



# The Burden of Surgical Disease and Access to Care in a Vulnerable Syrian Refugee Population in Lebanon

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## Abstract

**Background** The Syrian conflict has produced one of the largest refugee crises in modern times. Lebanon has taken in more Syrian refugees per capita than any other nation. We aimed to study the burden of surgical disease and access to surgical care among Syrian refugees in Lebanon.

**Methods** This study was designed as a convenient cross-sectional cluster-based population survey of all refugee camps throughout the Bekaa region of Lebanon. We used a modified version of the Surgeons OverSeas Assessment of Surgical Need to identify surgical conditions and barriers to care access. The head of household of each informal tented settlement provided demographic information after which two household members were randomly chosen and administered the survey.

**Results** A total of 1,500 individuals from 750 households representing 21 camps were surveyed. Respondents had a mean age of 36.6 (15.0) years, 54.6% were female, and 59% were illiterate. Nearly 25% of respondents reported at least one surgical condition within the past year, most commonly involving the face, head, and neck region (32%) and extremities (22%). Less than 20% of patients with a surgical condition reported seeing any healthcare provider, > 75% due to financial hardship.

**Conclusions** The prevalence of surgical disease among Syrian refugees is very high with a fourth of refugees suffering from one or more surgical conditions over the past year. The surgical needs of this vulnerable population are largely unmet as financial reasons prevent patients from seeking care. Local and humanitarian efforts need to include increased access to surgical care.

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## Background

The Syrian conflict has resulted in the worst humanitarian crisis since World War II [1, 2]. More than 200,000 people have died, and more than 13 million have fled their homes [3]. Countries neighboring Syria carry most of the refugee burden with over 95% of refugees settling in adjacent nations [3]. Lebanon, which shares its entire eastern and northern borders with Syria, has been impacted the most by the crisis, taking in the equivalent of 30% of its pre-existing population in refugees, which resulted in the highest refugee per capita rate in the world [2, 4]. This high concentration of refugees in Lebanon has created tremendous strain on the local health care system that was already overburdened prior to the conflict [3].

Preliminary reports suggest that the burden of disease among Syrian refugee populations is higher than that of non-refugee populations [5, 6]. However, little is known about refugees' specific burden of surgical disease. Global health has traditionally focused on communicable diseases with limited attention to surgical care [7]. Several studies over the past decade have established the importance of emphasizing surgical care as a cost-effective and essential component of a robust health care system [1, 8, 9]. Understanding the surgical needs and barriers to access to care is essential to reducing strains on resource-limited health care systems. Limited resources, scarce funding, and prioritization of resources toward providing relief rather than data collection all contribute to the factual lack of data.

Studies on surgical capacity in Lebanon suggest that its resources pre-2011 were on par with upper-middle income countries, though less than high-income countries [10]. The Surgical Capacity in Areas with Refugees (SCAR) study corroborated these findings but noted significant disparities across the governorates dense with refugees. The SCAR study demonstrated that Personnel, Infrastructure, Procedure, Equipment and Supply (PIPES) indices were lowest in areas with relatively high refugee numbers, including the Bekaa, Baalbek-Hermel, North Lebanon and Akkar [10]. While SCAR provided information on overall surgical capacity, there are no published studies that provide information on the surgical needs and access to care specifically among refugees in Lebanon. A few limited non-published reports suggest that the burden of disease among the Syrian refugee populations is extremely high. While the United Nations High Commissioner for Refugees (UNHCR) has a policy of subsidizing emergency surgery care for refugees in Lebanon, the actual access to such specialized care is debatable. We aimed to study the burden of surgical disease and access to surgical care of the Syrian refugee population in Lebanon. We hypothesized that the refugee population has a high burden of surgical disease and limited access to surgical services.

