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Strengthening health systems for displaced populations: A systematic review of access to surgical care in low- and middle-income countries

Shreeja Sarabu [a,1], Maeve Sophia Bognini [a,1], Meskerem Aleka Kebede [a], Martilord Ifeanyichi [a], Rachel Hargest [b], Rocco Friebel [a,c,*]

[a] Global Surgery Policy Unit, The London School of Economics and Political Science, Houghton Street, London, WC2A 2AE, United Kingdom
[b] University Hospital of Wales, Health Park, Cardiff, CF14 4XN, United Kingdom
[c] Department of Health Policy, London School of Economics and Political Science, Houghton Street, London, WC2A 2AE, United Kingdom

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ABSTRACT

There are over 122 million forcibly displaced people in the world, many of whom face complex healthcare needs. A global estimate from 2016 suggested that around three million surgical procedures are needed annually to meet the needs of refugees, internally displaced people and asylum seekers. This systematic review aims to synthesise literature on access to surgical care for displaced populations living within camp settings in low- and middle-income countries. Relevant articles were identified by searching three databases between January 2003 and June 2024, with no language restrictions, and findings were synthesised narratively. In total, 21 studies met our inclusion criteria. Findings were synthesised thematically under *macro-*, *meso-*, and *micro-level* factors influencing access to surgical care. Macro-level factors included political support and availability of funding, cost-effectiveness of surgical provision and interactions between displaced and host-country populations. At the meso-level, provision of surgical care *within* camps was constrained by limited resources. In some settings, these challenges were mitigated through task-shifting and sharing, adoption of tele-medicine and collaboration with local and international partners. Referrals to outside facilities were indispensable to treat surgical patients who could not be managed within camp settings. Micro-level factors included socio-demographic and cultural characteristics of refugees as well as patients' ability to pay for healthcare services. Our review provides comprehensive insights into the barriers and facilitators that influence access to surgical care within these settings, which is crucial to address the pressing healthcare issues faced by displaced populations.

1. Introduction

Surgery is a cornerstone of global health, with approximately 28–32 % of the global burden of disease being surgical in nature (Shrime et al., 2015). A recent paper by Wimmer et al. (2025) estimated that emergency and operative conditions accounted for 37,850,181 deaths (514.09 deaths per 100,000 population) and 1,331,300 000 Disability Adjusted Life Years (DALYs) (18,113.00 DALYs per 100,000 population) worldwide in 2019. Since the publication of the Lancet Commission on Global Surgery report in 2015, anaesthesia and surgical care have increasingly been recognised as essential components of robust health systems towards the achievement of Universal Health Coverage (Meara et al., 2015; Kebede et al., 2023a,b). Despite the increased focus on global surgery over the past decade, research on surgical provision in humanitarian settings still falls behind and is poorly understood, with few studies existing on the provision of surgical care for refugees and displaced populations (Kebede et al., 2023a,b; McKnight et al., 2024; Rapaport et al., 2021). In particular, refugee camps have been relatively neglected from this field of research (Rapaport et al., 2021).

In 2024, there were about 122.6 million forcibly displaced people worldwide, including 68.3 million internally displaced people (IDPs) and 37.9 million refugees (UNHCR, 2024; USA for UNHCR, 2024). These numbers are on the rise given the surge in conflicts, war, and crisis situations which have forced millions of people to flee their homes in recent years. Around 71 % of refugees and other people in need of international protection seek refuge in low- and middle-income countries (LMICs), posing a significant strain on poorly resourced healthcare systems (UNHCR, 2024).

* Corresponding author. The London School of Economics and Political Science, Houghton Street, London, WC2A 2AE, United Kingdom.
E-mail address: r.friebel@lse.ac.uk (R. Friebel).
[1] Joint first authors.

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According to a global estimation from 2016, approximately three million procedures are required annually to meet the surgical needs of refugees, IDPs, and asylum seekers (Zha et al., 2016). Surgical need in humanitarian settings is highly context dependent. Humanitarian crises resulting in forced migration can be acute (emergent) or protracted (chronic) (UNHCR, 2024; Kushner et al., 2009). In the emergent phase, which immediately follows the outbreak of a crisis, displaced populations require immediate emergency care, and they are disproportionately affected by trauma-related injuries, including gunshot wounds, shrapnel injuries, burns, fractures, amputations and soft tissue injuries (Hornez et al., 2015; Blanchet et al., 2016; Awuah et al., 2023). Few studies have focussed on chronic humanitarian settings, where displacement is protracted and often spans years, or decades (Blanchet et al., 2016). Over time, the health profiles of refugee populations gradually transition and converge with the prevalence of surgical disease among non-refugee populations in the host-countries. Therefore, surgical care in protracted contexts often relates to standard obstetric and general surgery procedures as opposed to acute conflict related trauma care (Weerasuriya et al., 2012; Rapaport et al., 2021; Awuah et al., 2023).

This systematic literature review aims to identify and synthesise the existing literature on anaesthesia and surgical care delivery to displaced populations within the context of IDP and refugee camp settlements in LMICs. It sheds light on the challenges faced by displaced populations in accessing surgery as well as factors which can facilitate delivery of surgical care in these fragile contexts.

2. Methods

We conducted a systematic literature review to identify the existing literature addressing the delivery of anaesthesia and surgical care in refugee camps. This review was reported in compliance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines (Moher et al., 2009). A study protocol was written and registered on PROSPERO prior to commencing the review process (CRD420251026123).

2.1. Inclusion and exclusion criteria

The *population of interest* included both refugees and IDPs living in displacement camps in either ongoing conflict or post-conflict regions. We excluded populations situated in regions of natural disasters or located in high-income countries, as well as refugee populations living outside of camp settlements. *Relevant interventions* included anaesthesia, surgical and obstetric provision. Both minor and major operations, performed on an emergency or elective basis, were eligible. For this review, we excluded studies focusing solely on minor dental procedures, other medical services beyond anaesthesia and surgery, and female genital mutilation. The *main outcome* of interest was access to surgical care, defined by Levesque et al. (2013) as "the opportunity to identify, seek, reach, obtain, or use healthcare and to ensure the fulfilment of the needs for these services" (Levesque et al., 2013; Cu et al., 2021). We focused on factors impacting access to care, including barriers as well as facilitators. We included studies describing the provision of anaesthesia, surgical, and obstetric care within refugee camps, the burden of surgical disease among displaced populations, interactions between host communities and camp-based surgical services, and referrals from camps to external facilities. We included retrospective and prospective reviews, cohort studies, observational studies, descriptive studies and qualitative studies. We excluded existing literature reviews, case reports, letters, commentaries and conference abstracts. Only countries classified as LMICs based on the 2023 World Bank income groups were eligible for inclusion (World Bank, 2023). Table 1 provides further details of the eligibility criteria.

Table 1
Definition of key concepts.

Concept	Definition	References
Surgical procedure	The incision, excision or manipulation of tissue that requires regional or general anaesthesia or profound sedation to control pain.	Bognini et al. (2023)
Refugee	A person who owing to well-founded fear of being persecuted for reasons of race, religion, nationality, membership of a particular social group or political opinion, is outside the country of [their] nationality and is unable or, owing to such fear, is unwilling to avail [themself] of the protection of that country.	UNHCR (1951)
Internally displaced person	A person who has been forced or obliged to flee or to leave their home or place of habitual residence, in particular as a result of or in order to avoid the effects of armed conflict, situations of generalized violence, violations of human rights or natural or human-made disasters, and who has not crossed an internationally recognised state border.	UNHCR (1998)
Refugee camp	Temporary facilities built to provide immediate protection and assistance to people who have been forced to flee their homes due to war, persecution or violence. While camps are not established to provide permanent solutions, they offer a safe haven for refugees and meet their most basic needs such as food, water, shelter, medical treatment and other basic services during emergencies. In situations of long-term displacement, the services provided in camps are expanded to include educational and livelihood opportunities as well as materials to build more permanent homes to help people rebuild their lives. These services are also offered to host communities.	UNHCR (2025)
Access to healthcare	The opportunity to identify, seek, reach, obtain, or use healthcare and to ensure the fulfilment of the needs for these services.	Levesque et al. (2013)

2.2. Literature search and review process

We developed a comprehensive search strategy in consultation with a health policy librarian from the London School of Economics and Political Science. In June 2024, we searched MEDLINE, EMBASE and Global Health, using subject headings and keywords relating to '*surgery, obstetrics and anaesthesia*', '*refugee populations and refugee camps*' and '*low- and middle-income countries*.' We captured publications between January 2003 and June 2024, with no language restrictions. Full details are available in Supplementary File 1. Additionally, we manually screened the reference lists of all included articles to identify other relevant publications.

