41–50	1061 (17.7)	205 (12.2)		3.06 (2.44–3.84)	831 (19.2)	435 (13.0)		3.26 (2.65–4.01)
≥51	488 (8.1)	185 (11.0)		1.56 (1.22–1.98)	338 (7.8)	335 (10.0)		1.72 (1.37–2.16)
Marital status								
Married	3654 (60.8)	760 (45.1)	167.9, p < 0.001	1.80 (1.61–2.02)	2772 (63.9)	1642 (48.9)	189.7, p < 0.001	1.84 (1.67–2.02)
Single	2030 (33.8)	760 (45.1)		Reference	1337 (30.8)	1453 (43.3)		Reference
Divorced	247 (4.1)	93 (5.5)		0.99 (0.77–1.28)	179 (4.1)	161 (4.8)		1.21 (0.96–1.51)
Widowed	77 (1.3)	71 (4.2)		0.41 (0.29–0.57)	49 (1.1)	99 (3.0)		0.54 (0.38–0.76)
Number of children								
No children	2522 (42.0)	1007 (59.8)	179.8, p < 0.001	Reference	1652 (38.1)	1877 (55.9)	262.0, p < 0.001	Reference
1–2	1242 (20.7)	254 (15.1)		1.95 (1.68–2.28)	938 (21.6)	558 (16.6)		1.91 (1.69–2.16)
3–5	1594 (26.5)	262 (15.6)		2.43 (2.09–2.82)	1263 (29.1)	593 (17.7)		2.42 (2.15–2.72)
≥6	650 (10.8)	161 (9.6)		1.61 (1.34–1.94)	484 (11.2)	327 (9.7)		1.68 (1.44–1.96)
Living area								
City	5483 (91.3)	1495 (88.8)	9.6, p = 0.002	1.32 (1.11–1.57)	3965 (91.4)	3013 (89.8)	5.9, p = 0.016	1.21 (1.04–1.41)
Village	525 (8.7)	189 (11.2)		Reference	372 (8.6)	342 (10.2)		Reference
Education level								
Bachelor's degree or higher	3556 (59.2)	855 (50.8)	205.1, p < 0.001	5.75 (4.17–7.92)	2517 (58.0)	1894 (56.5)	136.6, p < 0.001	5.00 (3.41–7.34)
High school	1971 (32.8)	554 (32.9)		4.92 (3.55–6.81)	1506 (34.7)	1019 (30.4)		5.56 (3.78–8.19)
Intermediate	317 (5.3)	97 (5.8)		4.52 (3.07–6.65)	221 (5.1)	193 (5.8)		4.31 (2.82–6.69)
Primary	96 (1.6)	84 (5.0)		1.58 (1.03–2.42)	59 (1.4)	121 (3.6)		1.84 (1.13–3.00)
Illiterate	68 (1.1)	94 (5.6)		Reference	34 (0.8)	128 (3.8)		Reference
Employment								
Employed	3514 (58.5)	752 (44.7)	112.2, p < 0.001	2.01 (1.73–2.34)	2650 (61.1)	1616 (48.2)	158.0, p < 0.001	2.21 (1.93–2.52)
Not employed	1437 (23.9)	513 (30.5)		1.21 (1.03–1.42)	1022 (23.6)	928 (27.7)		1.48 (1.28–1.72)
Student	787 (13.1)	339 (20.1)		Reference	480 (11.1)	646 (19.3)		Reference
Retired	270 (4.5)	80 (4.8)		1.45 (1.10–1.92)	185 (4.3)	165 (4.9)		1.51 (1.19–1.92)
Health insurance								
No health insurance	559 (9.3)	272 (16.2)	74.8, p < 0.001	Reference	313 (7.2)	518 (15.4)	142.2, p < 0.001	Reference
Governmental	3876 (64.5)	940 (55.8)		2.01 (1.71–2.36)	2882 (66.5)	1934 (57.6)		2.47 (2.12–2.87)
Private	878 (14.6)	259 (15.4)		1.65 (1.35–2.02)	631 (14.5)	506 (15.1)		2.06 (1.72–2.48)
Both governmental and private	695 (11.6)	213 (12.6)		1.59 (1.29–1.96)	511 (11.8)	397 (11.8)		2.13 (1.76–2.58)