## Methods

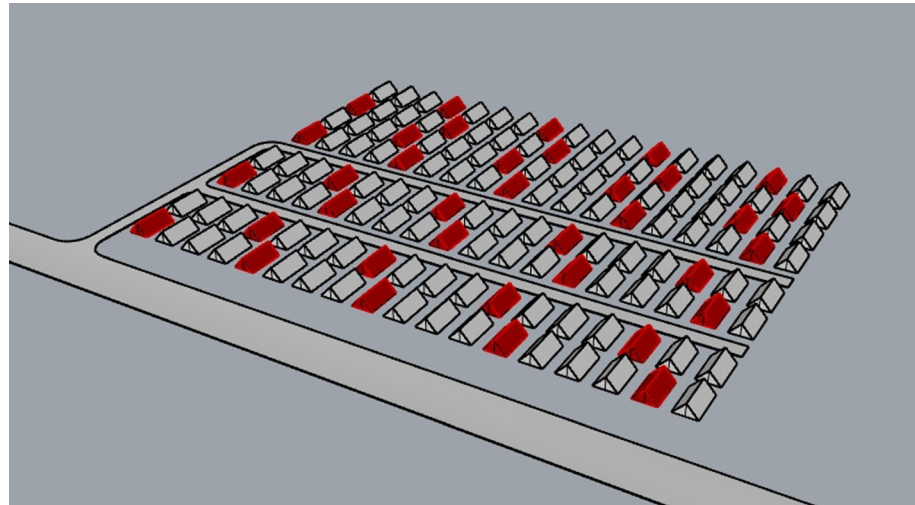
### Study design

This study was designed as a cross-sectional cluster-based population survey using the Surgeons Overseas Assessment of Surgical Need (SOSAS) tool. SOSAS is based on the Demographic and Health Surveys (DHS) guidelines and the World Health Organization (WHO) Guidelines for Conducting Community Surveys for Injuries and Violence and the survey tool designed for road traffic injuries [11]. Survey development has been previously described and the tool is freely available online at [www.surgeonsoverseas.org](http://www.surgeonsoverseas.org) [12]. Minor modifications were made to the tool to better suit it to the Syrian refugee population. First, patients were asked where in Syria they are originally from, what year they left Syria, and how long they have been in Lebanon. Second, the unit cost for transport was modified to represent Lebanese Lira to USD conversion (as of March 2019). Third, 'Boat' was deleted from 'Section C1.1 Transportation' since it's not applicable to the context of Syrian refugees. Fourth, since individuals under the age of 18 were not interviewed, the answer 'Girls under the age of 12 years' was removed from the reproductive age screening question.

The first section of the survey gathers household demographics in each informal tented settlement (ITS). Household representatives are also asked to report the total number of deaths in the household within the past 12 months. The second section of SOSAS is organized by anatomic area and serves as a proxy for identifying any prevalent surgical condition. Individuals responding to this section only answer data pertaining to their own health regarding conditions that may require operative intervention. For the purposes of this study, a potentially operative condition was defined as a self-reported wound, burn, mass, congenital or acquired physical deformity, or operation in any of the anatomic areas defined in the survey. The anatomic areas included face/head/neck, chest/breast, back, abdomen, groin/genitalia, or extremities.

The data collected focused on: (1) *Burden of surgical need*, e.g., family perception of medical and surgical need categorized by system (e.g. abscesses, intra-abdominal pathology, obstetric complications, vascular disease, cancer), and (2) *Access to surgical care*, e.g., attempt to seek surgical care within the past 12 months or since arriving in Lebanon, where such care was sought (non-governmental organization vs government hospital), and the method of payment used (personal savings, help from family or other refugees, subsidy from UNHCR).

**Fig. 1** Sampling methodology of Syrian refugee camps



The SOSAS questionnaire was translated into Arabic by a bilingual researcher then back-translated into English to ensure content validity and consistency.

### Data collection

Four bilingual Research Assistants (RA) familiar with the local geography and dialects were recruited and trained in the administration of the SOSAS questionnaire. Training took place over 2 weeks and included lessons on basic surgical disease and terminology, required readings, simulated practice sessions with role-play, in addition to supervised data collection in the camps for the initial phases of the study. Data collection took place over 3 months between February and April 2019. Every fourth residence along the most easily accessible major routes was selected (Fig. 1). If no one answered, the next residence along the route was selected. For each household, the RA described the study and obtained verbal informed consent in Arabic. Verbal consent was obtained in lieu of written consent because of the low literacy rate and the minimal risk involved with participation. Children under the age of 18 did not participate in the interview and information related to minors (any child less than 18) were provided by the head of the household (child parent or guardian). The study was approved by the American University of Beirut Institutional Review Board (IRB).