We deduplicated articles in EndNote and performed the screening process using Rayyan software. Two reviewers independently screened titles and abstracts, followed by the full-text review of articles against the pre-defined eligibility criteria. At all stages, discrepancies were resolved through discussion and by involving a third reviewer until consensus was reached.

2.3. Data analysis

Two authors independently extracted data using a standardised Excel sheet capturing general information (*e.g.*, paper title, author, year and language), study design and study objectives, geographical location and information relating to the displacement camps, details of anaesthesia, surgical or obstetric provision, any details relating to the characteristics of the study populations and key study findings. We contacted

study authors when key data were missing.

We summarised the characteristics of the populations, interventions and key findings using tables. We performed a narrative synthesis of results highlighting the factors that impacted access to surgical care for populations in displacement camps. We classified barriers and facilitators through reviewer-generated codes that summarised their content. Codes were grouped into three thematic levels: *macro-level factors* (*i.e.*, political support and funding, cost-effectiveness of surgery and interactions with host-country populations), *meso-level factors* (*i.e.*, in-camp service delivery and referral systems) and *micro-level factors* (*i.e.*, patient-level factors, including socio-demographic characteristics, cultural factors and ability to pay).

3. Results

We included 21 studies out of 2898 documents initially identified. Full details are shown in Fig. 1 below.

3.1. General characteristics

All included articles were written in English. Seven papers were published between 2003 and 2015 (Duzel et al., 2003; Ryan et al., 2003; Weerasuriya et al., 2012; Waheed et al., 2013; Wu and Poenaru, 2013; Bouchghoul et al., 2015; Hornez et al., 201), and 14 papers were published between 2016 and 2023 (Srikanok et al., 2017; Sanders et al., 2019; Ahmed et al., 2020; Hussain et al., 2020; Kuwayama et al., 2020; Enumah et al., 2021; Moustafa et al., 2021; Rapaport et al., 2021, 2023;

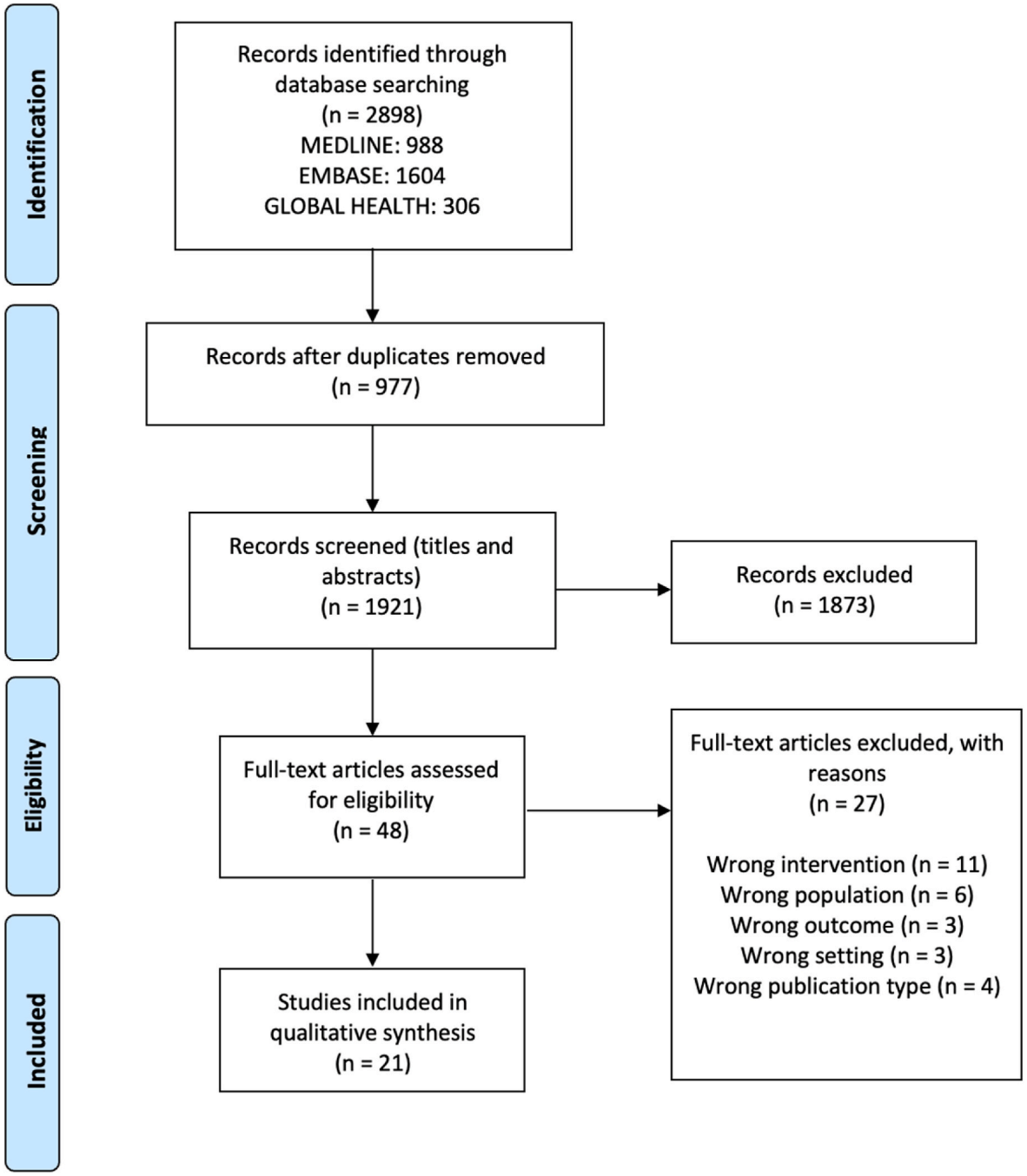

Fig. 1. Prisma study flow diagram.

Abrahim et al., 2022; Enumah et al., 2022a; 2022b, 2022c; Maaroufi et al., 2023). Based on 2025 World Bank income classifications, ten studies were located in sub-Saharan Africa (Wu and Poenaru, 2013; Sanders et al., 2019; Kuwayama et al., 2020; Enumah et al., 2021; Rapaport et al., 2021, 2023; Abrahim et al., 2022; Enumah et al., 2022a; 2022b, 2022c), four studies were set in the Middle East and North Africa region (Bouchghoul et al., 2015; Hornez et al., 2015; Moustafa et al., 2021; Maaroufi et al., 2023), three studies were from South Asia (Waheed et al., 2013; Ahmed et al., 2020; Hussain et al., 2020), two studies were from East Asia and the Pacific region (Weerasuriya et al., 2012; Srikanok et al., 2017), and two studies were located in Europe and Central Asia (Duzel et al., 2003; Ryan et al., 2003). Full information on the characteristics of the studies and their key findings can be found in Table 2 and in Supplementary File 1.

3.2. Synthesised findings

Study findings were synthesised under macro-, meso- and micro-level factors impacting access to surgical care for displaced populations living in refugee camps. Full details can be found in Table 3 below.

3.3. Macro-level factors

3.3.1. Political support and funding

At the macro-level, political commitment is a key factor impacting the provision of surgery for displaced people in humanitarian settings. Refugee healthcare, and particularly surgical care, is often a low political priority for governments in LMICs constrained by limited resources. Refugees are often excluded from national health planning in their host countries. For instance, this is seen across several National Surgical, Obstetric and Anaesthesia Plans, which have been adopted by Governments in LMICs to strengthen national surgical service provision but fail to address refugee populations' needs and care pathways (Srikanok et al., 2017; Sanders et al., 2019; Abrahim et al., 2022; Enumah et al., 2022a,b,c; Rapaport et al., 2023). Funding for refugee care typically involves partnerships between governments, the United Nations High Commissioner for Refugees (UNHCR), non-governmental organisations (NGOs), and other multilateral bodies. However, given the strain in resources and competing healthcare priorities, secondary care for essential surgery, chronic conditions, and other specialty care frequently falls outside of these funding frameworks (Moustafa et al., 2021; Abrahim et al., 2022).