	3462 (57.6)	1131 (67.2)	49.7, p < 0.001	Reference	2419 (55.8)	2174 (67.2)	64.0, p < 0.001	Reference
Medical history								
Negative history	3462 (57.6)	1131 (67.2)	49.7, p < 0.001	Reference	2419 (55.8)	2174 (67.2)	64.0, p < 0.001	Reference
Positive history	2546 (42.4)	533 (32.8)		1.50 (1.34–1.69)	1918 (44.2)	1181 (35.2)		1.46 (1.33–1.60)
Belief that TMCS can decrease hospital visits								
Yes	3857 (64.2)	787 (46.7)	249.5, p < 0.001	3.18 (2.74–3.69)	2932 (67.6)	1712 (51.0)	236.9, p < 0.001	2.54 (2.21–2.93)
Somewhat	1562 (26.0)	515 (30.6)		1.97 (1.67–2.32)	1014 (23.4)	1063 (31.7)		1.42 (1.21–1.65)
No	589 (9.8)	382 (22.7)		Reference	391 (9.0)	580 (17.3)		Reference

χ^2 , chi square; OR, odds ratio; CI, confidence interval; TMCS, telephone medical consultation service.

Moreover, in the multivariable analysis (Table 3), all independent variables were significant predictors, except employment and marital status in predicting call center awareness and utilization, and living area in predicting utilization. Having an education higher than primary level was the strongest predictor of service awareness and utilization (aOR 4.03, 95% CI: 3.17–5.12 and 3.42, 95% CI: 2.64–4.42, respectively), and was followed by Saudi nationality as a predictor of awareness (aOR 2.04, 95% CI: 1.72–2.41) and positive beliefs as a predictor of utilization (aOR 1.99, 95% CI: 1.81–2.20). Participants with children were almost twice as likely to be aware of or to use the 937 service than those without children (aOR 1.87, 95% CI: 1.57–2.23 and 1.93, 95% CI: 1.66–2.24, respectively). Participants 21–50 years of age were almost 1.5 times more likely to be aware of or use the service than those in other age groups (aOR 1.52, 95% CI: 1.31–1.78 and 1.51; 95% CI: 1.31–1.73, respectively), similarly to findings for participants with medical insurance or with a positive medical history. Male gender was also a significant predictor of both awareness and service utilization.

Most participants (97.5%) who had not used the service were either unaware of the service (50.2%) or did not need the service (47.3%); only 2% were not using the service because they lacked trust in telephone medical consultation or were unaware of the service. More than three-quarters (77.1%) of the study participants had used the 937 service for medical consultations: approximately half (50.6%) for appointment booking, and one-third (33.2%) for inquiries (Figure 1).

The main reasons for choosing to call the 937 service rather than visiting a hospital were ease of utilization (67.7%), 24/7 availability (57.3%), free service (47.6%), and pandemic (COVID-19) restrictions (46.8%) (Figure 2).

As shown in Table 4, most participants who had used the service (86%) were satisfied; 88.2% reported that they would recommend the service to others. Among participants who were neutral toward or dissatisfied with the service (608 participants), a long waiting time was the main reason for dissatisfaction (46.4%), which was followed by not receiving a satisfactory full answer to their enquiry (15.5%).

As shown in Table 5, univariable analysis indicated that Saudis who were married, had children, were medically insured, had a positive medical history, and had positive beliefs regarding telephone medical consultation were more likely to be satisfied by the service than their reference groups. Moreover, gender, age, education level, and employment were not significantly associated with satisfaction with the service. Satisfaction differed among the studied health directorates, and the lowest levels were found in Asir and Al-Madinah.

Table 6 shows the results of regression analysis of factors influencing satisfaction among study participants who had used the MoH's 937 service. Participants with positive beliefs about telephone medical consultation were almost twice as likely as those without positive beliefs to be satisfied with the service (aOR 2.22, 95% CI: 1.86–2.64). Those with medical insurance and those with children, were more likely to be satisfied by the service (aOR 1.62, 95% CI: 1.21–2.18 and 1.46, 95% CI: 1.09–1.95, respectively). However, a positive medical history and Saudi nationality were predictors of lower satisfaction

Table 3: Multiple logistic regression analysis of factors influencing public awareness and utilization of the MoH 937 service.

