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Refugee Access to Surgical Care in Lebanon: A Post Hoc Analysis of the SCAR Study

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ABSTRACT

Background: Lebanon hosts an estimated one million Syrian refugees registered with the United Nations High Commissioner for Refugees (UNHCR). The UNHCR contracts with select Lebanese hospitals to provide affordable primary and emergency care to refugees. We aimed to assess the surgical capabilities of UNHCR-affiliated hospitals in Lebanon.

Methods: Cross-sectional data from the Surgical Capacity in Areas with Refugees study were combined with hospital affiliation data obtained from the UNHCR. The Surgical Capacity in Areas with Refugees study evaluated surgical capacity in Lebanon by mapping all acute care hospitals and administering the five domain Personnel, Infrastructure, Procedures, Equipment, and Supplies (PIPES) tool to each hospital. Mean PIPES indices and mean numbers of hospital beds, surgeons, and anesthesiologists were compared between UNHCR-affiliated and nonaffiliated hospitals. Geographically, the distribution of UNHCR-affiliated hospitals was cross-referenced with refugee population distributions.

Results: One hundred and twenty nine hospitals were included, 35 (27.1%) of which were affiliated with the UNHCR. The PIPES tool was administered across all hospitals. Mean PIPES indices and mean number of hospital beds, general surgeons, and anesthesiologists were similar between UNHCR-affiliated and nonaffiliated hospitals. Geographical mapping of hospitals and refugee populations across Lebanon revealed a disparity in the Northeastern region of the country: that region had the highest number of refugees but lacked sufficient UNHCR coverage.

Conclusions: Hospitals covered by the UNHCR performed similarly to nonaffiliated hospitals with respect to all aspects of the PIPES surgical capacity tool. However, there is a concerning geographic mismatch between UNHCR coverage and refugee density, specifically in the governorates of Akkar, Bekaa, and Baalbek-Hermel.

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Introduction

The conflict in Syria started in 2011 and continues to be an ongoing humanitarian crisis with serious health care challenges affecting millions of people. It is now estimated that 7.5 million people have been displaced within Syria, and an additional 5 million fled the country altogether, especially to neighboring Lebanon, Jordan, and Turkey.[1] Lebanon, a small country of approximately 5 million people residing in less than 11,000 square kilometers, is estimated to host an additional 1.1 registered million Syrian refugees in 250,000 of its households. The country's total population has subsequently increased to a total of 6 million, with 164 refugees per 1000 population, making Lebanon the country with the highest number of refugees per capita in the world.[2] As the situation in Syria continues to be precarious, Lebanon is facing significant and increasing health care needs, including barriers to provide primary surgical care to the refugee patient population.

Safe surgical care is increasingly being recognized as an essential component of any modern health care system that strives to be not only functional but also effective and resilient.[3,4] In Lebanon, the rapid increase in demand for surgical services mostly due to the influx of refugees, combined with suboptimal health care infrastructure at the baseline, has stressed the country's ability to provide surgical care to the refugee population as well as the underserved segments of the Lebanese population. Lebanese hospitals, most of which are privatized and function on a true fee-for-service payment model, arguably lack the appropriate coordination, interfacility communication, infrastructure, and financial incentive to provide care to the refugees; as such, they are likely ill-prepared to handle this sudden and recent rise in demand for primary surgical services.[5-8]

To mitigate this predictable mismatch between the need for and the ability to provide safe primary surgical care, several regional and international aid agencies have initiated relief missions targeted at the vulnerable refugee populations in Lebanon.[9,10] In particular, the United Nations Refugee Agency (UNHCR) has made Lebanon its largest single-country operation with five offices countrywide and is leveraging several national and international partnerships to provide health care including surgical services to refugees.[11] The strategy the UNHCR has adopted so far is negotiating low-cost contracts with private and public hospitals and financially reimbursing these select hospitals for a large proportion of the cost of essential surgical and obstetrics care provided to the refugee patient population. The surgical capacity/ability of these UNHCR contracted hospitals, and their geographical distribution in comparison with the refugee distribution in the country remains largely unknown.