3.4. Cost-effectiveness of surgery

Two articles assessed the cost-effectiveness of providing surgical services to patients living in refugee camps. Weerasuriya et al. (2012) estimated the value of providing non-acute surgical care within Mae La camp over a 14-month period, compared to the expected costs had procedures been referred to the local general hospital. The costs of in-house procedures amounted to 42,666 USD while referrals were estimated to cost 75,683.33 USD, leading to savings of around 33,000 USD for in-camp provision. Furthermore, they estimated that 31 emergency procedures referred to Mae Sot General Hospital could have instead been managed at camp-level if identified at an earlier, non-acute stage. These preventable referrals resulted in excess costs of 11,880.40 USD.

Wu and Poenaru (2013) quantified the value and cost-effectiveness of surgical treatment provided to children residing in Dadaab refugee camp in Kenya and affected by congenital or acquired surgical conditions. Between 2005 and 2011, 4136–9529 DALYs were averted, corresponding to 6.4–14.8 DALYs per patient. Averted DALYs were evenly distributed between congenital and acquired conditions. The total cost of surgical treatment for 289 children was $141,675. The results of the cost-effectiveness analysis showed an ICER of $40-$88 per DALY, with neurosurgical procedures having the lowest cost per DALY ($26–$65). These ratios were found to compare favourably with previous studies in humanitarian and non-humanitarian settings (Ifeanyichi et al., 2024).

3.5. Interaction with the host-country population

Seven studies addressed the interaction between refugees and host-country populations (Sanders et al., 2019; Ahmed et al., 2020; Enumah et al., 2021; Moustafa et al., 2021; Rapaport et al., 2021, 2023; Srikanok et al., 2017). Host populations were found to benefit from healthcare and surgical services provided within the refugee camps. Enumah et al. (2021) and Rapaport et al. (2021) found that local Tanzanians underwent over 25 % of all operations performed in Nyarugusu refugee camp between 2000 and 2020. Similar trends were reported for Tanzanian children treated surgically within this setting (Rapaport et al., 2023). Importantly, camp services remained receptive to the needs of refugees: following an influx of Burundian refugees in 2015, the average rate of surgical procedures immediately decreased by 38 % for native Tanzanians, while increasing by 20 % for refugees (Enumah et al., 2021). Surgical services in Nyarugusu refugee camp were provided free of charge for both refugees and native residents, enabling access to care at little or no out-of-pocket cost.

3.6. Meso-level factors

3.6.1. Provision of surgery within refugee camps

Nine studies described the provision of surgical care *within* refugee camps (Duzel et al., 2003; Weerasuriya et al., 2012; Bouchghoul et al., 2015; Hornez et al., 2015; Srikanok et al., 2017; Enumah et al., 2021; Rapaport et al., 2021, 2023; Maaroufi et al., 2023). In-camp surgical care was constrained by inadequate resources as well as scarcity of surgical and anaesthesia specialists (Duzel et al., 2003; Ryan et al., 2003; Weerasuriya et al., 2012; Waheed et al., 2013; Bouchghoul et al., 2015; Srikanok et al., 2017; Kuwayama et al., 2020; Enumah et al., 2021; Enumah et al., 2022a,b; Rapaport et al., 2021, 2023; Abrahim et al., 2022; Maaroufi et al., 2023). Growing influxes of refugee populations further strained available resources in camp settlements (Wu and Poenaru, 2013; Bouchghoul et al., 2015; Kuwayama et al., 2020; Enumah et al., 2021; Moustafa et al., 2021).

3.7. Infrastructure, medical equipment and supplies

Many refugee camps lack basic healthcare infrastructure, with clinics or makeshift tents that are ill-equipped to handle complex or specialised surgeries. Studies from Nyarugusu refugee camp reported a shortage of diagnostic equipment, which was limited to ultrasound (Abrahim et al., 2022; Enumah et al., 2022a). Across many settings, the scarce availability of anaesthesia significantly impacted the types of surgical procedures performed (Enumah et al., 2021, 2022b; Rapaport et al., 2021; Maaroufi et al., 2023). In Zaatari camp, spinal anaesthesia was used in 64.6 % of procedures and was most frequently chosen as it was cheaper and easier to administer. In turn, this influenced the procedures that could be performed within the refugee camp, with a high frequency of hernia repairs, proctology procedures, and caesarean deliveries (Maaroufi et al., 2023). Similar considerations were reported in Rapaport et al. (2021) where spinal anaesthesia was the main type of anaesthetic (65 %) followed by general anaesthesia (36 %). In Nyarugusu refugee camp, there was no functioning anaesthesia machine, precluding procedures requiring intubation (Enumah et al., 2021, 2022b; Rapaport et al., 2021). Weerasuriya et al. (2012) also noted a lack of blood storage facilities and limited pre-transfusion testing, the absence of ventilators for newborns and the limited use of perioperative antibiotics, restricting the surgical care provided within Mae La camp to solely minor and low-risk operations.

Table 2
General features of the studies.

Author (Year)	Title	Location	Type of Refugee setting	Population	Type of Surgery	Main Scope
Abrahim et al. (2022)	"Patterns of referral for refugees in western Tanzania: a retrospective review".	Nyarugusu refugee camp, Tanzania	Chronic	Refugees	All surgery	Referral patterns
Ahmed et al. (2020)	"Burden of eye disease and demand for care in the Bangladesh Rohingya displaced population and host community: A cohort study".	Kutupalong refugee settlement in Cox's Bazar district, Bangladesh	Chronic	Refugees and host population	Eye health and cataract surgery	Burden of disease Referral patterns
Bouchghoul et al. (2015)	"Humanitarian obstetric care for refugees of the Syrian war. The first 6 months of experience of Gynécologie Sans Frontiers in Zaatari Refugee Camp (Jordan)".	Zaatari refugee camp, Jordan	Acute	Refugees	Obstetric surgery	Provision of surgery within the refugee camp Referral patterns
Duzel et al. (2003)	"Learning through the Community Service".	Mostar, Bosnia and Herzegovina	Chronic	Refugees	Minor surgery	Provision of surgery within the refugee camp
Enumah et al. (2021)	"Humanitarian surgical service utilization by a host country population: comparing surgery patterns between refugees and Tanzanians using an interrupted time-series analysis".	Nyarugusu refugee camp, Tanzania	Chronic	Refugee and host population	General surgery and obstetric surgery	Provision of surgery within the refugee camp Utilization of surgical services by the host population
Enumah et al. (2022)	"Prevalence of pediatric surgical problems among east African refugees: estimates from a cross-sectional survey using random cluster sampling".	Nyarugusu Refugee Camp, Tanzania	Chronic	Refugees	Paediatric surgery	Burden of disease
Enumah et al. (2022)	"Reasons for referral and referral compliance among Congolese and Burundian refugees living in Tanzania: a community-based, cross-sectional survey".	Nyarugusu Refugee Camp, Tanzania	Chronic	Refugees	All surgery	Referral patterns
Enumah et al. (2022)	"Untreated Surgical Problems Among East African Refugees: A Cluster Randomized, Cross-Sectional Study".	Nyarugusu Refugee Camp, Tanzania	Chronic	Refugees	All surgery	Burden of disease
Hornez et al. (2015)	"Surgical management of Syria's war casualties: experience from a French surgical team deployed in the Zaatari refugee camp (Jordan)".	Zaatari refugee camp, Jordan	Acute	Refugees	Trauma surgery	Provision of surgery within the refugee camp
Hussain et al. (2020)	"Rapid assessment of avoidable blindness and cataract surgery coverage among forcibly displaced Myanmar Nationals (Rohingya refugees) in Cox's Bazar, Bangladesh".	Camps in Cox's Bazar district, Bangladesh	Chronic	Refugees	Eye health and cataract surgery	Burden of disease Referral patterns Perceived barriers to accessing surgical care
Kuwayama et al. (2020)	"Surgical Needs of Internally Displaced Persons in Kerenik, West Darfur, Sudan".	IDP camp in the village of Kerenik, West Darfur, Sudan	Acute	IDPs and host population	All surgery	Burden of disease
Maaroufi et al. (2023)	"Anaesthetic management and surgical care in a field refugee hospital: experience of the Moroccan 1st Field Medical-Surgical hospital at the Zaatari Camp for Syrian refugees".	Zaatari refugee camp, Jordan	Acute	Refugees	Anaesthesia care and all surgical provision	Provision of surgery within the refugee camp
Moustafa et al. (2021)	"The Burden of Surgical Disease and Access to Care in a Vulnerable Syrian Refugee Population in Lebanon".	Twenty-one refugee camps in Lebanon	Chronic	Refugees	All surgery	Burden of disease Perceived barriers to accessing surgical care
Rapaport et al. (2021)	"Epidemiology of surgery in a protracted humanitarian setting: a 20-year retrospective study of Nyarugusu Refugee Camp, Kigoma, Western Tanzania".	Nyarugusu Refugee Camp, Tanzania	Chronic	Refugees and host population	Anaesthesia and all surgery	Provision of surgery within the refugee camp
Rapaport et al. (2023)	"Patterns, procedures, and indications for paediatric surgery in a Tanzanian Refugee Camp: a 20-year experience".	Nyarugusu Refugee Camp, Tanzania	Chronic	Refugees and host population	Paediatric surgery	Provision of surgery within the refugee camp
Ryan et al. (2003)	"Fast-track surgical referral in a population displaced by war and conflict".	Refugee camps in the Southern region of Azerbaijan	Chronic	Refugees and IDPs	Trauma and congenital abnormalities	Referral patterns
Sanders et al. (2019)	"Prevalence of trachoma within refugee camps serving South Sudanese refugees in White Nile State, Sudan: Results from population-based surveys".	Refugee camps in Al Jabalain (2 camps) and Al Salam (6 camps), White Nile State, Sudan	Acute	Refugees	Eye health and trachoma	Burden of disease
Srikanok et al. (2017)	"Empirical lessons regarding contraception in a protracted refugee setting: A descriptive study from Maela camp on the Thai-Myanmar border 1996–2015".	Mae La refugee camp, Thailand	Chronic	Refugees	Obstetric surgery	Provision of surgical contraceptive methods
Waheed et al. (2013)	"Maternal Risk Factors among Pregnant Internally Displaced Person Women in Mardan, Pakistan".	Twelve IDP camps in Mardan District, Pakistan	Acute	IDPs	Obstetric care	Review of maternal risk factors Referral patterns
Weerasuriya et al. (2012)	"Evaluation of a surgical service in the chronic phase of a refugee camp: an example from the Thai-Myanmar border".	Mae La camp, Thailand	Chronic	Refugees	Anaesthesia and all surgery	Provision of surgery within the refugee camp Referral

