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The journey of female surgeons in the arab region: A scoping review

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ABSTRACT

Background: In the Arab region, there's a dearth of research on female surgeons' experiences and challenges. To address this gap, a scoping review aims to map existing literature. It seeks to understand the hurdles faced by female surgeons in Arab countries and examine any gender biases in public preferences for surgeons. No previous reviews were conducted on female surgeons in the Arab region. By identifying systemic barriers, the review aims to promote inclusivity and support for female surgeons in the Arab medical community.

Methods: A scoping review was performed and reported using the PRISMA extension for scoping reviews. Five databases were searched which include PubMed, Web of Science, Scopus, Embase, and ProQuest. The search strategy included three main strings that are "Women" AND "Surgeons" AND "Arab Country". A priori-identified spreadsheet was used for data extraction.

Results: A total number of 23 studies were included in this review. The findings were categorized under several headings, such as the general public's preferred gender of surgeon and well-being, challenges, and experiences of female surgeons as well as career perspectives, choices, and satisfaction.

Conclusions: This scoping review explores experiences and challenges faced by female surgeons in the Arab region, emphasizing the need to address systemic barriers and promote inclusivity.

1. Introduction

Surgery stands as one of the most demanding fields in medicine, necessitating not only intensive training but also a profound dedication to patient care. Historically underrepresented in medicine, women are now demonstrating a strong and growing presence, particularly within the surgical specialties [1]. However, this progress varies due to cultural and social factors, creating a contrasting narrative for women entering surgical careers in the Arab world.

The issue of access to surgical care is not only a regional concern. Globally about 4.8 billion people, equivalent to two-thirds of the populace, need adequate surgical services [2]. This shortage highlights the urgent call for more surgeons. Despite this, women face a unique set of challenges that obstruct their entry and progression in the surgical field. Women's underrepresentation in the discipline stands in sharp

contrast to the global healthcare labor force (67 % female as indicated by the World Health Organization [3] and employment in the Arab agriculture, education, healthcare, and public administration sectors (two-thirds female [4]).

The educational landscape for women in the Arab world has seen remarkable progress. For instance, in Saudi Arabia, women make up 60 % of the university graduate population, with a literacy rate among young women reaching 99.3 % [5]. Yet, this educational success has not translated equally into the surgical field where men still dominate. To illustrate, research conducted in Kuwait, focusing on the participation of women in healthcare leadership, found that there has been no significant increase in the number of female department heads and that surgery remained male-dominated [1].

The heterogeneity of the Arab region is reflected in the vastly different experiences of women's empowerment across countries. Some

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have experienced notable progress as women surge forward, challenging and changing long-standing gender roles. In others, deep-rooted societal and cultural norms significantly restrict women’s professional pursuits, particularly in male-dominated fields like surgery [6].

The disparity in the representation of women in surgery are due to multiple barriers. These include, but are not limited to, gender biases, societal expectations, and a noticeable lack of female role models and mentors within surgery [7]. Additionally, female surgeons in the Arab world often find themselves navigating the complex interplay between meeting the demands of their profession whilst confronting societal skepticism of their professional aptitudes as surgeons and societal norms of women’s familial roles.

This scoping review aims to comprehensively chart the literature pertaining to female surgeons in the Arab region. It encompasses an exploration of themes, delving into the lived experiences of women in surgery within the Arab world. The primary objective is to unravel the complex challenges they encounter and the remarkable resilience they exhibit in overcoming these challenges. This review will bring into focus the narratives of female surgeons, examining the cultural hurdles they face, their well-being, career progression, and societal perceptions.

By meticulously examining the existing literature, this paper synthesizes current knowledge and identifies areas warranting further investigation. The aim is to formulate strategies that can provide support and empowerment for women navigating this essential yet demanding field. Recognizing and addressing these barriers extends beyond the realm of equity; it is a crucial step toward optimizing the surgical workforce to meet the pressing need for surgical care globally, with a particular emphasis on the Arab region specifically.

2. Methods

2.1. Study design

A scoping review was employed using the Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) guideline for reporting this study.

2.2. search Strategy

A systemic search was performed on August 16, 2023 using the following five databases: PubMed, Web of Science, Scopus, Embase, and ProQuest. A comprehensive search strategy was built to capture all articles that addressed female surgeon topics in the Arab region. The search strategy included three main strings that are “Women [Title/Abstract]” AND “Surgeons [Title]” AND “Arab Country [Title/Abstract]” which were separated with the AND Boolean. Each string included multiple keywords (Supplementary Table 1) used in the search strategy in each database and each keyword was separated with the OR Boolean operator. All database searches were confined to English language. No restrictions were made on age, gender, nor date. Google Scholar and the reference lists of included studies were also searched to identify additional relevant articles.

2.3. Selection of included studies

A systematic search was conducted, and results were reported in accordance with the selection process in the PRISMA 2020 flow diagram as presented in Fig. 1. All studies retrieved from the databases searched (n = 1383) were inserted into the bibliographic software EndNoteX9 and duplicates were removed automatically as an initial step. The