Dependent variable	Awareness					Utilization				
	β	Wald	aOR	95% CI	p value	β	Wald	aOR	95% CI	p value
➤ Education higher than primary level	1.394	130.015	4.03	3.17–5.12	<0.001	1.229	87.877	3.42	2.64–4.42	<0.001
➤ Saudi nationality	0.710	66.669	2.04	1.72–2.41	<0.001	0.351	19.795	1.42	1.22–1.66	<0.001
➤ Positive beliefs regarding telephone medical consultation service	0.705	145.694	2.03	1.81–2.27	<0.001	0.690	193.104	1.99	1.81–2.20	<0.001
➤ Having children	0.627	48.043	1.87	1.57–2.23	<0.001	0.659	74.661	1.93	1.66–2.24	<0.001
➤ Age 21–50 years	0.420	28.440	1.52	1.31–1.78	<0.001	0.409	32.604	1.51	1.31–1.73	<0.001
➤ Having medical insurance	0.405	22.503	1.50	1.27–1.77	<0.001	0.673	71.057	1.96	1.68–2.29	<0.001
➤ Male gender	0.356	31.054	1.43	1.26–1.62	<0.001	0.268	25.179	1.31	1.18–1.45	<0.001
➤ Positive medical history	0.306	22.904	1.36	1.20–1.54	<0.001	0.274	27.516	1.32	1.19–1.46	<0.001
➤ Living in a city	0.232	5.880	1.26	1.05–1.52	0.015	0.133	2.529	1.14	0.97–1.35	0.247
➤ Currently married	0.139	2.429	1.15	0.97–1.37	0.119	0.042	0.309	1.04	0.90–1.21	0.112
➤ Currently employed	0.050	0.577	1.05	0.92–1.20	0.448	0.061	1.196	1.06	0.95–1.19	0.578
Constant	-2.647	148.347	0.07		<0.001	-3.353	317.935	0.04		<0.001

aOR, adjusted odds ratio; CI, confidence interval.

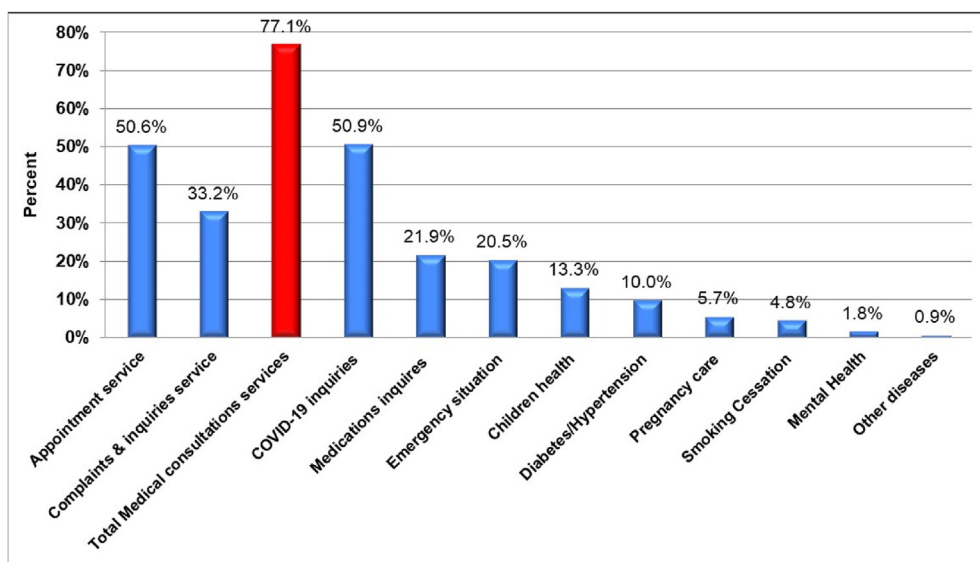


Figure 1: 937 call center health services used.

* More than one service might have been selected.