(*continued on next page*)

Table 2 (*continued*)

Author (Year)	Title	Location	Type of Refugee setting	Population	Type of Surgery	Main Scope
						patterns Cost-effectiveness of surgical provision
Wu and Poenaru (2013)	"Burden of Surgically Correctable Disabilities Among Children in the Dadaab Refugee Camp".	Dadaab refugee camp, Kenya	Chronic	Refugees	Paediatric surgery	Burden of disease Referral patterns Cost-effectiveness

3.8. Surgical providers in refugee camps

Absence of specialist workforce, including general surgeons and anaesthetic care providers, hindered the provision of surgery in many settings. In Nyarugusu refugee camp, where no trained surgeons operated permanently, the need to consult a specialist was a common reason for referring refugees to outside facilities (31.9 % of referrals) (Abrahim et al., 2022). Although 16.9 % of children examined in Nyarugusu reported an untreated surgical problem, only 11.5 % of procedures performed in-camp between 2000 and 2020 were paediatric operations (Enumah et al., 2022b). Furthermore, the paediatric surgical output was reflective of basic, general, and emergent surgery, lacking complicated congenital cases. The latter would have required a highly specialised paediatric workforce which was unavailable at the camp-level hospital (Rapaport et al., 2021, 2023). Similarly, in Dadaab refugee camp in Kenya, only an estimated 13.5 % of all children suffering from congenital surgical disabilities were treated (Wu and Poenaru, 2013).

3.9. Mitigating the lack of resources

The literature outlines a number of strategies adopted to mitigate the limited availability of resources and surgical specialists. These include task-shifting/sharing, adopting telemedicine and collaborations with NGOs and visiting surgical teams.

3.9.1. Task-shifting/sharing and telemedicine

In Nyarugusu refugee camp, the main surgical providers were local Tanzanian general practitioners with some surgical training obtained through apprenticeship. Their presence enabled timely care within the refugee camp and reduced the burden of referrals (Rapaport et al., 2021, 2023; Enumah et al., 2022b). In Mae La camp in Thailand, a general surgeon was employed between 2005 and 2007 to provide obstetric services while midwives were trained as operating theatre assistants. The latter were also trained to administer general anaesthesia under supervision (Weerasuriya et al., 2012). Over two years, medical students and general practitioners conducted 51 field visits to four refugee camps in Bosnia and Herzegovina. They assisted with minor surgical procedures, including suture removal, abscess drainage, and bed sores debridement (Duzel et al., 2003). Abrahim et al. (2022) suggested that telemedicine could be adopted as a mitigating strategy to increase access to diagnosis and treatment, supporting the non-specialist workforce in the refugee camps through training programmes and clinical consultations.

3.9.2. Collaboration and outreach

Across many refugee camps, entities such as UNHCR, other multilateral organisations, NGOs, Ministries of Health and other government departments collaborate to address the challenges faced by refugees. Their collaborative efforts are crucial for the delivery of care within the camps and to facilitate the integration of refugee populations with local governments and local health systems. Fifteen studies discussed collaborations with local or international NGOs and reliance on visiting surgeons for provision of surgical care (Duzel et al., 2003; Ryan et al., 2003; Weerasuriya et al., 2012; Waheed et al., 2013; Wu and Poenaru, 2013; Bouchghoul et al., 2015; Hornez et al., 2015; Srikanok et al., 2017; Sanders et al., 2019; Ahmed et al., 2020; Hussain et al., 2020; Rapaport et al., 2021, 2023; Enumah et al., 2022b; Maaroufi et al., 2023).

Three studies described the provision of trauma, surgical and obstetric care in Zaatari refugee camp in Jordan (Bouchghoul et al., 2015; Hornez et al., 2015; Maaroufi et al., 2023). Between January and March 2013, the French Sixth Forward Surgical Team established a mobile hospital in Zaatari camp to manage war-related trauma among Syrian refugees, providing surgical, resuscitation, and intensive care services. Collaboration with the Jordanian Ministry of Health and Jordan Health Aid Society was crucial to secure blood supplies for transfusions and coordinate onward referrals. Gynécologie Sans Frontières and the Moroccan army hospital jointly provided comprehensive obstetric care, including antenatal services, normal and instrumental deliveries, emergency caesarean sections, and basic neonatal care (Bouchghoul et al., 2015; Hornez et al., 2015; Maaroufi et al., 2023). Within the chronic refugee setting of Mae La camp, Shoklo Malaria Research Unit (SMRU) employed a general surgeon who established a sterilisation service in the camp between 2005 and 2007 (Weerasuriya et al., 2012). The general surgeon also performed minor, non-acute surgical procedures, including mass excisions (17.4 %), general surgery (13.3 %), and other gynaecological surgery (5.6 %) (Weerasuriya et al., 2012; Srikanok et al., 2017). Similarly, several NGOs belonging to the International Agency for the Prevention of Blindness provided eye health services in Cox's Bazar camp in Bangladesh (Ahmed et al., 2020; Hussain et al., 2020). Since 2018, Orbis International has been carrying out patient screenings and comprehensive eye examinations across the camp, referring people in need of cataract surgery to Cox's Bazar Baitush Sharaf Hospital (Ahmed et al., 2020).