The recently published Surgical Capacity in Areas with Refugees (SCAR) study evaluated surgical capacity in Lebanon by mapping every single acute care hospital in the country and administering a validated surgical capacity tool to each facility. The authors reported significant surgical capacity gaps and disparities disproportionately affecting public and rural community hospitals where refugees likely access surgical care.[6] Using cross-sectional data from the SCAR study database, as well as publicly available data on refugee population distributions (UNHCR), we sought to evaluate Syrian refugee access to surgical care in Lebanon. Specifically, we performed an SCAR post hoc analysis to 1) assess the surgical capacity of the UNHCR hospitals in comparison with the non-UNHCR ones and 2) determine the geographic match between UNHCR contracted hospitals and refugee population density.

Methods

Hospital data of primary-, secondary-, and tertiary-level acute care centers from the cross-sectional SCAR study were combined with hospital affiliation and procedural coverage data obtained directly from the UNHCR administration. As of mid-2018, the UNHCR cost-sharing mechanism is as follows: The first 100 USD are financed by the patient, after which the UNHCR covers 75% of all expenses up to a ceiling of 10,000 USD, with a maximum patient share of 800 USD. Exceptions to this policy exist, however. For example, neonatal intensive care and burn intensive care have a ceiling of 15,000 USD, whereas patients suffering from cerebrovascular accidents have a ceiling of 5000 USD.[12]

The SCAR study

The recently published SCAR study has 1) geographically mapped all hospitals providing surgical care in Lebanon, 2) systematically assessed each hospital's surgical capacity using the validated Personnel, Infrastructure, Procedures, Equipment, and Supplies (PIPES) tool, and 3) identified surgical care disparities across hospital types (public *versus* private, urban *versus* rural) and regions (administrative governorates). Surgical care was defined as "the provision of operative, perioperative, and nonoperative management; anesthesia; and obstetric care for all surgical conditions", thus excluding chronic care facilities, psychiatric hospitals, and rehabilitation centers.[13] Between 2014 and 2017, the well-validated PIPES tool (see the following) was administered to all identified hospital administrations and/or leadership by face-to-face meeting or by phone interviews.

The PIPES surgical capacity tool

The PIPES tool is a modified version of the World Health Organization Situational Analysis survey that was developed by Surgeons Overseas to measure surgical capacity in low- and middle-income countries (LMIC).[14] It has been validated in various LMIC in South America and Africa.[15-18] It consists of 105 survey items evaluating 5 domains of surgical capacity: 1) Personnel (e.g., the number of surgeons and Anesthesiologists, 2) Infrastructure (e.g., availability of continuous electricity, laboratory and imaging modalities, number of operating rooms), 3) Procedures (e.g., types of interventional procedures performed), 4) Equipment (e.g., presence of laparoscopic and endoscopic instruments), and 5) Supplies (e.g., protective gear, needles, catheters, chest tubes).[14] In the Personnel domain, 1 point is assigned for each full-time general surgeon, anesthesiologist, medical doctor with surgical skills, and nurse anesthetist working at a specific hospital. In the Infrastructure

(I-Score), Procedures, Equipment, and Supplies subdomains, 1 point is assigned for each of the survey items that are reported as "Always available," and 0 if reported as "Not always available." For each hospital, the overall PIPES score is calculated as the sum of each section domain scores, divided by the total number of completed items, and multiplied by 10. There is no upper limit to the PIPES index, and a higher score corresponds to a greater surgical capacity.

The PIPES tool can be modified depending on the specific situation in which it is applied. For example, the SCAR study excluded the item "Medical Doctors with Surgical Skills" in the Personnel subdomain because of ambiguity and misunderstanding among interviewees. We excluded nine surgical procedures from the "Procedure" subdomain, as they are not subsidized by the UNHCR.[12] The procedures excluded were tubal ligation, obstetric fistula repair, hernia repair (elective), male circumcision, biopsy (lymph node, mass, other), skin grafting, clubfoot repair, cleft lip repair, and contracture release. Thus, the total number of items included in the PIPES tool for this analysis was 95. In this post hoc analysis, the overall surgical capacity and its components as defined by the PIPES tool domains were all compared between UNHCR-affiliated and nonaffiliated hospitals. Specifically, the overall modified PIPES index was calculated for UNHCR-affiliated and nonaffiliated hospitals, as well as the overall modified PIPES indices for each of the 5 domains described previously. The hospitals were also compared at the individual specific items level within each domain.