### Data analysis

Data were analyzed using measures of frequency, central tendency, and variation depending on the input. Categorical variables are summarized as proportions and continuous variables as mean (standard deviation). For univariate analysis, Pearson's  $\chi^2$  tests or Fisher's Exact Tests were

performed for categorical variables. Student's *t* test was performed when the means for continuous variables were reported. All statistical analysis was performed by using the Stata v15.1 (StataCorp 2017. Stata Statistical Software: Release 15. College Station, TX: StataCorp LLC).

### Response rates

Data were analyzed in a complete case analysis fashion, and no imputation was performed for missing data. The percentage of missing data for each variable is underlined in the footnote of the respective table.

## Results

### Demographics

A map of the region is shown in Fig. 2. A total of 1500 individuals from 750 households representing 21 camps were surveyed. The mean number of individuals per ITS was 6.4 (standard deviation: 2.8). The respondents had a mean age of 36.6 (15.0) years, and 54.6% were female. Syrian governorates of origin were diverse with Aleppo (31.7%) and Raqqa (30.0%) being the most highly represented. This was followed by Homs (12.2%), Idleb (11.3%), and Hama (7.5%) and several other regions represented in smaller numbers. The average length of stay in Lebanon was 5 (2.5) years. (Table 1).

### Employment and literacy

The majority (72.2%) of refugees reported unemployment with an additional 10.3% reporting their sole job as

**Fig. 2** Map of Syria and Lebanon**Table 1** Demographic characteristics of respondents

| Variables                        | N = 1500    |
|----------------------------------|-------------|
| <i>Sex</i>                       |             |
| Female                           | 814 (54.6%) |
| Male                             | 676 (45.7%) |
| Age of respondents, mean (SD)    | 36.6 (15.0) |
| <i>Age group</i>                 |             |
| Under 1 year                     | 89 (6.0%)   |
| 1–12 years old                   | 544 (36.4%) |
| 12–17 years old                  | 171 (11.4%) |
| 18–44 years old                  | 541 (36.3%) |
| 45 + years old                   | 147 (9.9%)  |
| <i>Province of origin</i>        |             |
| Damascus                         | 10 (0.7%)   |
| Homs                             | 181 (12.2%) |
| Raqqa                            | 445 (30.0%) |
| Hasaka                           | 52 (3.5%)   |
| Aleppo                           | 470 (31.7%) |
| Hama                             | 112 (7.5%)  |
| Deir el Zor                      | 43 (2.9%)   |
| Dara                             | 2 (0.1%)    |
| Idleb                            | 167 (11.3%) |
| Lebanese                         | 2 (0.1%)    |
| LOS in Lebanon, years, mean (SD) | 5.0 (2.5)   |
| LOS in house, years, mean (SD)   | 3.8 (2.3)   |

SD standard deviation; IQR interquartile range; LOS length of stay

homemaker/housewife; 8.4% were farmers and 59.0% were illiterate. (Table 2).

### Death within 12 months

Forty-two (5.6%) households recalled at least one death within the household within the prior year. Households reported that, of those that died, 22 (52.3%) had a potentially surgical condition prior to death. The most commonly cited reasons for death included acquired deformities (19.0%) and injury (11.9%). (Table 3).

### Prevalence of potential surgical conditions

A total of 374 (24.9%) respondents reported a surgical condition within the past 12 months. The breakdown and onset of the surgical conditions are summarized in Tables 4 and 5. The most common surgical indications reported were treatment of acquired deformity (9.0%), injury (7.0%), congenital deformity (3.8%), and mass/goiter (2.3%). The two anatomic locations where a surgical condition was reported were the face/head/neck (32.1%) followed by the extremities (21.9%).