3.10. Provision of surgery outside of refugee camps

3.10.1. Referrals

Referrals were essential to manage surgical patients whose diagnostic and treatment needs could not be met through the limited capabilities of the camp. Overall, 10 studies described referral patterns to outside facilities (Ryan et al., 2003; Waheed et al., 2013; Wu and Poenaru, 2013; Bouchghoul et al., 2015; Weerasuriya et al., 2012; Srikanok et al., 2017; Ahmed et al., 2020; Hussain et al., 2020; Abrahim et al., 2022; Enumah et al., 2022a).

Abrahim et al. (2022) examined reasons for referral. Over 15 months, around 650 referrals were made from Nyarugusu camp to Kapanga Hospital. The most common reasons for referral were imaging diagnosis (37.2 %) followed by the need to consult a specialist (31.9 %) and further management (17.3 %). The most common specialties referred to were ophthalmology (31.9 %), surgery (29.4 %) and otolaryngology (7.9 %). Enumah et al. (2022a) also found that 45 % of patients were referred for a surgical problem.

The referral process from refugee camps to external facilities is fraught with challenges. Many camps have encampment policies requiring refugees to obtain legal permits for authorised referrals. This time-consuming process can lead to significant delays in accessing care (Bouchghoul et al., 2015; Srikanok et al., 2017; Abrahim et al., 2022; Enumah et al., 2022a,b; Rapaport et al., 2023). According to Enumah et al. (2022a), 63 % of patients in need of referral were still waiting for approval, and all had been waiting for over one month. Of those who had attended a referral appointment, 31 % had waited between 1 and 3 months and 28 % had to wait for over 3 months for approval. Around 16

Table 3
Barriers and facilitators influencing access to surgical care.

Factors	Barriers/ Facilitators	Description	Articles
Macro-level Factors			
Political support and funding	Barrier	Lack of inclusion of refugees in the national health plans of host countries. Limited funding for refugee healthcare.	Abrahim et al. (2022); Enumah et al., 2022a, 2022b, 2022c; Moustafa et al. (2021); Rapaport et al. (2023); Sanders et al., 2019; Srikanok et al. (2017)
Interaction with the host-country population	Barrier/ Facilitator	Influxes of refugees and IDPs can lead to frictions with host-country populations. Host populations benefit from healthcare and surgical services provided within the refugee camps.	Ahmed et al. (2020); Enumah et al. (2021); Moustafa et al. (2021); Rapaport et al. (2021), 2023; Sanders et al., 2019; Srikanok et al. (2017)
Cost-effectiveness of surgical provision	Facilitator	Economic value of providing surgical care to refugees living in displacement camps.	Weerasuriya et al. (2012); Wu and Poenaru (2013)
Meso-level Factors			
Provision of surgical care *within* refugee camps			
Lack of resources: infrastructure, equipment and supplies	Barrier	Lack of resources including infrastructure, equipment and supplies limits the nature of procedures which can be performed within refugee camps.	Abrahim et al. (2022); Bouchghoul et al. (2015); Duzel et al. (2003); Enumah et al. (2021); Enumah et al. (2022b), 2022c; Kuwayama et al. (2020); Maaroufi et al. (2023); Moustafa et al. (2021); Rapaport et al. (2021); Rapaport et al. (2023); Ryan et al. (2003); Srikanok et al. (2017); Waheed et al. (2013); Weerasuriya et al. (2012)
Lack of resources: anaesthesia and surgical providers	Barrier	Lack of specialist providers of anaesthesia and surgery limits the nature of procedures which can be performed within refugee camps.	
Task-shifting and sharing	Facilitator	To overcome the gap in human resources, non-specialists provide anaesthesia and surgical care in some refugee camps.	Duzel et al. (2003); Enumah et al. (2022c); Rapaport et al. (2021); Rapaport et al. (2023); Weerasuriya et al. (2012)
Telemedicine	Facilitator	Use of telemedicine tools to support the non-specialist workforce operating within refugee camps (*e.g.* for training and clinical consultations).	Abrahim et al. (2022)
Collaboration and outreach	Facilitator	Collaborations with local or international NGOs and reliance on visiting surgeons for provision of surgical care to refugees.	Ahmed et al. (2020); Bouchghoul et al. (2015); Duzel et al. (2003); Enumah et al., 2022a,b,c; Hornez et al. (2015); Hussain et al. (2020); Maaroufi et al. (2023); Rapaport et al. (2021); Rapaport et al. (2021); Ryan et al. (2003); Sanders et al., 2019; Srikanok et al. (2017); Waheed et al. (2013); Weerasuriya et al. (2012); Wu and Poenaru (2013)
Provision of services *outside of* refugee camps: Referrals			
Closed encampment policies	Barrier	Refugees are often required to obtain a legal permit to leave the camps for referral care. This can be a time-consuming process, leading to significant delays in accessing surgical care.	Abrahim et al. (2022); Bouchghoul et al. (2015); Enumah et al., 2022a, 2022b; Rapaport et al. (2021); Rapaport et al. (2023)
Long travel distances, poor road conditions and insecurity	Barrier	Many refugee camps are in remote areas and far from healthcare facilities. Movement outside of camps is restrained by long travel distances, poor road conditions and inadequate transportation, as well as security concerns.	Kuwayama et al. (2020); Ryan et al. (2003); Srikanok et al. (2017); Waheed et al. (2013); Weerasuriya et al. (2012)
Cost-constraints for referrals	Barrier	Due to cost constraints, in some refugee camps only selected conditions can be referred to outside facilities for referral care.	Weerasuriya et al. (2012)
Poor transferability of data between refugee camps and referral facilities	Barrier	Lack of transferability of patient and health information between in-camp facilities and national health systems.	Abrahim et al. (2022); Bouchghoul et al. (2015); Enumah et al., 2022a,b,c; Hornez et al. (2015); Weerasuriya et al. (2012)
Cooperation between camp entities and host-country authorities to facilitate referrals	Facilitator	Collaboration and coordination between entities operating within refugee camps and local authorities in the host countries facilitates smooth referral processes.	Bouchghoul et al. (2015); Hornez et al. (2015); Ryan et al. (2003)
Micro-level Factors			
Socio-demographic characteristics	Barrier	Certain socio-demographic characteristics (including age, gender, existing disabilities etc.) exacerbate the vulnerability of refugee populations.	Ahmed et al. (2020); Enumah et al. (2021), 2022a,b,c; Hussain et al. (2020); Kuwayama et al. (2020); Moustafa et al. (2021); Sanders et al., 2019; Srikanok

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Table 3 (*continued*)

Factors	Barriers/ Facilitators	Description	Articles
			et al. (2017); Waheed et al. (2013); Wu and Poenaru (2013)
Limited health education	Barrier	Low levels of literacy and education among refugees lead to lack of awareness of surgical disease and surgical treatment.	Hussain et al. (2020); Moustafa et al. (2021); Sanders et al., 2019
Trust and cultural beliefs	Barrier/ Facilitator	Lack of trust in healthcare services and healthcare professionals can hinder the uptake of surgical care. The involvement of cultural and religious leaders as well as the availability of interpreters can have a positive effect on uptake of surgical care.	Bouchghoul et al. (2015); Enumah et al., 2022a,b,c; Hussain et al. (2020); Kuwayama et al. (2020); Moustafa et al. (2021); Srikanok et al. (2017)
Ability to pay	Barrier/ Facilitator	The inability to afford healthcare services leads to delays in seeking care and the worsening of surgical conditions. In some refugee camps, surgical care is provided free of charge to refugees and host-country populations.	Abrahim et al. (2022); Enumah et al. (2021); Moustafa et al. (2021); Rapaport et al. (2021); Rapaport et al. (2023); Ryan et al. (2003); Srikanok et al. (2017)

% of respondents reported leaving the refugee camp without a legal permit to seek healthcare. Additionally, in Nyarugusu, follow-up visits required regular re-evaluation of the referral approval, leaving many camp residents without a guarantee that they would receive the required longitudinal management (Abrahim et al., 2022; Enumah et al., 2022a).