Geographic mapping of hospitals and UNHCR affiliation

The geographic distribution of UNHCR-affiliated hospitals was cross-referenced with refugee population distributions across the country to visualize refugee access to surgical care. To do that, a list of hospitals and their locations was obtained from the Lebanese Ministry of Public Health and the Lebanese Syndicate of Hospitals. Hospital affiliation with the UNHCR was determined after cross-reference with publicly available UNHCR data sets and direct phone and email formal contacts with the UNHCR administration. To identify geographic disparities of refugee access to UNHCR-covered surgical care, ArcGIS software was used to create a geographic map of Lebanon annotated with the ratio of UNHCR-affiliated hospital beds to refugee number across governorates. A similar map was created that shows hospital distribution categorized by UNHCR affiliation overlaid on refugee population distributions.

To best portray the geographic access to hospitals in the country, the neighboring governorates of Beirut and Mount Lebanon were combined in this study. This was carried out because the Beirut governorate is disproportionately small compared with the other governorates and is surrounded by the much larger governorate of Mount Lebanon, and combining them provides a more proportionate geographical comparison of the governorates.

Statistical analysis

Descriptive statistics were calculated for hospital characteristics (primary, secondary, tertiary levels, rural *versus* urban, and private *versus* public) and PIPES overall and subdomain scores. Continuous data are presented as means and standard deviations (SDs), medians, and interquartile ranges, and categorical data as frequencies and percentages. Comparisons of surgical capacity between UNHCR-affiliated and nonaffiliated hospitals were performed using independent-sample t-tests for sample means and Wilcoxon rank-sum tests for sample medians. A one-way single-factor analysis of variance with post hoc analysis was performed to evaluate regional differences in surgical capacity by administrative governorates. Statistical significance was indicated at $P < 0.05$. Statistical analyses were performed using Stata v15.1 (StataCorp. 2017. Stata Statistical Software: Release 15. College Station, TX: StataCorp LLC).

Funding, affiliations, and ethical oversight

Neither the UNHCR nor any external organizations had any role in the funding, design, analysis, or writeup of the study. The SCAR study was previously approved by institutional review board.

Results

Assessment of overall surgical capacity by UNHCR affiliation

Of a total of 164 health care facilities, 129 (78.7) hospitals with surgical capabilities in Lebanon were identified and included in the post hoc analysis. These hospitals were cross-referenced with UNHCR hospital affiliations as of June 2018. Thirty-five hospitals (27%) of 129 were found to be affiliated with the UNHCR and were distributed across all the 8 administrative governorates. Table 1 compares the characteristics of UNHCR-affiliated and nonaffiliated hospitals. In summary, the two groups were similar in terms of care designation level (primary, secondary, and tertiary level), and both were predominantly urban (73.26% and 65.71%, respectively, $P = 0.889$). However, the UNHCR-affiliated hospitals were more likely to be private hospitals (57.14% *versus* 42.86%, $P < 0.001$) rather than public.

The overall surgical capacity of the two groups was similar; specifically, the mean overall modified PIPES index across all UNHCR-affiliated hospitals was 11.00 (SD = 0.92), as compared with 11.18 (SD = 1.35) for the nonaffiliated hospitals (mean difference = 0.18, 95% CI −0.31; 0.67, $P = 0.46$).