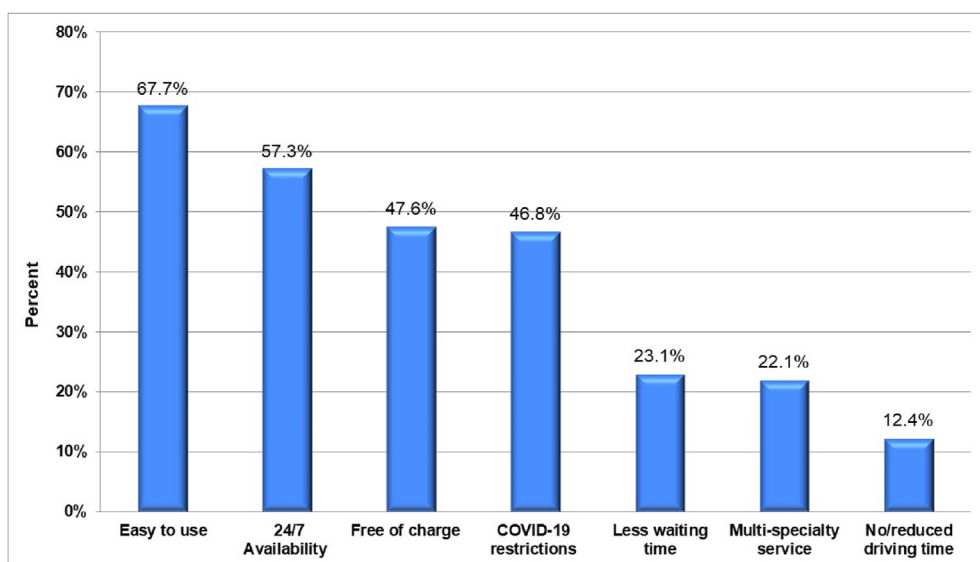


Figure 2: Reasons for calling the 937 service rather than visiting a hospital.

* More than one reason might have been selected.

Table 4: Users' satisfaction with the MoH 937 service (N = 4337).

Variables	Count	Percent
Satisfaction level		
> Satisfied	3729	86.0
> Neutral	402	9.3
> Dissatisfied	206	4.7
Recommendation of the service to others		
> Yes	3825	88.2
> Maybe	449	10.4
> No	63	1.5
Reasons for dissatisfaction with the 937 service (n = 608)^a		
> Late response/long call waiting times		46.4
> Not receiving a full answer	282	15.5
> Lack of a specialist	94	6.4
> Respondent's weak communication skills	39	5.4
> No action taken with complaint	33	1.5
> No action taken with complaint	9	0.5
> Contradictory messages	3	0.5
> No reason reported for neutral response	148	24.3

^a Only participants who were neutral or dissatisfied regarding the MoH 937 service (n= 608)

Table 5: Satisfaction of 937 service users according to participant characteristics (n = 4337).

Socio-demographic and other characteristics/satisfaction	Satisfied 3729 (86.0%)	Dissatisfied or neutral 608 (14.0%)	χ^2 , p value	OR (95% CI)
	n (%)	n (%)		
Gender				
Female	1703 (45.7)	281 (46.2)	0.06, p = 0.80	Reference
Male	2026 (54.3)	327 (53.8)		1.02 (0.86–1.21)
Nationality				
Saudi	3344 (89.7)	570 (93.8)	9.86, p < 0.01	0.58 (0.41–0.82)
Non-Saudi	385 (10.3)	38 (6.3)		Reference
Age group (years)				
≤20	180 (4.8)	28 (4.6)	2.91, p = 0.57	Reference
21–30	1233 (33.1)	219 (36.0)		0.88 (0.57–1.34)
31–40	1312 (35.2)	196 (32.2)		1.04 (0.68–1.59)
41–50	716 (19.2)	115 (18.9)		0.97 (0.62–1.51)
≥51	288 (7.7)	50 (8.2)		0.90 (0.54–1.48)
Marital status				
Married	2416 (64.8)	356 (58.6)	8.82, p < 0.01	1.30 (1.09–1.55)
Not married	1313 (35.2)	252 (41.4)		Reference
Having children				
No children	1380 (37.0)	272 (44.7)	13.25, p < 0.001	Reference
Children	2349 (63.0)	336 (55.3)		1.38 (1.16–1.64)
Living area				
City	3421 (91.7)	544 (89.5)	3.43, p = 0.06	1.31 (0.98–1.74)
Village	308 (8.3)	64 (10.5)		Reference
Education level				
Illiterate/primary	86 (2.3)	7 (1.2)	3.32, p = 0.07	Reference
Higher than primary	3643 (97.7)	601 (98.8)		0.49 (0.23–1.07)
Employment				
Employed	2300 (61.7)	350 (57.6)	3.72, p = 0.054	1.19 (0.99–1.41)
Not employed	1429 (38.3)	258 (42.4)		Reference
Health insurance				
No health insurance	250 (6.7)	63 (10.4)	10.44, p < 0.01	Reference
Health insurance	3479 (93.3)	545 (89.6)		1.61 (1.20–2.15)
Medical history				
Negative history	2112 (56.6)	307 (50.5)	8.00, p < 0.01	Reference
Positive history	1617 (43.4)	301 (49.5)		0.78 (0.66–0.93)
Belief that TMCS can decrease hospital visits				
Yes	2618 (70.2)	314 (51.6)	95.43, p < 0.001	2.98 (2.31–3.84)
Somewhat	823 (22.1)	191 (31.4)		1.54 (1.17–2.03)
No	288 (7.7)	103 (16.9)		Reference

χ^2 , chi square; OR, odds ratio; CI, confidence interval; TMCS, telephone medical consultation service.