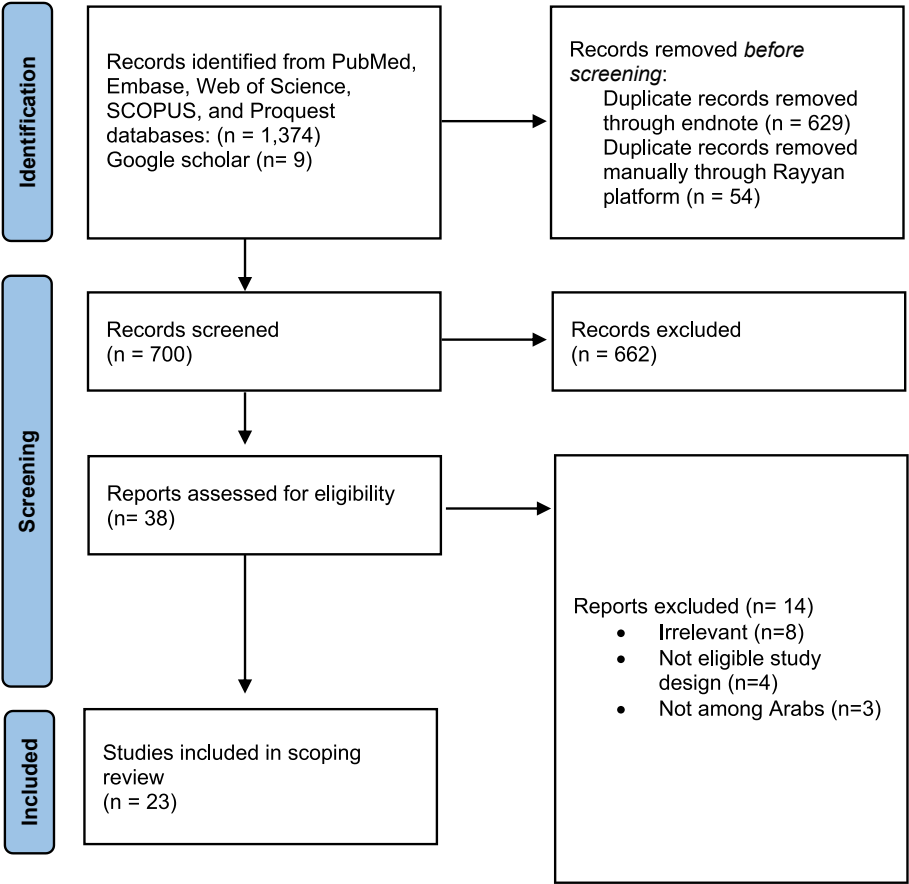


Fig. 1. PRISMA flowchart.

number of duplicates removed using Endnote was 629. The remaining 754 articles were downloaded onto the Rayyan platform, and a manual duplicate removal was performed (54 duplicates were manually removed). Two researchers independently screened the titles and abstracts of 700 studies. Any differences in their assessments were resolved through discussion or, if necessary, by involving a third researcher. Following this, 38 studies were deemed relevant. The researchers then independently assessed the full text of these studies for eligibility; again, any discrepancies were resolved through discussion. The criteria determining inclusion are peer-reviewed, full-text articles published in English which included any information relevant to female surgeons and surgical residents conducted in Arab countries and utilizing qualitative, quantitative, observational, experimental, and mixed methods. The criteria determining exclusion are studies conducted outside the Arab region, and on the history of female surgeons as well as articles without full-text access, case reports/series, books, letters, conferences, and editorials.

2.4. Data extraction

A spreadsheet was prepared prior to data extraction which included the following information: First author, title, year, study design, topic (public perception, challenges and barriers, experiences), aim/objectives, population, sample size, the age for the total population, other demographics for the total population, the prevalence of female surgeons/interns, the age for female surgeons, other demographics for female surgeons, surgery specialty, a summary of main findings, and limitations. A single reviewer integrated all extracted data into a tabular format and subsequently re-examined the data to confirm the precision of the reported information.

2.5. Synthesis of results

Data was compiled in the form of tables and graphs with demographics presented as frequencies and percentages as well as median and/or ranges, as appropriate, in descriptive statistics. The included studies were divided into four/five categories and presented in the results section.

3. Results

3.1. Characteristics of included studies

A total of 23 studies were identified and included, and their

publication period ranged from 2019 to 2023. The geographical distribution of these studies was primarily concentrated in Saudi Arabia ($n = 14$) [8–22]. The review included one study in each of Syria [23], Kuwait [24], and Iraq [25], alongside two studies in each of Jordan [26,27] and Lebanon [28,29]. Moreover, two multicenter studies conducted across Egypt, Jordan, and Saudi Arabia were included [30,31]. All included studies employed a cross-sectional study design as shown in Fig. 2.

The included studies were predominantly among established surgeons ($n = 10$) [13,15,16,18,20,25,26,28,30,31] and surgical residents ($n = 7$) [8,10,11,14,22–24], it was also extended to medical ($n = 1$) [9] and dental students, trainees/interns ($n = 2$) [12,19], and the general public ($n = 3$) [21,27,29]. The sample sizes of the included studies ranged from 31 to 15,429 participants. Within the corpus of research examined, 8 studies (33.3 %) focused on career choice, 7 studies (29.2 %) explored challenges, 6 studies (25 %) were centered around well-being and health, 3 studies (12.5 %) investigated public perception.

In terms of demographics, some studies exclusively examined the unique challenges female surgeons face. Others sampling male and female participants generally showed a higher representation of men. The average age of participants was between the early thirties to the early forties. Many of the professionals studied were married ranging from 3 to 90 %. Other demographic data collected included smoking status, Body Mass Index (BMI), years of experience in the field, and nationality, if available, which are presented in Table 1.

3.2. Female surgeons in the arab countries

Among studies investigating female surgeons, the prevalence of female surgeons ranged between 2.3 % and 61.3 %. Two studies included only female surgeons with a prevalence equal to 100 %. Female surgeons specialized in Oral and Maxillofacial Surgery (OMFS) had a prevalence of 36.3–37.3 % in all studies that included surgeons in this specialty, except one that included dental interns with a higher prevalence of 56 %. The age of female surgeons ranged between 20 and 66 years old. The demographics of female surgeons are presented in Table 2.

3.3. Well-being of female surgeons

Out of all the studies included, about 27 % ($n = 6$) focused on the health of female surgeons, including their physical and mental well-being [8,13,14,16,18,24].

In Saudi Arabia, two studies investigated the issue of muscle pain related to work. One study with orthopedic surgeons, which included a few women (3.4 %), found that muscle pain was common among women



Fig. 2. Map of included studies.

Table 1
Characteristics of included studies.