In summary, all five domains were similar between the UNHCR-affiliated hospitals and the nonaffiliated hospitals: Personnel scores (14.20 *versus* 15.18, $P = 0.55$); Infrastructure (14.77 *versus* 15.59, $P = 0.18$), modified Procedures (29.00 *versus* 29.18, $P = 0.72$), Equipment (21.69 *versus* 21.61, $P = 0.63$), and Supplies (24.89 *versus* 24.73 $P = 0.36$). The mean number of hospital beds between affiliated and nonaffiliated hospitals was also similar: 94 (SD = 57.52) *versus* 104 beds (SD = 86.61), respectively (mean difference 9.7, 95% CI −21.6; 41.0, $P = 0.54$). Even when performing the comparisons at the individual PIPES items within each domain, the 2 groups were in general comparable, except for the number of nurse anesthetists and the number of functional operating rooms. The UNHCR-affiliated hospitals had a lower median number of nurse anesthetists

Table 1 – Population characteristics of hospitals with or without UNHCR affiliation.

Hospital characteristic	All Lebanon (Total $n = 129$)	No UNHCR affiliation (Total $n = 94$)	UNHCR affiliation (Total $n = 35$)	P
Health facility level (%)				0.44
Primary level (district/community hospital)	52 (40.31)	40 (42.55)	12 (34.29)	
Secondary level (provincial hospital)	62 (48.06)	42 (44.68)	20 (57.14)	
Tertiary level (central hospital/university hospital)	15 (11.63)	12 (12.77)	3 (8.57)	
Geographical area (%)				0.889
Urban	86 (66.67)	63 (73.26)	23 (65.71)	
Rural	43 (33.33)	31 (32.98)	12 (34.29)	
Hospital type (%)				<0.001
Private	103 (79.84)	83 (88.30)	20 (57.14)	
Public	26 (20.16)	11 (11.70)	15 (42.86)	
Mean number of beds (SD)	101.16 (79.67)	103.78 (86.61)	94.11 (57.52)	0.54
Number of beds (median IQR)	75 (48-125)	76 (50-126)	70 (45-120)	0.95
Overall mean modified PIPES score total (SD)	105.81 (11.86)	106.29 (12.82)	104.54 (8.81)	0.46
Overall median modified PIPES score total (IQR)	104(99-114)	104 (98 -113)	103 (99-110)	0.39
Overall mean modified PIPES index (SD)	11.14 (1.25)	11.18 (1.35)	11.00 (0.92)	0.46
Overall median modified PIPES index (IQR)	10.94 (11.58 - 10.42)	10.94 (10.31 - 11.89)	10.94 (10.42 - 11.16)	0.39
Mean personnel (P-score) score (SD)	14.91 (8.17)	15.18 (8.92)	14.2 (5.74)	0.55
Median personnel (P-score) score (IQR)	13 (10-18)	13 (10-18)	13 (10-18)	0.95
Mean infrastructure (I-score) score (SD)	15.36 (3.05)	15.59 (3.17)	14.77 (2.67)	0.18
Median infrastructure (I-score) score (IQR)	15 (14-17)	15 (14-17)	14 (13-16)	0.11
Mean procedure (Pr-score) score (SD)	29.13 (2.54)	29.18 (2.6)	29.00 (2.4)	0.72
Median procedure (Pr-score) score (IQR)	30 (28 - 30)	30 (28 - 30)	29 (29 -31)	0.64
Mean equipment (E-score) score (SD)	21.63 (0.84)	21.61 (0.93)	21.69 (0.53)	0.63
Median equipment (E-score) score (IQR)	22 (22-22)	22 (22-22)	22 (21-22)	0.7
Mean supplies (S-score) score (SD)	24.78 (0.84)	24.73 (0.95)	24.89 (0.40)	0.36
Median supplies (S-score) score (IQR)	25 (25-25)	25 (25-25)	25 (25-25)	0.35

(2 [1-3] *versus* 3 [1-4], $P = 0.03$) and a lower mean number of operating rooms as compared with nonaffiliated hospitals (3 [2-4] *versus* 3 [3-5], $P = 0.02$) (Appendix Tables A1-A.5).

Geographic mapping

The geographic distribution of hospitals and affiliation to the UNHCR were mapped over 7 Lebanese governorates. Table 2 presents the governorates, sorted 1 through 7 in descending order of refugee percentage of the total number of the governorate's inhabitants. The Bekaa governorate had the greatest proportion of the inhabitant population registered as refugees at 41.5%. North Lebanon, Baalbek-Hermel, Akkar, Nabatieh, South Lebanon, and Beirut/Mount Lebanon followed at 36.0, 28.9, 19.2, 13.5, 10.0, and 8.1%, respectively.