As some refugee camps are located in remote areas and far from healthcare facilities, movement outside of camps is further restrained by long travel distances, poor road conditions and inadequate transportation, as well as security concerns, making it harder for patients to receive urgent or specialised surgical treatment (Ryan et al., 2003; Weerasuriya et al., 2012; Waheed et al., 2013; Srikanok et al., 2017; Kuwayama et al., 2020). Due to cost constraints, in Mae La camp only acute and emergency surgical cases could be referred for treatment, leading to considerable unmanaged non-acute morbidity within the camp population (Weerasuriya et al., 2012). Another challenge related to the lack of transferability of health information between in-camp facilities and national health systems. In many camps, data on overall referral rates, time to referral, referral completion, and clinical outcomes were lacking. The inability to accurately track patient data and outcomes caused lapses in the continuity of care of patients (Weerasuriya et al., 2012; Bouchghoul et al., 2015; Hornez et al., 2015; Abrahim et al., 2022; Enumah et al., 2022a).

In contrast, some articles also highlighted factors that facilitated the referral process. Studies from Jordan and Azerbaijan demonstrated that strong coordination with host-country authorities, NGO support, and free provision of services could streamline referral pathways and improve patient access (Ryan et al., 2003; Bouchghoul et al., 2015; Hornez et al., 2015). Bouchghoul et al. (2015) and Hornez et al. (2015) noted that effective collaboration between the entities operating in the refugee camp and the host-country local authorities was essential for a smooth referral process. In Zaatari camp, ambulance transportation was coordinated with the JHAS and the Qatari Red Crescent (Bouchghoul et al., 2015; Hornez et al., 2015). Ryan et al. (2003) described a fast-track referral system established to transfer patients with trauma injuries and congenital abnormalities from camps in the south of Azerbaijan to specialist hospitals in the capital, Baku. This was possible through cooperation between an international partner (Leonard Cheshire Centre of Conflict Recovery, LCC), the Azerbaijani government together with local medical directors and senior clinicians. Additionally, referrals were more accessible when services were provided free of charge for refugees: LCC arranged referral transportation and funded all referral costs, including expenses for travel, hospital admission and treatment (Ryan et al., 2003).

3.11. Micro-level factors

Thirteen studies identified patient-level factors impacting refugee populations' uptake of surgical care.

3.12. Socio-demographic and cultural factors

Socio-demographic and cultural factors affected access to surgical care for refugees. These included age, gender, disability, language barriers, low literacy, as well as poor health education and awareness (Waheed et al., 2013; Wu and Poenaru, 2013; Srikanok et al., 2017; Sanders et al., 2019; Ahmed et al., 2020; Hussain et al., 2020; Kuwayama et al., 2020; Enumah et al., 2021; Moustafa et al., 2021; Enumah et al., 2022a,b,c).

3.12.1. Health education

In many settings, studies reported low levels of health education among the refugee populations. Among Syrian refugees across 21 camps in Lebanon, 52 % had no education, and 72.2 % of them were unemployed (Moustafa et al., 2021). Through patient surveys, Hussain et al. (2020) and Moustafa et al. (2021) identified *lack of perceived need* and *lack of awareness of treatment* as barriers to uptake. Sanders et al. (2019) attributed the increased burden of trachoma among South Sudanese refugees in Sudan to a lack of awareness regarding the treatment of this condition and highlighted the importance of health education campaigns. In 2018, the Sudanese Ministry of Health organised surgical outreach programmes within these refugee camps, alongside health education campaigns on prevention and treatment of trachoma.

3.12.2. Trust and cultural beliefs

Another patient-level factor impacting access to care was trust in healthcare professionals and healthcare services, together with reliance on cultural beliefs and traditional practices. Hussain et al. (2020) and Moustafa et al. (2021) reported that *fear* and *no trust* hindered uptake of surgical care among refugees in Bangladesh and Lebanon. Enumah et al. (2022a) highlighted the influence of traditional healers in patients' decision to seek hospital care, with 11.3 % of participants being referred from a traditional healer to the clinic or hospital.

Addressing the growing challenges faced by vulnerable populations requires a culturally sensitive approach. In Zaatari refugee camp, there was a good acceptance of maternity and obstetric services due to the presence of female interpreters during clinical consultations. This facilitated the interaction between women and healthcare providers, enabling continuity of care (Bouchghoul et al., 2015). Similarly, in Mae La camp in Thailand the operating surgeon could communicate fluently in the local camp languages, thereby building a relationship of trust with patients (Srikanok et al., 2017). Kuwayama et al. (2020) emphasised that the involvement of community and tribal leaders in their study was important to increase trust among the research participants.

3.12.3. Ability to pay

Moustafa et al. (2021) surveyed Syrian refugees living across 21

tented settlements in Lebanon to identify barriers impacting their access to surgical care. Overall, 15.9 % of patients who had been referred for surgery did not seek treatment, with 75.4 % of respondents reporting financial concerns as the primary reason for delaying care. On average, the total cost for households that had undergone surgical treatment amounted to $1716 and 2.9 % had experienced a family death due to inability to afford care. Similarly, Hussain et al. (2020) found that 30.5 % of refugees living in Cox's Bazar with blindness or severe visual impairment due to untreated cataract had experienced *financial costs* as the main barrier to seeking surgical treatment. In contrast, the provision of healthcare services free-of-charge across the referral pathway not only increased the uptake of surgical care among refugees in various camps, but also facilitated access to treatment for the local host population (Ryan et al., 2003; Srikanok et al., 2017; Enumah et al., 2021; Rapaport et al., 2021, 2023; Abrahim et al., 2022).

4. Discussion

Access to timely and appropriate surgical care in refugee camps remains a critical, but often overlooked, aspect of health service delivery. This study highlights the multifaceted challenges that displaced populations living in refugee camps face, while also exploring the key factors that have contributed to improving access in some contexts. The growing burden of preventable surgical conditions, many of which remain undiagnosed and untreated, reflects a significant gap in healthcare systems in LMICs, and even more so in refugee settings. Addressing this unmet need requires a nuanced understanding of the barriers and facilitators that influence access to surgical care for displaced populations. By reviewing these factors, this study aims to inform more targeted and effective policy responses as well as identify priority areas for investment and intervention.

On the supply side, factors that influence access to surgical care are funding, political support and the availability of adequate resources for surgical care, including infrastructure and specialist providers. Despite UNHCR guidelines urging host governments to provide security and essential healthcare services to refugees, the political will of host nations significantly influences the policies adopted. On the demand side, refugees face a high burden of disease and an unmet need for surgery. The shocks of conflict and displacement, along with adversities such as gender-based violence and disability, render displaced populations especially vulnerable. Their fragility is further exacerbated by limited economic opportunities (World Economic Forum, 2023). For instance, a study by Zha et al. (2016) highlighted that approximately 910,000 surgical procedures are required for about 19.5 million refugees, with 196,000 of these procedures being emergency obstetric surgeries. Alarmingly, many IDPs and refugees who require surgery do not receive care due to significant challenges, as highlighted by the findings of this review. For example, over 25 % of refugees in Sudanese and Lebanese refugee camps were not able to access surgical treatment (Zha et al., 2016).

5. Policy implications

A key policy implication for improving access to surgical care in refugee camps is the provision of financial protection through inclusive health insurance schemes and sustainable livelihood opportunities. Financial constraints often deter refugees from seeking timely surgical care, leading to worsened health outcomes. Evidence from Uganda's Refugee Response Plan highlights the importance of integrating humanitarian and development efforts by granting refugees access to land, services and mobility, which in turn supports self-reliance and health-seeking behaviours (Matovu and Chrispus, 2021). In contrast, the adoption of strict encampment policies restricts the movement of refugees and denies their right to seek care, as evidenced in this systematic review. Similarly, Kenya's pilot inclusion of refugees in its National Health Insurance Fund further demonstrates the potential of such models to reduce out-of-pocket expenditure and ensure access to essential surgical services (World Economic Forum, 2023).

Secondly, the inclusion of refugees in National Health Plans can have a multiplier effect in strengthening the health systems of host countries. As highlighted in this review, many host-country populations can benefit from free healthcare and surgical services provided within refugee camps. According to the UNHCR, it would cost about 11.0 billion USD (both annual and recurrent costs) for the inclusion of refugees, globally (UNHCR, 2024). This would not only help to build infrastructure and support the delivery of services, but also strengthen the resilience of the health systems and lead to broader economic impact. Integrating refugees can drive economic growth, enhance overall societal well-being, and act as a strategic investment in health (Taylor et al., 2016).