First author	Year	Country	Topic	Aim/objectives	Population	Sample size	Age (mean \pm SD or range)	Other demographics
<i>Malik M. Almailabi</i>	2019	Saudi Arabia	Quality of life of surgical residents	Evaluate quality of life of the surgical residents and address factors affecting it.	Surgical residents	73	28 \pm 2.1	53.4 % males 54.8 % married 42.5 % smoker BMI mean: 25kg/m2
<i>Abdulaziz Z. Alomar</i>	2023	Saudi Arabia	Perception of students	Assess the apparent lag in equal representation among men and women in orthopedic surgery.	Medical students	565	NR	51 % males 3 % married 69 % in clinical years
<i>Tariq Altokhais</i>	2020	Saudi Arabia	Satisfaction of residents	Examine residents' satisfaction with pediatric surgery program and the degree of burnout	Surgical residents	31	25 to 30	38.7 % males 35.5 % married
<i>Anas Abdo</i>	2021	Syria	Satisfaction of residents	Identify the strengths and weaknesses points in the program.	Surgical residents	59	NR	62.7 % males 18.6 % first year of residency
<i>Rawan Abdulrahman T. Harun</i>	2022	Saudi Arabia	Career influence in female residents	Investigate role models and the presence of women in the surgical field.	Female surgical residents	51	27.37 \pm 2.13	41.2 % in first year of residency 90.2 % Saudi 3.9 % married
<i>N. Dar-Odeh</i>	2019	Egypt, Jordan, and Saudi Arabia	Career obstacles for female surgeons	Provide understanding of factors contributing to weak participation of women in the OMFS workforce.	Surgeons	588	39.2 \pm 9.0	63.6 % males 76.4 % married Years of professional experience mean: 9.36 \pm 9.1
<i>Abdulaziz Z. Alomar</i>	2022	Saudi Arabia	Pursuing multiple fellowships	Determine the factors and motives influencing trainees to pursue multiple fellowships.	Orthopedic trainees	250	27 \pm 1.67	80 % males 40 % married 51 % junior year
<i>Nosaiba Al Ryalat</i>	2021	Jordan	Career obstacles for female surgeons	Explore socio-professional characteristics of female surgeons and understand surgeon perceptions of factors promoting or hindering careers.	Female surgeons	56	38.55 \pm 5.80	76.8 % married Years of experience mean: 8.59 \pm 5.46
<i>Omar A. Al-Mohrej</i>	2020	Saudi Arabia	Pain in orthopedic surgeons	Estimate prevalence of musculoskeletal pain and possible complications among orthopedic surgeons and identify risk factors.	Orthopaedic surgeons	179	32.2 \pm 7.7	96.6 % males 56.4 % married BMI mean: 27.8 \pm 5.2 39.6 % smoking 51.4 % exercising
<i>Abdulmajeed Bin Dahmash</i>	2020	Saudi Arabia	Pain in Otorhinolaryngology-Head and Neck Surgery Residents	Identify musculoskeletal symptoms among otorhinolaryngology residents.	Otorhinolaryngology residents	45	25 to 30	73.3 % males 46.7 % married. 60 % exercise \geq 1 days a week
<i>Jehad Feras AlSamhori</i>	2023	Jordan	Gender preference of surgeons	Assess gender preference of surgeons among the Jordanian population and evaluate factors predictive of such a preference.	Jordanian adults	1708	32.9 \pm 15.8	36.3 % married. 81.3 % \geq bachelor's degree 47.5 % income >500 49.9 % unemployed
<i>Hatan Mortada</i>	2021	Saudi Arabia	Career-choice satisfaction	Assess impacts of plastic surgeon demographics and practices on levels of career-choice satisfaction.	Plastic surgeons	63	42.21 \pm 6.61	82.5 % males 85.7 % married. 36.5 % Saudi 78.2 % males
<i>Said El Hage</i>	2022	Lebanon	Gender gap in surgical specialties	Assess status of female surgeons and possible gender gaps in surgery specialty in Lebanon.	Physicians	15,429	NR	
<i>Abdullah I. Almater</i>	2020	Saudi Arabia	Psychological impact of the COVID-19	Evaluate the psychological impact and mental health problems (depression, anxiety, insomnia, and stress) of ophthalmologists during COVID19.	Ophthalmologists	107	32.9 \pm 9.6	56.1 % males 93.5 % Saudi 47.6 % married 61.7 % resident

(continued on next page)

Table 1 (continued)

First author	Year	Country	Topic	Aim/objectives	Population	Sample size	Age (mean \pm SD or range)	Other demographics
Ahmed Mohammed Alshammari	2023	Saudi Arabia	Effects of the COVID-19 on general surgeons	Study the positive and negative outcomes of the COVID-19 pandemic on surgical training, education, and burnout among general surgeons.	General surgeons	111	NR	68.5 % males 24.3 % consultant 34.2 % resident 62.2 % direct care with cases
Shaden Abu-Hammad	2020	Egypt, Jordan, and Saudi Arabia.	Career satisfaction and perceptions of gender representation	Explore career satisfaction and perceptions regarding gender and its impact on representation, with a focus on leadership and mentorship positions, among male and female OMFS surgeons.	OMFS surgeons	110	39.2 \pm 9.0	63.6 % males 76.4 % married. 25.5 % Jordanian, 26.4 % Saudi Arabian, 37.3 % Egyptian Years of experience mean: 9.36 \pm 9.1 44 % males
AlhAnouf AlhulAyyil	2021	Saudi Arabia	Knowledge and confidence level to carry out surgery	Assess knowledge and confidence level of new graduate dental interns to carry out oral surgery procedures.	Dental interns	210	NR	
Suzan A. Rattan	2023	Iraq	Challenges and obstacles	Address disparities between male and female ophthalmologists in terms of personal circumstances, professional profiles, and attitudes toward work and family life.	Ophthalmologists	209	35 to 55	Female-to-male ratio: 1:1.6 90 % married 89 % have \geq 1 children
Rana Moshref	2021	Saudi Arabia	Perception, Academic Performance, Gender Judgment and Barriers among Surgeons' Career Progression	Examine the perception and equity of females as surgeons.	Surgeon specialists	100	<40 to >65	47 % males 31 % interns and residents 22 % consultants 14 % males 42 % married 79.4 % university or higher 31.8 % employed 64.7 % males 51.8 % married 31.8 % smoker 38.8 % exercising regularly 23.5 % medical condition
Layla M.Alkhaldi	2022	Saudi Arabia	Population Preference of Surgeon's Gender	Assess gender preferences when selecting surgeons for consultation and surgeries related to breast cancer and hemorrhoids.	Public aged 18 and above	635	18 to 50	53.1 % males 34.2 % married 93.1 % high school or higher 54.3 % employed 79.8 % \geq 500 income
Waleed Burhamah	2021	Kuwait	Burnout and depression	Assess prevalence and identify predictors of depression and burnout among residents across all surgical specialties.	Residents in surgical residency programs	85	20 to 40	62.7 % males 26.5 % overweight 14.5 % obese 32.5 % were smokers 43.3 % exercises regularly
Nour Abdul Halim	2020	Lebanon	Patient's preference	Study preference of public for gender preference of surgeons and reasons for preferences.	Public older than 18 years	1000	18 to 85	
Fahad A. Al Mulhim	2023	Saudi Arabia	Pain among orthopedic surgery physicians and residents	Quantify prevalence of MSPs among practicing orthopedic surgery physicians and residents.	Orthopedic surgery physicians and residents	83	27.8 \pm 2.2	

Table 2

Profile of female surgeons in Arab countries.