Across governorates, the average modified PIPES index of the hospitals was similar ($P = 0.21$), with the highest percentage of hospitals that are UNHCR-affiliated found in governorate 5 (Nabatieh) and governorate 6 (South Lebanon) (44.4% and 42.9%, respectively). This translates to these regions having the highest percentage of beds available to refugees under the coverage of the UNHCR, and contrasts with the concentration of refugees, whereby the largest concentration lies in governorates 1, 2, and 3, but the percentage of covered beds is much lower at 33.2, 26.8, and 29.8% respectively.

Examining the ratio of UNHCR-affiliated beds to registered Syrian refugees across Lebanon yields a national average of 3.5 beds/1000 refugees. The governorates of Akkar, Bekaa, and Baalbek-Hermel have the lowest ratios at 1.2, 1.8, and 2.2, respectively, whereas South Lebanon and Nabatieh are found to have ratios of 11.1 and 7.4, respectively. Figure 1[20] presents the data geographically.

Fig A1 plots acute care hospitals and their UNHCR affiliation status over the refugee distribution density across Lebanon.

Discussion

In this post hoc analysis, we cross-referenced the findings of the SCAR study with the comprehensive UNHCR database for refugees in Lebanon. This allowed us to view surgically capable hospitals in the country from an angle that is most relevant for the nongovernmental organizations and policymakers tackling the problem of access to primary surgical services for Syrian refugees. Specifically, we found that the surgical capacity of UNHCR-affiliated hospitals is in general comparable with that of nonaffiliated hospitals, but that there is mismatch between refugee concentration and UNHCR coverage only in the northeastern region of the country.

Table 2 – Percentage of affiliated hospitals, hospital beds, ratio of hospital beds to refugees, and modified PIPES indices of UNHCR-affiliated hospitals by governorate.

Governorate	Bekaa (1)	North Lebanon (2)	Baalbek-Hermel (3)	Akkar (4)	Nabatieh (5)	South Lebanon (6)	Beirut/Mount Lebanon (7)	Total
Percentage of refugees per total inhabitant population (%)	41.5	36.0	28.9	19.2	13.5	10.0	8.1	15.6
Total number of registered refugees	221,088	100,266	117,489	104,296	43,413	72,186	250,161	952,562
Number of UNHCR-affiliated hospitals (% of total hospitals)	5 (38.5)	6 (30.0)	3 (27.3)	1 (25.0)	4 (44.4)	6 (42.9)	10 (17.3)	35 (27.1)
Number of beds in UNHCR-affiliated hospitals (% of total beds)	390 (33.2)	425 (26.8)	260 (29.8)	120 (33.3)	323 (40.9)	800 (53.1)	976 (15.0)	3294(25.2)
Number of UNHCR-affiliated hospital beds per 1000 refugees	1.8	4.2	2.2	1.2	7.4	11.1	3.9	3.5
Mean modified PIPES index (SD) $P = 0.21$	10.8 (0.7)	10.6 (1.2)	10.8 (0.9)	10.8 (0.5)	10.9 (0.7)	11.3 (1.2)	11.5 (1.4)	11.1 (1.2)

Sorted in decreasing percentage of refugees of total inhabitant population.
Registered refugee population and distribution data current as of September 30, 2018.[19]

The comparable surgical capacity of UNHCR hospitals to nonaffiliated hospitals was demonstrated in each of the five domains of capacity: Personnel, Infrastructure, Procedures performed, Equipment, and Supplies. The only two discrepancies between the two groups of hospitals were in the median number of available operating rooms and the median number of nurse anesthetists, where the numbers were higher in nonaffiliated than in UNHCR-affiliated hospitals. These two discrepancies, while isolated, deserve long-term observation to ensure it does not lead to decreased access of refugees to surgical services.