Table 6: Multiple logistic regression analysis of factors influencing satisfaction among participants using the MoH 937 service.

Dependent variable	Satisfaction				
	Predictors/statistics	β	Wald	aOR	95% CI
➤ Positive beliefs regarding telephone medical consultation service	0.797	79.599	2.22	1.86–2.64	<0.001
	–0.296	10.778	0.74	0.62–0.89	<0.01
➤ Positive medical history	0.483	10.170	1.62	1.21–2.18	<0.01
➤ Having medical insurance	–0.531	8.895	0.59	0.42–0.83	<0.01
➤ Saudi nationality	0.375	6.320	1.46	1.09–1.95	<0.05
➤ Having children	0.405	0.008	0.99	0.74–1.32	0.930
➤ Currently married					
Constant	–2.647	148.347	0.07		<0.001

aOR, adjusted odds ratio; CI, confidence interval.

levels (aOR 0.74, 95% CI: 0.62–0.89 and 0.59, 95% CI: 0.42–0.83, respectively).

Discussion

This study measured levels of public awareness of, utilization of, and satisfaction with the Saudi MoH's 937 call center telephone health service 10 years after its launch in 2013, as well as associated socio-demographic factors, to provide deeper understanding of the barriers to, and facilitators of, service use among various population groups.

The study revealed high service awareness, utilization, and satisfaction among Saudi residents. These results were consistent with those from a recent study by Al-ryes et al., in 2021,¹¹ which has reported highly similar awareness and utilization of the 937 service. However, in a study in 2020, Al-ryes et al.⁸ reported low levels of public awareness and utilization of the service. This difference might be attributable to the time when the surveys were conducted (June to September 2021), and increases in both public demand for virtual healthcare services and governmental efforts to encourage use of the 937 service as an alternative to in-person visits for non-emergency health concerns during the COVID-19 pandemic. In a recent review of telehealth before, during, and after the COVID-19 pandemic, Sculley et al.¹² have suggested that telehealth delivered in addition to traditional in-person care may increase access to, and patient satisfaction with, healthcare. Many other studies have reported the effects of the COVID-19 pandemic on increasing awareness and utilization of telehealth services, both in the Middle East^{13–15} and worldwide.^{16–18} However, An et al.¹⁹ have reported no significant relationship between COVID-19 anxiety and acceptance of telehealth in the Korean general population.

We detected multiple socio-demographic factors associated with awareness and utilization of the 937 service in our study population. Having higher education level, Saudi nationality, positive beliefs regarding the service; children, medical insurance, male gender, and positive medical history, and being 21–50 years of age, were associated with service awareness and utilization.

In addition, participants with positive beliefs that telephone medical consultation services could avoid hospital visits were more aware of the 937 service and used it more. This finding supports the results of Onyeneho et al.,²⁰ which have confirmed an association between positive perception and utilization of public health services.

Education level was also a significant predictor of both awareness and utilization of telehealth services. Most individuals who were aware of and used the service had higher education levels, a finding mirroring the results from several other studies.^{8,21,22} This finding might have been due to more educated individuals' greater awareness of, and likelihood of using, technology-based services.²³

In contrast to findings reported by El-Mahalli et al.,²⁴ awareness and utilization levels in the current study were found to be high for Saudis compared with non-Saudis, perhaps because of perceptions among non-Saudis that the service is only for Saudi citizens.

Participants with children had higher awareness and utilization levels, as expected, given that caregivers have a medical responsibility for their children and must seek medical services and advice from reliable and accurate sources. Indeed, Hosley²⁵ has reported challenges in telehealth among families of children with neurodevelopmental disorders.

Young and middle-aged people were more aware of, and more likely to use, the 937 service than the older population. This result was consistent with findings by Junge et al.,²² who have reported that ~70% of primary care users of telemedicine were younger than 50 years. Another study by El-Mahalli et al.²⁴ has indicated that 30–50-year-olds are most likely to use telemedicine, probably because younger people are more likely than older people to be familiar with technology.