First author	Population	Female surgeons/ interns n (%)	Age for female surgeons	Other demographics for female surgeons	Surgery specialty
Malik M. Almailabi	Surgical residents	34 (46.6 %)	NR	NR	All specialties
Tariq Altokhais	Surgical residents	19 (61.3 %)	25–30	NR	Pediatric surgery
Anas Abdo	Surgical residents	22 (37.3 %)	NR	First year of residency (18.6 %), second (10.2 %), third (20.3 %), forth (18.6 %) and fifth (32.2 %)	OMFS
Rawan Abdulrahman T. Harun	Female surgical residents	51 (100 %)	27.4 ± 2.1	First year of the residency (41.2 %)	General surgery
N. Dar-Odeh	Surgeons	40 (36.4 %)	<30 - 60	Saudi (90.2 %), married (3.9 %)	OMFS
Abdulaziz Z. Alomar	Orthopedic trainees	49 (20 %)	NR	Professional experience (years), <5 (40.0 %), 5–10 (17.5 %), >10 (42.5 %)	Orthopedic surgery
Nosaiba Al Ryalat	Female surgeons	56 (100 %)	38.6 ± 5.8	Country of employment: Jordan (12.5 %), KSA (32.5 %), Egypt (55 %)	OMFS and ENT
Omar A. Al- Mohrej	Orthopedic surgeons	6 (3.4 %)	24–66	Country of specialization: Jordan (15 %), KSA (17.5 %), Egypt (62.5 %), WE (5 %)	Experience in years: 8.59 ± 5.457
Abdulmajeed Bin Dahmash	Otorhinolaryngology residents	12 (26.7 %)	25–30	Workplace: Academic institution (16.1 %), Ministry of health (57.1 %), private (26.8 %). Married (76.8 %)	GS, pediatric, orthopedic, trauma, spine, and oncology
Hatan Mortada	Surgeons	11 (17.5 %)	NR	NR	Otorhinolaryngology-Head and Neck Surgery
Abdullah I. Almater	Ophthalmologists	47 (43.9 %)	24–62	Married (45.5 %), Saudi (54.5 %), ≥5 years of experience (72.7 %)	Plastic surgery
Ahmed Mohammed Alshammari	Surgeons	35 (31.5 %)	NR	NR	Ophthalmologists
Shaden Abu- Hammad	Surgeons	40 (36.3 %)	25–60	Married (57.5 %)	GS, ENT, Urology, Orthopedics, Ophthalmology, Obstetrics and Gynecology, Neurosurgery, and Pediatric Surgery
AlhAnouf AlhulAyyil	Dental interns	117 (56 %)	NR	Nationality: Jordan (15 %), KSA (22.5 %), Egyptian (62.5 %)	OMFS
Suzan A. Rattan	Ophthalmologists	78 (37.3 %)	35–55	Employment country: Jordan (12.5 %), KSA (32.5 %), Egypt (55 %)	Married (80.8 %), No children (19.2 %), <3 children (51.3 %), 3–5 children (2.5 %)
Rana Moshref	Surgeons	53 (53 %)	<40–> 65	Country of specialization: Jordan (15 %), KSA (17.5 %), Egypt (62.5 %), WE (5 %)	Orthopedic/trauma, urology, vascular, cardiothoracic, neurosurgery, General surgery, hepatobiliary, plastic
Waleed Burhamah	Residents in surgical residency programs	46 (35.3 %)	20–40	NR	Otolaryngology, general surgery, neurosurgery, obstetrics and gynecology, orthopaedic surgery, urology
Fahad A. Al Mulhim	Orthopedic surgery physicians and residents	31 (37.3 %)	25–36	NR	Orthopedic

KSA: Kingdom of Saudi Arabia, WE: Western Europe, NR: Not reported.

accounting for 60.6 % [13]. Another study with residents in otorhinolaryngology, of whom about a quarter were women (26.7 %), showed muscle pain was not more common in both women and men, except for wrist/hand complaints which were more frequently reported by women (50 % versus 27.3 % [14].

Two other studies from Saudi Arabia investigated how COVID-19 affected female surgeons. One study with ophthalmologists, found that women were more likely to feel stressed and anxious than men [16]. The other study looked at how COVID-19 affected training in different surgical fields. It found a significant decline in the number of days off in a month among women [18]. Another study on quality of life for surgical residents found that there was no difference in the quality of life between men and women for surgical residents with more than half having low quality of life [8].

In Kuwait, half of women felt a higher level of job burnout [24]. Women face greater discrimination (65.1 %), and some even experience sexual harassment (19.9 %). Most of the time, superiors are responsible for misconduct (51.9 % [24].

3.4. Career perspectives, choice, and satisfaction

In Saudi Arabia, four studies have shed light the professional journeys of female surgeons [11,12,15,20]. The first of these studies surveyed female surgical residents to understand the impact of female role models in the field. A vast majority (92.2 %) had worked with a female surgeon prior to their surgical application, and only a third (35.3 %) felt that female surgeons were well-represented in their community [11]. Another study among orthopedic trainees identified a gender disparity

in motivation for fellowships, with male trainees showing a preference for multiple fellowships compared to their female counterparts (85 % vs. 62 %) [12].

Further research among plastic surgeons demonstrates a significant gender-based difference in weekly work hours. This research indicates the potential for female surgeons to work longer hours, with approximately 50 % reporting workweeks exceeding 60 h [15]. This trend extended to clinic as well as on-call days, with female plastic surgeons shouldering heavier workloads. A higher percentage of female surgeons reported being "very unsatisfied" with their jobs and cited working hours, financial compensation, and departmental leadership as key factors [15].

In a broader study among specialist surgeons, nearly half of women surveyed indicated that they viewed surgery as a career incompatible with family life. Inflexible work hours and societal barriers were cited as the most significant deterrents [20]. A considerable portion of female surgeons (39.6 %) identified limitations in career advancement and patient preference for male surgeons. This perception aligns with established research on gender-based disparities in healthcare, particularly within surgical specialties, and was less frequently reported by male colleagues. (19.1 %) [20]. This finding underscores the persistence of gender bias within the surgical field.