On the other hand, the distribution of affiliated hospitals across the different regions with different refugee concentrations leaves room for improvement. The disparity lies in having the highest percentages of affiliated hospitals and beds per 1000 refugees in the Nabatieh and South Lebanon governorates. The northern governorates of Bekaa, North Lebanon, Akkar, and Baalbek-Hermel, where the greatest concentration of refugees resides, have significantly lower bed to refugee numbers than the southern governorates. This points to a real potential for improvement with regard to the geographic distribution of UNHCR hospital affiliations.

Suboptimal health care coverage in the northern part of Lebanon does not perhaps come as a surprise to public health experts on Lebanese health care but has far reaching implications. Refugees may find the cost of essential care in nonaffiliated facilities to be beyond their financial capabilities, forcing them to travel across the mountainous country to seek surgical care. With long journey times and limited resources for transportation, lack of local accessibility to surgical care can risk clinical worsening of the surgical condition. While it is possible that refugees in Northern Lebanon that borders Syria may be potentially seeking surgical care in war-torn Syria, this route of care is not without its own barriers and risks. In Syria, health care is being weaponized[21] with accidental as well as deliberate targeting of health care facilities and workers. Between January and August 2018, 97 personnel were killed and another 165 were injured, compared with 73 total deaths in all of 2017, making Syrian territories the location of 70% of all attacks on health care personnel and facilities that occur worldwide.[22,23] In addition, many more doctors and nurses fled the country, worsening the status of the health care services in Syria and resulting in more Syrians entering Lebanon to seek care, both medical and surgical, rather than the other way around.

Recent statistics show that the trend in number of persons newly displaced daily in Syria is increasing—up from 28,000 per day in 2016 to 44,000 in 2017.[2] This trend can reflect a projected growth in the number of people seeking refuge in Lebanon. As a result, it is imperative that the UNHCR continues its admirable efforts to respond to the surgical needs of the refugee population. Hospital health care costs in Lebanon are increasing, and as a result, the UNHCR public health approach is ever changing to maintain its mission of prioritizing affordable and accessible basic primary health and emergency care, over more costly and complex treatments, while ensuring coverage for the greatest number of refugees in Lebanon.[7] In general, we believe that our results support the notion that the UNHCR is to be commended for an overall thoughtful choice of hospitals for refugee care. These