Lastly, there is a need for socio-culturally inclusive approaches to surgical care in refugee camps. Displaced populations often face barriers such as language differences, cultural misunderstandings, and gender norms that hinder access to care. Policies that prioritise culturally-sensitive practices such as employing interpreters, training surgical providers in cultural competence, and addressing gender-specific barriers can enhance communication with patients, improve their trust in the health system and, ultimately, increase their acceptance and uptake of surgical services (Bouchghoul et al., 2015; Srikanok et al., 2017).

6. Strengths and limitations

This is one of the few literature reviews which analyse the provision of anaesthesia and surgical care within refugee camps in LMICs, and the first to systematically explore factors affecting access to surgical care in these settings. However, this study does present some limitations. Our inclusion criteria only captured studies located within LMICs and specifically set within refugee camps in conflict settings. Additionally, we only searched for academic publications and we did not include operational or programmatic reports. The included studies were primarily descriptive. There was a lack of experimental designs, which could show attributions of surgical interventions to changes in health outcomes, as well as qualitative studies, which could provide a deeper insight into refugee populations' experiences in accessing surgical care. However, the ethical challenges of conducting research in humanitarian and conflict settings must be acknowledged. The literature identified in this systematic review was mostly centred on the supply of surgery to displaced populations; instead, few papers studied demand-side factors and their impact on access to surgical care for these populations. Furthermore, there was a lack of evidence quantifying lives saved, and disabilities averted through surgical provision in displacement camps. The 21 included studies had limited geographical reach, only representing 10 LMICs. Notably, no study was set in Latin America and the Caribbean region. The included papers represented even fewer distinct settings, as Nyarugusu and Zaatari camps were over-represented among the published studies. Generally, more literature was available for chronic refugee settings, as opposed to acute conflict settings. This is likely because stable and long-term displacement camps are more accessible to conduct research and are more likely to provide surgical services for displaced populations. The dearth of research across many humanitarian settings makes it difficult to generalise the results of this review. Therefore, caution is needed when interpreting these findings and formulating future health policies and interventions.

7. Conclusion

In the current context of ongoing global crises and shrinking development aid, the need to strengthen healthcare services for displaced populations living within LMICs has become more urgent than ever. This review has highlighted the critical gaps in access to surgical care faced by displaced populations living in camp settlements and the multifactorial challenges that they experience. As the burden of unmet surgical

need grows, especially in fragile settings, global donors and policy-makers must prioritise inclusive, sustainable health interventions that protect refugee populations and support host-country health systems.

CRediT authorship contribution statement

Shreeja Sarabu: Writing – review & editing, Writing – original draft, Methodology, Formal analysis, Data curation, Conceptualization. **Maeve Sophia Bognini:** Writing – review & editing, Writing – original draft, Methodology, Formal analysis, Data curation, Conceptualization. **Meskerem Aleka Kebede:** Writing – review & editing, Methodology, Conceptualization. **Martilord Ifeanyichi:** Writing – review & editing. **Rachel Hargest:** Writing – review & editing. **Rocco Friebel:** Writing – review & editing, Writing – original draft, Supervision, Formal analysis, Conceptualization.

Data sharing

All data used for the study have been included in the manuscript and supplementary materials.

Ethics approval

This systematic review was exempt from ethical approval as it relied on published information.

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Declaration of competing interest

We declare no competing interests.

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Data availability

Data will be made available on request.

References

Abrahim, O., Rapaport, S., Ngude, H., Abbas, M., Winch, P.J., Stevens, K.A., et al., 2022. Patterns of referral for refugees in Western Tanzania: a retrospective review. Pan Africa. Med. J. 41, 76. https://doi.org/10.11604/pamj.2022.41.76.32559.

Ahmed, M., Whitestone, N., Patnaik, J.L., Hossain, M.A., Husain, L., Alauddin, M., et al., 2020. Burden of eye disease and demand for care in the Bangladesh Rohingya displaced population and host community: a cohort study. PLoS Med. 17 (3), e1003096. https://doi.org/10.1371/journal.pmed.1003096.

Awuah, W.A., Adebusoye, F.T., Ferreira, T., Azeem, S., Bharadwaj, H.R., Akpan, A.A., et al., 2023. The unmet surgical needs of global refugee populations: a perspective review. SAGE Open Med. 11. https://doi.org/10.1177/20503121231204492, 20503121231204492.

Blanchet, K., Fouad, F.M., Pherali, T., 2016. Syrian refugees in Lebanon: the search for universal health coverage. Conflict Health 10 (1), 12. https://doi.org/10.1186/s13031-016-0079-4.

Bognini, M.S., Oko, C.I., Kebede, M.A., Ifeanyichi, M.I., Singh, D., Hargest, R., et al., 2023. Assessing the impact of anaesthetic and surgical task-shifting globally: a systematic literature review. Health Pol. Plann. 38 (8), 960–994. https://doi.org/10.1093/heapol/czad059.

Bouchghoul, H., Hornez, E., Duval-Arnould, X., Philippe, H.J., Nizard, J., 2015. Humanitarian obstetric care for refugees of the Syrian war: the first 6 months of experience of Gynécologie Sans Frontières in Zaatari Refugee Camp (Jordan). Acta Obstet. Gynecol. Scand. 94 (7), 755–759. https://doi.org/10.1111/aogs.12638.

Cu, A., Meister, S., Lefebvre, B., Ridde, V., 2021. Assessing healthcare access using the Levesque's conceptual framework – a scoping review. Int. J. Equity Health 20 (1), 116. https://doi.org/10.1186/s12939-021-01416-3.

Duzel, G., Kristo, T., Parcina, M., Simunović, V.J., 2003. Learning through the community service. Croat. Med. J. 44 (1), 98–101.

Enumah, Z.O., Rapaport, S., Ngude, H., Yenokyan, G., Lekey, A., Winch, P.J., et al., 2021. Humanitarian surgical service utilization by a host country population: comparing surgery patterns between refugees and Tanzanians using an interrupted time-series analysis. Conflict Health 15 (1), 85. https://doi.org/10.1186/s13031-021-00423-z.

Enumah, Z.O., Rafiq, M.Y., Manyama, F., Ngude, H., Juma, O., Sakran, J.V., et al., 2022a. Reasons for referral and referral compliance among Congolese and Burundian refugees living in Tanzania: a community-based, cross-sectional survey. BMJ Open 12 (10), e058778. https://doi.org/10.1136/bmjopen-2021-058778.

Enumah, Z.O., Rafiq, M.Y., Rhee, D., Manyama, F., Ngude, H., Stevens, K., et al., 2022b. Prevalence of pediatric surgical problems among East African refugees: estimates from a cross-sectional survey using random cluster sampling. BMC Pediatr. 22 (1), 518. https://doi.org/10.1186/s12887-022-03576-9.

Enumah, Z.O., Manyama, F., Yenokyan, G., Ngude, H., Rafiq, M.Y., Juma, O., et al., 2022c. Untreated surgical problems among East African refugees: a cluster randomized, cross-sectional study. World J. Surg. 46 (6), 1278–1287. https://doi.org/10.1007/s00268-022-06505-0.

Hornez, E., Ramiara, P., Mocellin, N., Bajard, X., Legoudeveze, S., Charpail, C., et al., 2015. Surgical management of Syria's war casualties: experience from a French surgical team deployed in the Zaatari refugee camp (Jordan). Eur. J. Trauma Emerg. Surg. 41 (2), 143–147. https://doi.org/10.1007/s00068-014-0424-5.

Hussain, A.H., Ahmed, M., Vincent, J.E., Islam, J., Sapkota, Y.D., Das, T., et al., 2020. Rapid assessment of avoidable blindness and cataract surgery coverage among forcibly displaced Myanmar nationals (Rohingya refugees) in Cox's Bazar, Bangladesh. PLoS One 15 (12), e0243005. https://doi.org/10.1371/journal.pone.0243005.

Ifeanyichi, M., Lara, J.L.M., Tenkorang, P., Kebede, M.A., Bognini, M.S., Abdelhabeeb, A. N., et al., 2024. Cost-effectiveness of surgical interventions in low-income and middle-income countries: a systematic review and critical analysis of recent evidence. BMJ Glob. Health 9, e016439. https://doi.org/10.1136/bmjgh-2024-016439.