Two multicenter studies were conducted in Saudi Arabia, Jordan, and Egypt [30,31]. One among OMFS surgeons, highlighted gender-specific challenges with female surgeons citing issues related to marriage, children, societal expectations, and sexism as significant barriers [30]. The other study found women more likely to feel dissatisfied or neutral but men more satisfied with OMFS as a specialty, [31]. Despite feeling underrepresented in the field, many women believed they possessed qualities which made them more suitable for OMFS than men [31].

Lastly, a Jordanian study on female surgeons except for 'hard-working,' which was more frequently mentioned by ENT surgeons ($P = 0.040$), no significant differences in perceived personal attributes contributing to career success were found [26]. Communication skills were also highlighted, with ENT surgeons feeling they had an edge over OMFS counterparts ($P = 0.015$). In terms of career obstacles, the most frequently cited concern was physical exertion (62.5 %) and sexual harassment (19.6 %) was the least cited [26].

3.5. Experiences of female surgeons

Five studies focused on the experiences of female surgeons in their careers [9,10,19,23,25]. These studies touched on various aspects, such as how female surgeons are perceived by medical students, the satisfaction of surgical residents, and the confidence female surgeons have in their skills.

Out of these, three studies were based in Saudi Arabia [9,10,19]. One study with medical students revealed that a large majority, 81.9 % ($n = 565$), believed women faced challenges in becoming orthopedic surgeons. Female students specifically mentioned stress, burnout, and doubts about their surgical skills as barriers [9]. Another study ($n = 51$) found that female surgical residents (61.3 % of the sample) reported lower job satisfaction levels than male residents [10].

A Syrian study of surgical residents ($n = 59$, 37.3 % women) indicated widespread agreement that women experience discrimination within the surgical field. Additionally, many respondents perceived Oral and Maxillofacial Surgery (OMFS) as a discipline more readily suited to men [23]. However, a Saudi Arabia study of maxillofacial surgeons ($n = 210$) 56 % women) showed that men and women scored similarly on knowledge and confidence [19].

An Iraqi study investigating ophthalmologists ($n = 209$, with a 1:1.6 female-to-male ratio) uncovered that domestic responsibilities presented a substantial obstacle for women seeking further specialization [25]. Despite comparable job burnout rates among genders, female ophthalmologists expressed lower professional satisfaction ($P = 0.009$)

and a heightened perception of workplace challenges ($P = 0.007$). Notably, approximately two-thirds (64.4 %) of male ophthalmologists acknowledged the additional difficulties faced by their female counterparts [25].

3.6. Challenges of female surgeons

Two studies were conducted on challenges and barriers to women's participation in surgery, one of which was of medical students [9]. Findings concluded that one of factors preventing women from seeking an orthopaedic career was the fact that 81.9 % of the students believed there were barriers to female representation in orthopaedics. students also suggested that the most mentioned perceived barriers affecting female participation in orthopaedic surgery included the need for a better physique (46.5 %), patient preference for male Orthopedic surgeons (44.4 %), gender discrimination (42.4 %), and social and family commitments (41.2 %). Other perceived barriers mentioned were long working hours, heavy workloads, burnout and stress, and on-call duties.

In the context of Iraq, a study examining ophthalmologists ($n = 209$, with a female-to-male gender ratio of 1:1.6) demonstrated a significant negative impact of family responsibilities on female practitioners' ability to pursue advanced specialization [25]. The research identifies family duties as the foremost challenge faced by female surgeons. Notably, only 25.7 % of female surgeons cited challenges arising from private practice as an obstacle to specialization. Despite comparable levels of job burnout between genders, female ophthalmologists expressed lower satisfaction with their profession ($P = 0.009$) and the perception of increased challenges ($P = 0.007$). The primary source of dissatisfaction among female surgeons was the burden of responsibility (53.7 %), with lack of time for family (34.1 %) and income disparities (29.3 %) as additional factors. Importantly, nearly two-thirds (64.4 %) of male ophthalmologists acknowledged the unique challenges faced by their female colleagues [25].

3.7. Gender preference for surgery performance

Four studies in (Jordan, Saudi Arabia, Lebanon) examined gender preferences in surgical care. Three studies focused on the general public, while one surveyed physicians across specialties. A low overall preference for female surgeons (24.3 %) was found among the public. However, physician preference for female surgeons varied by specialty (0.4%–22.9 %). Participants linked gender with specific surgeon qualities: men were perceived as more trustworthy, knowledgeable, experienced, and communicative, and women were seen as more compassionate, cooperative, and attentive listeners.

A preference for female surgeons was observed in the fields of obstetrics/gynecology, plastic surgery, and breast surgery. Of the respondents expressing this preference, 95.7 % cited increased comfort levels and privacy concerns as primary reasons. Conversely, male surgeons were favored in specialties such as cardiovascular, orthopedic, neurology, ophthalmologic, and ENT surgery. This preference was attributed to perceptions of greater competence, experience, reputation, physical strength, and trustworthiness in male surgeons.

This study examined public perceptions of gender differences in surgical practice. A significant proportion of respondents indicated a belief that female surgeons face systemic biases, with 34.1 % agreeing they are perceived as less qualified, 48.5 % that they struggle to establish authority, and 19.8 % that they must work harder than males to gain professional legitimacy. Conversely, 58.6 % of respondents associated female surgeons with positive traits such as being detail-oriented and nurturing. Furthermore, 62.9 % indicated a preference for female surgeons, citing their delicate approach and greater interpersonal skills. Patient preference for same-gender surgeons was evident in procedures related to breast cancer and hemorrhoids. Those actively choosing female surgeons identified fearlessness (54.3 %), confidence (71.0 %), greater patience (62.2 %), superior examination skills (62.4 %), and

Table 3
Summary of main findings of included studies.