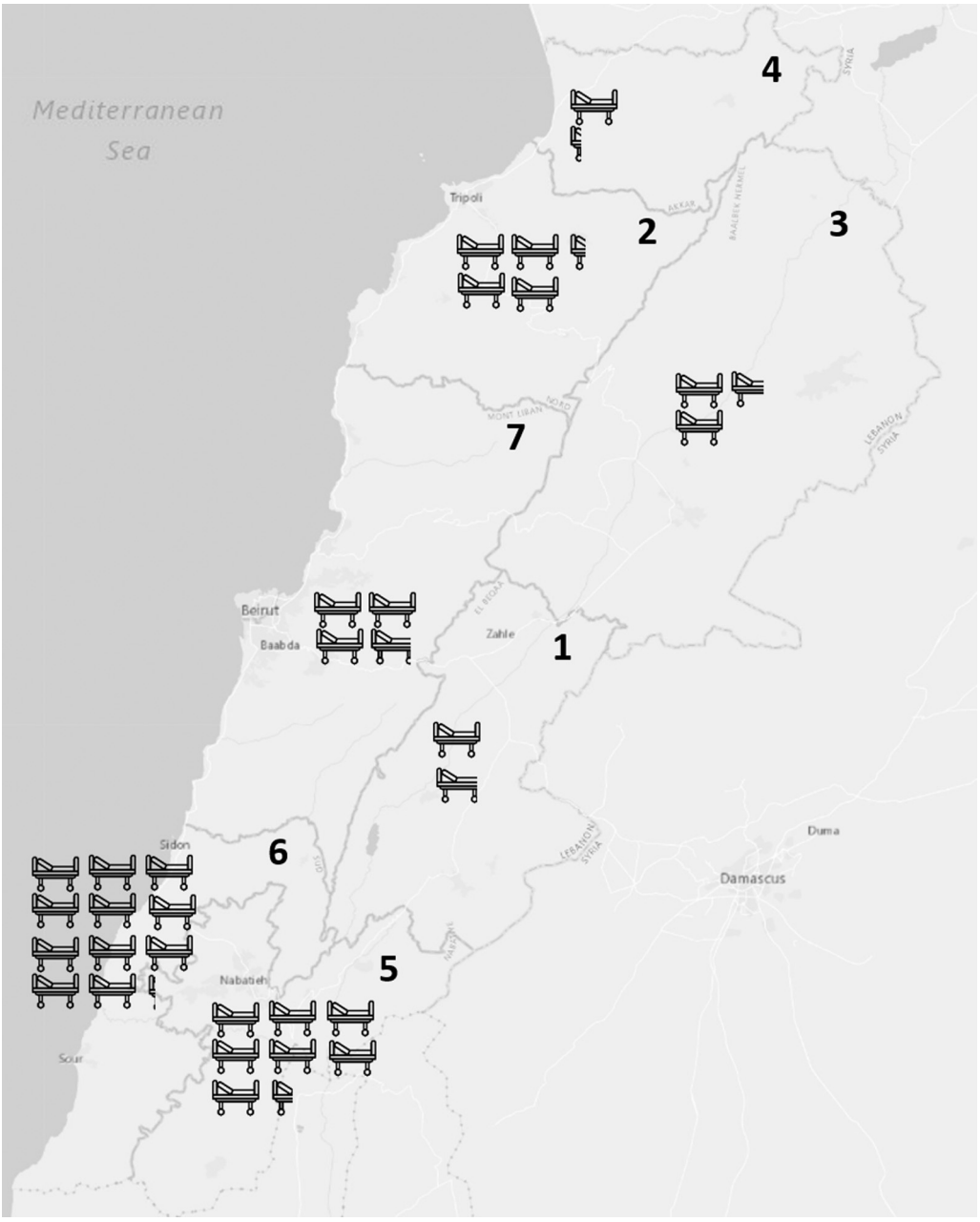

Fig. 1 – Map representing the number of UNHCR beds per 1000 refugees by governorate. *1 UNHCR-affiliated bed per 1,000 Registered Syrian Refugees.

hospitals have reasonable capacity to provide surgical care, although our study did not evaluate the quality of surgical care provided itself. Data on outcomes of surgical procedures in Lebanon is simply not collected at a national level and very rarely at an institutional level. Nonetheless, our data show that the geographic distribution of affiliated hospitals and affiliated bed-to-refugee ratios has potential for improvement. This can be achieved by seeking new affiliations in these high refugee density areas or shifting hospital affiliations more toward the north *versus* the south and mountain regions of the country, specifically to better cover the governorates of Bekaa, Baalbek-Hermel, and Akkar. In addition, an alternative solution is to provide UNHCR supervision for the triage and transport of patients with complex surgical needs to hospitals in better surgically capable and less refugee dense Lebanese governorates.

Limitations

Our study has a few limitations. First, the PIPES tool, despite its design for LMIC, is perhaps more suited for low-income countries and arguably has less discriminatory power in a middle-income country such as Lebanon. Second, the instrument does not account for the number of cases performed or attempts to evaluate care quality or patient outcomes. Third, we did not evaluate for the barriers to access of refugees in UNHCR-affiliated hospitals; the shared cost still incurred by the impoverished refugees remains elevated even with the

subsidy provided by the UNHCR, and no doubt pushes many of them to seek care in completely free, usually humanitarian hospitals, or to not seek care altogether.

Conclusion

The surgical capacity of the hospitals contracted by the UNHCR to provide subsidized care to refugees in Lebanon is comparable with the nonaffiliated hospitals and suggests that the UNHCR strategy in hospital choice is not jeopardizing the surgical care of refugees. However, there is a geographic mismatch between the refugee concentrations and the UNHCR hospital affiliations, particularly in the northern region of the country. With the prolonged Syrian conflict, the UNHCR is strongly encouraged to improve that gap in coverage and to mitigate its potential long-term effects.

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Supplementary data

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Disclosure

The authors report no proprietary or commercial interest in any product mentioned or concept discussed in this article.

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