People living in urban areas or large cities were more aware of the service than those living in rural areas or villages. This finding was consistent with the results of several studies indicating greater telehealth awareness among people living in urban rather than rural areas.^{8,26} However, our findings contrast with those of Chen et al.,²⁷ who have found that urban patients are less likely than rural patients to use telemedicine for ophthalmic care.

The awareness and utilization of 937 services in participants with a history of chronic disease were higher than that in participants with no history of chronic disease, similarly to results reported by Haque et al.²⁸ This finding was probably because people with chronic diseases tend to continually use healthcare services, during which time healthcare providers might recommend the 937 service for certain health issues.

Unexpectedly, participants without rather than with health insurance were less likely to be aware of and use the 937 service, although it is provided free of charge. Similarly, students were less likely than participants with other employment statuses to be aware of and use the 937 service,

possibly because students might use health services less frequently than other individuals, given that they tend to be younger and healthier.

Most participants (86%) in our study were satisfied with the 937 service, although 4.7% were not satisfied. This finding was consistent with those in studies by Alkhashan et al.³ and Alfaleh et al.,²⁹ in which most callers to the 937 service expressed satisfaction (95% and 83.7%, respectively). Studies by Polinski et al.³⁰ have indicated that 94%–99% of participants were satisfied with all aspects of telehealth services, whereas studies by Aneja et al.³¹ and Martinez et al.³² have indicated that 97% and 85% of clients were satisfied with telemedicine services, respectively. Eighty-eight percent of participants indicated that they were willing to recommend the service to others, in agreement with a study by Polinski et al.,³⁰ in which almost 100% recommended telehealth services to others; in contrast, in a study by Aneja et al.,³¹ only 9.4% recommended the service to others, and 90% were neutral.

Long wait times were the main source of dissatisfaction among 937 service users (6.5%), similarly to findings by Alkhashan et al.³ in which 5.5% of participants were dissatisfied with the 937 service, but lower than those reported by Alfaleh et al.,²⁹ in which 15% were dissatisfied with the 937 service. These differences in satisfaction regarding long wait times might be explained by the studies having been conducted at different times: Alfaleh et al.²⁹ conducted their study during the height of the COVID-19 pandemic. We found that 0.8% of participants were dissatisfied because of communication with the provider; this percentage was lower than those reported by Alkhashan et al.³ and Alfaleh et al.²⁹ (5.5% and 10% dissatisfied, respectively). This difference might have been due to improvements in the 937 service and/or studies conducted during the COVID-19 restrictions reflecting high call volumes and limited physician availability to answer calls, thus leading to longer waiting times and greater dissatisfaction.

Our findings suggested that satisfaction was positively affected by positive beliefs regarding telephone medical consultation. Wang and Cao have concluded that the perceived usefulness of telemedicine has a significant positive effect on satisfaction, in agreement with our results.³³

This study has several limitations. The cross-sectional nature of the study made causal inferences impossible. The convenience sampling method and potential selection bias might have limited the generalizability of the study results. Because the interviews were conducted in public places, individuals with limited social mobility were not included. Finally the duration of data collection (June to September 2022) spanned the summer and vacation season.

Conclusion

To our knowledge, this investigation is the first large-scale, population-based study of all regions of KSA regarding the awareness of, utilization of, and satisfaction with the 937 call center telephone health service. We found high awareness of, utilization of, and satisfaction with the 937 service in the studied population. However, we found inequalities among population sub-groups. To ensure egalitarian telephone-accessed health services, more efforts must

be allocated toward groups with lower awareness of, utilization of, and satisfaction with the service. Further targeted studies are needed to investigate why certain population groups have lower levels of awareness and utilization.

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Conflicts of interest

The authors declare no conflicts of interest or any competing interests.

Ethical approval

The Central IRB of the MoH, Riyadh, KSA, approved the study protocol (ref: 21-48M). All respondents provided verbal consent before questionnaire administration. This study was conducted in accordance with the Declaration of Helsinki and all applicable local regulations. Data were stored securely and were accessible to only the research team.

Author contributions

All authors contributed to the conception and design of the study. WAA prepared and submitted the IRB dossier; validated the study questionnaire; analyzed the data; and drafted the manuscript. NKA and NAA searched the literature, wrote the study proposal, and supervised the data collection. ISS and NJA reviewed the manuscript and supervised the entire projects. All authors have critically reviewed and approved the final draft, and are responsible for the content and similarity index of the manuscript.

Data availability

The datasets analyzed during the current study are available from the corresponding author on reasonable request.

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