Kebede, M.A., Tor, D.S.G., Aklilu, T., Petros, A., Ifeanyichi, M., Aderaw, E., Bognini, M.S., et al., 2023a. Identifying critical gaps in research to advance global surgery by 2030: a systematic mapping review. BMC Health Serv. Res. 946 (23). https://doi.org/10.1186/s12913-023-09973-9.

Kebede, M.A., Beyene, A., Kedir, N., Abegaz, B., Friebel, R., 2023b. Organizational peer support to enable rehabilitating surgical services in Northern Ethiopia. Conflict Health 17 (19). https://doi.org/10.1186/213031-023-00515-y.

Kushner, A.L., Groen, R.S., Kingham, T.P., 2009. Surgery and refugee populations. Scand. J. Surg. 98 (1), 18–24. https://doi.org/10.1177/145749690909800104.

Kuwayama, D.P., Chu, K.M., Hartman, Z., Idris, B., Wolfgang, C., Frist, H.W.H., 2020. Surgical needs of internally displaced persons in Kerenik, West Darfur, Sudan. World J. Surg. 44 (10), 3224–3236. https://doi.org/10.1007/s00268-020-05603-1.

Levesque, J.F., Harris, M.F., Russell, G., 2013. Patient-centred access to health care: conceptualising access at the interface of health systems and populations. Int. J. Equity Health 12 (1), 18. https://doi.org/10.1186/1475-9276-12-18.

Maaroufi, A., Diai, A., El M'rabet, I., Laidouni, O., Omari, M., Kechna, H., et al., 2023. Anaesthetic management and surgical care in a field refugee hospital: experience of the Moroccan 1st field medical-surgical hospital at the Zaatari Camp for Syrian refugees. Br. J. Anaesth. 130 (3), e414–e416. https://doi.org/10.1016/j.bja.2022.11.019.

Matovu, F., Chrispus, M., 2021. A Synthesis of Key Aspects of Health Systems and Policy Design Affecting The Refugee Populations in Uganda (CHE Research Paper). Centre for Health Economics, University of York.

McKnight, G., Friebel, R., Marks, I., Almaqadma, A., Youssef Seleem, M., Tientcheu, T.F., et al., 2024. Defining humanitarian surgery: international consensus in global surgery. Br. J. Surg. 111 (2). https://doi.org/10.1093/bjs/znae024 znae024.

Meara, J.G., Leather, A.J.M., Hagander, L., Alkire, B.C., Alonso, N., Ameh, E.A., et al., 2015. Global surgery 2030: evidence and solutions for achieving health, welfare, and economic development. Lancet 386 (9993), 569–624. https://doi.org/10.1016/S0140-6736(15)60160-X.

Moher, D., Liberati, A., Tetzlaff, J., Altman, D.G., PRISMA Group, 2009. Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. PLoS Med. 6 (7), e1000097. https://doi.org/10.1371/journal.pmed.1000097.

Moustafa, M.K., Al-Hajj, S., El-Hechi, M., El Moheb, M., Chamseddine, Z., Kaafarani, H. M.A., 2021. The burden of surgical disease and access to care in a vulnerable Syrian refugee population in Lebanon. World J. Surg. 45 (10), 3019–3026. https://doi.org/10.1007/s00268-021-06242-w.

Rapaport, S., Ngude, H., Lekey, A., Abbas, M., Winch, P.J., Stevens, K., et al., 2021. Epidemiology of surgery in a protracted humanitarian setting: a 20-year retrospective study of Nyarugusu Refugee Camp, Kigoma, Western Tanzania. BMC Surg. 21 (1), 381. https://doi.org/10.1186/s12893-021-01365-2.

Rapaport, S., Enumah, Z.O., Ngude, H., Rhee, D.S., Abbas, M., Lekey, A., et al., 2023. Patterns, procedures, and indications for pediatric surgery in a Tanzanian refugee camp: a 20-year experience. World J. Plast. Surg. 6 (3), e000528. https://doi.org/10.1136/wjps-2022-000528.

Ryan, J.M., Fleggson, M., Beavis, J., Macnab, C., 2003. Fast-track surgical referral in a population displaced by war and conflict. J. R. Soc. Med. 96 (2), 56–59. https://doi.org/10.1258/jrsm.96.2.56.

Sanders, A.M., Abdalla, Z., Elshafie, B.E., Nute, A.W., Long, E.F., Aziz, N., et al., 2019. Prevalence of trachoma within refugee camps serving South Sudanese refugees in White Nile State, Sudan: results from population-based surveys. PLoS Neglected Trop. Dis. 13 (6), e0007491. https://doi.org/10.1371/journal.pntd.0007491.

Shrime, M.G., Bickler, S.W., Alkire, B.C., Mock, C., 2015. Global burden of surgical disease: an estimation from the provider perspective. Lancet Global Health 3 (Suppl. 2), S8–S9. https://doi.org/10.1016/S2214-109X(14)70384-5.

Srikanok, S., Parker, D.M., Parker, A.L., Lee, T., Min, A.M., Ontuwong, P., et al., 2017. Empirical lessons regarding contraception in a protracted refugee setting: a descriptive study from Maela camp on the Thai-Myanmar border, 1996–2015. PLoS One 12 (2), e0172007. https://doi.org/10.1371/journal.pone.0172007.

Taylor, J.E., Filipski, M.J., Alloush, M., Gupta, A., Rojas Valdes, R.I., Gonzalez-Estrada, E., 2016. Economic impact of refugees. Proc. Natl. Acad. Sci. 113 (27), 7449–7453. https://doi.org/10.1073/pnas.1604566113.

UNHCR, 1951. The 1951 Refugee Convention. Retrieved May 2, 2025, from. https://www.unhcr.org/about-unhcr/overview/1951-refugee-convention.

UNHCR, 1998. Guiding principles on internal displacement. Retrieved May 2, 2025, from. https://www.unhcr.org/in/media/guiding-principles-internal-displacement.

UNHCR, 2024. The global cost of refugee inclusion in host countries' health systems. Retrieved May 2, 2025, from. https://www.unhcr.org/media/global-cost-refugee-inclusion-host-countries-health-systems.

USA for UNHCR. (n.d.). What is a refugee camp? Definition and statistics. Retrieved August 16, 2023, from https://www.unrefugees.org/refugee-facts/camps/.

USA for UNHCR, 2024. Refugee statistics. https://www.unrefugees.org/refugee-facts/statistics/.

Waheed, G., Toheer, R., Jamil, S., Mansha, M., Ayub, T.B., 2013. Maternal risk factors among pregnant internally displaced person women in Mardan, Pakistan. Pakista.J. Med. Health Sci. 7 (3), 609–614.

Weerasuriya, C.K., Tan, S.O., Alexakis, L.C., Set, A.K., Rijken, M.J., Martyn, P., et al., 2012. Evaluation of a surgical service in the chronic phase of a refugee camp: an example from the Thai-Myanmar border. Conflict Health 6 (1), 95. https://doi.org/10.1186/1752-1505-6-5.

Wimmer, S., Sarabu, S., Calvello Hynes, E., Plummer, M.L., Bognini, M.S., Kebede, M.A., et al., 2025. Global burden of emergency and operative conditions: an analysis of global Burden of Disease data, 2011–2019. Bull. World Health Organ. 103 (3), 194–203. https://doi.org/10.2471/BLT.24.292412.

World Bank, 2023. The world by income and region. https://datatopics.worldbank.org/world-development-indicators/the-world-by-income-and-region.html.

World Economic Forum, 2023. How access to sustainable health services is being accelerated for refugee communities in Kenya. https://www.weforum.org/stories/2023/06/refugee-day-access-to-sustainable-health-services-for-refugee-communities-in-kenya/.

Wu, V.K., Poenaru, D., 2013. Burden of surgically correctable disabilities among children in the Dadaab refugee camp. World J. Surg. 37 (7), 1536–1543. https://doi.org/10.1007/s00268-012-1899-z.

Zha, Y., Stewart, B., Lee, E., Remick, K.N., Rothstein, D.H., Groen, R.S., et al., 2016. Global estimation of surgical procedures needed for forcibly displaced persons. World J. Surg. 40 (11), 2628–2634. https://doi.org/10.1007/s00268-016-3579-x.