First author	Topic	Year	Summary of main findings
Malik M. Almailabi	Well-being	2019	<ul style="list-style-type: none"> • Half of residents (50.7 %) reported a substandard quality of life, 37 % indicated a moderate quality of life, whereas only 12.3 % reported a high quality of life. • No significant gender-based difference in QOL amongst surgeons.
Abdulaziz Z. Alomar	Career, public perception	2023	<ul style="list-style-type: none"> • 17 % of students considered orthopedics as a future career option, with 27 % uncertain. • Female students showed lower interest. Gender was insignificant among those uncertain. • Most students concurred gender diversity as contributig factor to job efficiency in orthopaedics, with greater agreement amongst male students showing. However, half of students disagreed with women-appropriate subspecialties, with paediatric orthopedics being the most appropriate. • 81.9 % of students believed in barriers to female representation in orthopaedics, with females identifying stress, burnout, inferior surgical abilities, and inappropriateness of the field.
Tariq Altokhais	Experience and well-being	2020	<ul style="list-style-type: none"> • Gender was statistically significant with pediatric surgery program. Male residents were more satisfied than females with the program.
Anas Abdo	Experience	2021	<ul style="list-style-type: none"> • The majority of respondents agreed that discrimination against women occurs in this specialization and that the OMFS is more suited to men than women. • According to the results of the Mann-Whitney test, there is a statistically significant difference between men and women in terms of discrimination†.
Rawan Abdulrahman T. Harun	Career	2022	<ul style="list-style-type: none"> • Female surgical residents rarely reported relationships with spouses (7.8 %) or children (16 %) as important factors in decisions to pursue surgical careers. • Female surgeons had influenced decision to pursue surgical careers for women (41.2 %) but 76.5 % of male surgeons in training programs had no effect on their choices. • 68.6 % discussed a surgical career with a female surgeon before applying. • 92.2 % worked with a female surgeon before applying, and 35.3 % thought that female surgeons are properly represented in their community.
N. Dar-Odeh	Career	2019	<ul style="list-style-type: none"> • Gender differences were evident regarding the marital status of the participants, the education and occupation of the participant' spouses, and the perception as to whether spousal occupation influenced participant surgical careers. • Gender differences were statistically significant: Female surgeons expressed the following challenges: Marriage (40 %) and children (40 %), long hours (47.5 %), physical exertion (35 %), lack of mentorship (32.5 %), society (27.5 %), hostile work environment (15 %), sexism (15 %), and personal illness (7.5 %).
Abdulaziz Z. Alomar	Career	2022	<ul style="list-style-type: none"> • Amongst trainees, women preferred single (15 %) to multiple (38 %) fellowships. Male preferred multiple (85 %) to single (62 %) fellowships (p-value = 0.001). Gender-based differences in fellowships were significant.
Nosaiba Al Ryalat	Career	2021	<ul style="list-style-type: none"> • No significant difference was found in perceived personal attributes that contribute to career success between ENT and OMSF surgeons, except for the attributes of 'hard working' primarily by ENT surgeons. Other potential factors include advantages for female surgeons and experience. • Least voted obstacle in surgeons' career was 'sexual harassment' (19.6 %), while the most cited. • The perception that female surgeons contribute to transformation of traditional surgical stereotypes was validated. • Notable comments by surgeons included: There is no difference between a man and a woman with regard to achievement; it all depends upon the person, I don't think gender affects this profession, we "women" need support from government like "quota", and surgery is for men.
Omar A. Al-Mohrej	Well-being	2020	<ul style="list-style-type: none"> • Female surgeons experience a wide range of work-related musculoskeletal pain, including pain in the neck (5.9 %), shoulders and elbows (6.8 %), hands and wrists (4.3 %), lower back (3.7 %), hips and thighs (5.9 %), knees (5.0 %), and feet and ankles (3.2 %).
Abdulmajeed Bin Dahmash	Well-being	2020	<ul style="list-style-type: none"> • No significant association found between gender and prevalence of musculoskeletal pain. • Women reported shoulder pain most frequently (75 %), and wrist/hand complaints more frequently (50 %) than men (27.3 %) in the 12 months preceding the survey. • Men and women experienced similar rates of musculoskeletal complaints (75 % vs. 60.6 %), except for shoulder issues, which were more common in women.
Jehad Feras AlSamhori	Gender preference	2023	<ul style="list-style-type: none"> • With the exception of compassion, where women were favored (46.1 %), participants primarily provided neutral responses for characteristics such as trustworthiness (66.8 %), knowledge (67.4 %), experience (62.2 %), communication skills (53.6 %), cooperation (59.5 %), and listening skills (51.9 %). • When analyzing only participants expressing a gender preference, both genders perceived male surgeons as more trustworthy, knowledgeable, experienced, and communicative. • Conversely, female surgeons were perceived as demonstrating greater compassion, cooperation, and openness to listening. Our findings indicate that respondents tended to associate positive surgical characteristics with their own gender. • Both male and female respondents demonstrated a significant inclination to attribute traits such as trustworthiness, compassion, knowledge, and effective communication skills to surgeons of their own gender. • Participants expressed an overall neutral preference regarding surgeon gender (52.0 %), with 36.3 % favoring males and 11.7 % favoring females. • Male surgeons were strongly favored by both genders for cardiovascular and orthopedic surgeries. Similarly, female surgeons were strongly favored for gynecological, obstetric, plastic, and breast surgeries. • In urologic surgeries, respondents of both genders demonstrated a 12-fold higher likelihood of selecting a surgeon of their own gender. • Factors significantly predicting preference for female surgeons over male surgeons included female gender, residing outside of Amman, and marital status.
Hatan Mortada	Career	2021	<ul style="list-style-type: none"> • Statistically significant difference found in the total weekly workload (in hours, clinic days, and number of on-call days per month) between men and women plastic surgeons. Given that 45.5 % of women work more than 60 h a week, it appears that women may put in more hours and workload at work. • Only 7.7 % of men and 27.3 % of women expressed "very unsatisfied". • The department head and administrative staff (27.3 %), financial compensation (27.3 %), and the number of hours worked per week (27.3 %) were the main reasons why women were dissatisfied with their current jobs. • The primary factor affecting job satisfaction was "monetary incentive," amongst women (45.5 %) and "work-life balance" amongst men (38.5 %).
Said El Hage	Gender	2022	<ul style="list-style-type: none"> • Out of 3970 surgeons, only 65 were women, constituting 1.63 % of all surgeons in Lebanese hospitals.

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Table 3 (continued)

First author	Topic	Year	Summary of main findings
			<ul style="list-style-type: none"> •The specialties with the lowest percentages of female surgeons in Lebanon were orthopedic, cardiothoracic, and urological surgery. No female doctors practiced vascular surgery or neurosurgery. •Female students preferred flexible on-call schedules and minimum work hours over higher pay. Because of job stability and fewer rigid work schedules, women prioritize their psychological health and spend more time with families or on themselves. •In low-income countries female surgeons are perceived as less skilled than their male counterparts, which is a major barrier to gender equality in surgery. In higher-income countries, on the other hand, female physicians are believed to provide better quality of care and have lower patient mortality rates than male physicians •Rich nations tend to have the best healthcare systems, and they also have the highest proportions of female doctors. •The impact of culture and society contributes to the gender gap in surgery. Patriarchy, stereotypes, and the influence of religion discredit the position of women in society. In nations where tradition, religion, and customs shape society, women's involvement may be restricted to childrearing and household chores. Women are therefore viewed as incapable.
Abdullah I. Almater	Well-being	2020	<ul style="list-style-type: none"> •Female ophthalmologists consistently had a higher prevalence of psychological distress across all scales, statistically higher risk of anxiety and stress and significantly higher rates of depression than men. •Participants with moderate to severe stress symptoms were more likely to be women, with female ophthalmologists suffering from anxiety significantly more than male colleagues.
Ahmed Mohammed Alshammari	Well-being	2023	<ul style="list-style-type: none"> •When compared to women, more men (31.5 %) felt burned out during the pandemic (22.5 %) •When it came to their roles examining patients on rounds, both genders saw significant changes, with a higher percentage of males affected •Significant drop in the number of days off that women take each month. The number of COVID-19 patients in the wards increasing every day may be the cause of this drop in vacation days. •Men expressed greater concern than women that the COVID-19 pandemic would make them less concerned about the future. Similarly, most men expressed no concern that the COVID-19 pandemic would leave them less concerned for the future.
Shaden Abu-Hammad	Career	2020	<ul style="list-style-type: none"> •A much greater proportion of men than women believed that OMFS is the best specialty for them and that men should be the only ones who practice this specialty. •Women were either more unsatisfied with their careers or neutral, while men were noticeably more satisfied with their decision to pursue OMFS as a specialty. •Significant; ly more women than men believed that women are more suited for the OMFS specializations because of specific attributes. •On the other hand, when referring difficult surgical cases to another colleague, males and females agreed that the gender of the surgeon does not matter •Women were significantly more likely to believe underrepresentation of women in OMFS careers. However, both groups agreed that there is not enough representation of women in leadership roles.
AlhAnouf AlhulAyyil	Experience	2021	<ul style="list-style-type: none"> •A total of 56 % women had a mean knowledge score of 5.32 ± 2.02. •56 % of women had a mean confidence score of 13.85 ± 3.25 which indicated moderate confidence. •Female interns reported lesser self-confidence than males regarding extraction. •Gender differences were not statistically significant in total knowledge and confidence scores.
Suzan A. Rattan	Experience and challenges	2023	<ul style="list-style-type: none"> •Female ophthalmologists exhibited a statistically significant reduction in hours worked, clinic days, and surgical caseloads compared to their male counterparts. Additionally, a substantially lower percentage of female ophthalmologists were engaged in private practice. •The proportion of female ophthalmologists pursuing subspecialties was significantly lower than that of male ophthalmologists. Moreover, the scope and diversity of surgical procedures performed by female ophthalmologists were notably more limited than those performed by men. •Familial obligations were identified as the predominant barrier for female ophthalmologists in attaining subspecialty qualifications. Female respondents expressed lower levels of satisfaction with their practice and reported greater perceived challenges compared to male practitioners. •Approximately 64.4 % of male ophthalmologists recognized the unique difficulties faced by their female colleagues. •Dissatisfied respondents of both genders identified demanding workloads as a primary cause of dissatisfaction. However, male respondents indicated a perceived lack of time for family as a significant factor. This suggests that female ophthalmologists may prioritize family responsibilities by adjusting their work schedules or income potential. •Ophthalmologists of both genders concurred reducing work hours and utilizing familial support systems are the most effective strategies for a healthy work-life balance.
Rana Moshref	Career	2021	<ul style="list-style-type: none"> •Gender bias (39.6 %), perceived male dominance in surgical career options (39.6 %), and patient preference for male surgeons (39.6 %) were cited as barriers for female surgeons. •Women were significantly more likely than men to view surgery as male-dominated (20 % vs. 2 %). This perception was strongest regarding orthopedics (64 %) and urology (57 %). •Female surgeons prioritized career prospects, enthusiasm, and commitment when selecting their specialty. •Female surgeons reported lower average life satisfaction than male surgeons (7.13 vs. 7.79 on a 10-point scale). •The most common concern among surgeons was work-life balance (77 %). Proposed solutions focused on flexible hours (60 %) and reduced workload (42 %). •Primary perceived barriers for female surgeons include work-life balance concerns, gender bias, limited sub-specialty options for women, and patient preference for male surgeons.
Layla M. Alkhalidi	Gender preference	2022	<ul style="list-style-type: none"> •Half of the participants ($n = 317$, 49.9 %) reported a history of surgical consultation or treatment. •Patient preference for female surgeons was indicated for non-emergency visits (34.2 %), emergency surgery (55.4 %), and procedures deemed sensitive (71.8 %). •A slight preference for male surgeons (26.8 %) was observed in major surgeries as compared to female surgeons (29.3 %) for minor surgery. •Preference for female surgeons was also noted in breast cancer surgery (36.2 %) and hemorrhoid surgery (51.5 %). •The primary reason cited for gender-biased surgeon preference was they "can talk openly with a surgeon of the same gender".
Waleed Burhamah	Well-being	2021	<ul style="list-style-type: none"> •50 % of female residents had depression. •Female residents were emotionally less exhausted than male residents and also scored lower in depersonalization and overall burnout. •Women open scored higher than men in personal accomplishments, with no significant difference^a.

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Table 3 (continued)

First author	Topic	Year	Summary of main findings
Nour Abdul Halim	Gender preference	2020	<ul style="list-style-type: none">•Female residents had lower scores in all burnout components compared to male residents.•50 % did not have gender-based preference.•Male surgeons were preferred in cardiology, neurology, and orthopaedic. Female obstetrics/gynecology surgeons were slightly more preferred, with female plastic surgeons have a higher preference.•Male sex, single status were all highly significant determinants of the preference for a female surgeon[‡], while being employed was significant in male surgeon preferences^b.
Fahad A. Al Mulhim	Well-being	2023	<ul style="list-style-type: none">•77.4 % of women had musculoskeletal pain.•Chi-square test showed gender not significantly associated with musculoskeletal pain^a.

^a Unadjusted analysis.
^b Adjusted analysis.

increased comfort discussing sensitive issues (95.1 %) as primary reasons for their preference.

A substantial proportion endorsed male surgeons as superior this was due to men possessing greater experience within relevant specializations and enhanced professional skills. Moreover, a majority believed that men were more competent in performing specifically breast cancer surgery (50.5 %). Significant predictors for female surgeon preference were being female and being married.

A separate study found about half of patients attending a non-emergency surgery clinic prefer a surgeon of the same gender. This gender preference varied by surgical specialty: for instance, patients demonstrated a twelve-fold increase in the likelihood of selecting a same-gender surgeon for urologic interventions. Despite a predilection for male surgeons across most specialties, it is imperative to note that a considerable proportion of participants expressed no gender preference in the surgical context.

Table 3 presents a summary of the findings of studies included in this review.

4. Discussion

This scoping review explores by female surgeons in the Arab region, emphasizing the need to address systemic barriers and promote inclusivity.

This scoping review aims to synthesize existing literature on the experiences and challenges faced by female surgeons in Arab countries. While research on this topic within the region is limited, this study highlights well-being, career satisfaction, and patient gender-based preferences as pivotal factors shaping the experiences and challenges of female surgeons.

Discourses surrounding gender equality have evolved in parallel with societal advancement, allowing women to pursue education and professional careers, including the traditionally male-dominated fields of medicine and surgery [32]. While women have made significant strides in personal and professional spheres, they continue to encounter obstacle when navigating the complex interplay of social, cultural, and economic barriers [33].

This review identifies core challenges faced by female surgeons in the Arab region. These include physical demands, patient preferences, gender-based discrimination, social and family expectations, demanding work conditions, and income concerns. Our findings align with a global review on female surgeons’ experiences, which pinpoints a lack of effective mentorship and gender-based discrimination as predominant challenges for female surgeons in the US [34]. Similarly, in Europe, these challenges remain consistent, coupled with the difficulty of achieving work-life balance [34].

Female professionals across disciplines are often subject to the perception of being less capable, less dedicated, and suited for leadership roles compared to their male counterparts. This bias can result in women being excluded from career advancement opportunities, receiving lower remuneration, and facing pressure to exert disproportionate effort to demonstrate their value [35]. Our results support this trend, indicating that female surgeons may need to work harder or

longer to establish their professional competence. This results in workload imbalances [36], particularly burdensome for women who shoulder additional domestic responsibilities. To compensate for work demands, women may sacrifice personal and leisure time pursuits, potentially contributing to psychological distress, or career abandonment [36,37].

Research indicates that a significant barrier faced by female surgeons is the absence of flexible working arrangements [38]. Rigid schedules can create conflicts between women’s professional commitments and their domestic responsibilities, including childcare and family care. Flexible work options could alleviate this tension; however, many institutions remain reluctant to implement such accommodations, potentially hindering the career advancement of female surgeons.

Societal expectations pose challenges for female surgeons, who often feel pressured to prioritize family over career, leading to stress and burnout. Additionally, the demands of surgery clash with traditional gender roles, making it difficult for female surgeons to maintain relationships and raise families [39].

This review indicates that a significant portion of the public expresses a preference for surgeons of the same gender. The preference may be attributed to cultural and religious factors. Studies demonstrate a marked preference for same-gender surgeons when procedures involve sensitive body regions, such as genital areas. This tendency may stem from the perception of female surgeons as more empathetic than male surgeons, leading some female patients to express a gender-based preference [40]. Additionally, research indicated potential benefits to patient outcomes with female surgeons. A Canadian population-based retrospective cohort study investigated the correlation between surgeon gender and 90-day and 1-year postoperative outcomes [41]. The study revealed a decreased risk of adverse postoperative outcomes for patients treated by female surgeons, both 90 days and one year after surgery [41].

Another crucial factor impacting the experiences of female surgeons is their overall well-being, including both physical and mental health, and the occurrence of illnesses and work-related stress conditions like burnout. Our findings indicate that female surgeons encounter substantial challenges in maintaining both physical and mental health. One study demonstrated that female surgeons exhibited higher rates of burnout, social isolation, and psychological distress when compared to their male colleagues [42].

It is essential to develop effective time management strategies including prioritization and self-care and to provide supportive working conditions for female surgeons to maintain a work-life balance [43]. Further research is required to develop targeted interventions that support women in the surgical profession. Expanding mentorship opportunities holds particular promise, as studies demonstrate a positive correlation between mentorship and increased female participation in surgery [44].

4.1. Limitations and strengths of the study

This study represents the inaugural effort to systematically chart the existing literature on female surgeons in the Arab region. The research

design incorporated an exhaustive search strategy designed to encompass all pertinent scholarly articles. The study delved into the experiences and challenges confronted by Arab female surgeons, extending its scope to encompass their overall well-being. However, this study acknowledges certain limitations, including: a paucity of research originating from several Arab nations, limited sample sizes in some studies (potentially undermining their capacity to accurately reflect female surgeons within a broader community context), majority of studies included female surgeons specialized in ENT or MOF rather than other specialties, and the absence of statistical analyses to derive precise numerical findings.

5. Conclusion

This scoping review concludes with valuable insights into the professional paths of female surgeons in the Arab region. It reveals the unique challenges, experiences, and perceptions informing the surgical landscape for women. The findings underscore the importance of overcoming systemic impediments and promoting inclusivity to enhance the representation and success of female surgeons in the Arab world.

Author contributions

AA: Conceptualization, Methodology, Search Strategy, Screening, Data Extraction, Writing - Original Draft, Writing - Review & Editing the final Draft. NA: Conceptualization, Search Strategy, Screening, Data Extraction, Writing - Original Draft. UE: Screening, Data extraction, Writing - Original Draft. RA: Writing - Original Draft, Writing - Review & Editing the Final Draft.

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Data availability statement

Data will be made available on request.

Ethics approval and consent to participate

The authors are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part are appropriately investigated and resolved.

Consent to publish

Not applicable.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.surge.2024.07.009>.

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