### Access to care

Eighty-four percent of respondents reported being generally healthy. Only 15.9% of patients with a surgical condition reported seeing any healthcare provider. The most commonly cited reason for not seeking care was financial, with 75.4% reporting “no money” as their primary barrier to receiving care (Table 6). The household expenditures of the sampled population are summarized in Table 7. The mean healthcare expenditure per household was equal to

**Table 2** Education and occupation of respondents

| Variables   | N = 1500     |
|---|--------------|
| <i>Education</i>  |              |
| None (includes nursery)                                     | 775 (52.0%)  |
| Primary school  | 502 (33.7%)  |
| Secondary school (junior/senior)                            | 200 (13.4%)  |
| Tertiary (diploma, colleges, bachelors)                     | 13 (0.9%)    |
| Graduate degree (master's degree, PhD)                      | 1 (0.1%)     |
| Literacy  | 612 (41.0%)  |
| <i>Occupation</i>   |              |
| Unemployed (currently looking for jobs, retirees, students) | 1077 (72.2%) |
| Homemaker (housewives)                                      | 153 (10.3%)  |
| Domestic helpers (cleaners, housekeepers, watch guards)     | 58 (3.9%)    |
| Farmer (herders, agriculture, pastoralist)                  | 125 (8.4%)   |
| Self-employed/small-business owners                         | 62 (4.2%)    |
| Non-government employee                                     | 16 (1.1%)    |

1,600,000 Lebanese Liras (equivalent to \$1,056 at the time of the survey administration) and was higher than the average amount of money spent on rent (537,200 Liras, or \$393 at the time of administration of the survey) and living expenses (595,621 Liras or \$393 at the time of administration of the survey) combined. The mean healthcare expenditure was even higher if a surgery was performed (1,600,000 Liras, or \$1,716 at the time of administration of the survey). The majority of households (65.8%) did not have access to hospital care due to lack of finances and 22 (2.9%) reported the death of a household member due to the inability to afford healthcare.

## Discussion

### The burden of surgical need

This study represents the first primary survey of surgical disease in a Syrian refugee population in the Middle East. Nearly 25% of the surveyed population reported a recent potentially surgical condition. We hypothesized prior to beginning our study that, given the violent nature of the Syrian conflict and the circumstances surrounding the fleeing of many Syrians to neighboring countries, this population would have a higher incidence of surgical disease as compared to refugees in relatively stable, albeit low-income, countries [13]. Our hypothesis was in part supported by our study as participants reported nearly double the incidence of potentially surgical conditions as compared with Nepal (10%) and Rwanda (15%) [13, 14], but was similar to the incidence reported in Sierra Leone (25%) [15] and lower than that of Malawi (35%) [16]. We found that a third of the patients had surgical conditions

affecting their head, neck, or face which suggests that specialized reconstructive surgeons are likely needed to address the current case loads. Acquired deformity was the most common condition requiring surgical care, consistent with data from Sierra Leone [15]. Interestingly, wound-related injuries (7%) were less common in our study compared to populations from other LMIC countries [12, 14], but injury-related deaths (12%) were more than twice as common (1–6%) [17]. These injuries may have occurred during the violent Syrian conflict; however, given that the average time from immigration was five years, they could also have been sustained in Lebanon. The development of a robust trauma system, which Lebanon lacks, could reduce injury-related morbidity and mortality [18]. Finally, mortality from untreated surgical conditions among Syria refugees was more than 50% which is significantly higher than that of other LMICs (24–34%) [13–16, 19]. This alarming finding underscores the critical need for more robust surgical services to this underserved population.

### Catastrophic health expenditure

Refugees are under severe financial pressures with high vulnerability to catastrophic health expenditures. Most refugees (69%) are forced to pay out-of-pocket to cover their health care services provided by private clinics, particularly with the absence of available free services at local health care facilities or seek financial support from local charities and non-governmental organization (NGOs) to cover these expenditure [20, 21]. We showed that the average household expenditure on healthcare was substantially higher than the amount of money spent on rent and living costs combined, highlighting the need for

**Table 3** Characteristics of deceased household members within past year

| Variables  | N = 42      |
|--|-------------|
| <i>Sex</i>   |             |
| Female   | 17 (40.5%)  |
| Male   | 25 (59.5%)  |
| Age at death, mean (SD)                                    | 37.9 (34.0) |
| <i>By age groups (all-cause mortality)</i>                 |             |
| Under 1 year   | 10 (23.8%)  |
| 1–12 years old   | 5 (11.9%)   |
| 12–17 years old  | 0 (0%)      |
| 18–44 years old  | 9 (21.4%)   |
| 45 + years old   | 18 (42.8%)  |
| <i>By age groups (death from surgical disease, N = 22)</i> |             |
| Under 1 year   | 6 (23.8%)   |
| 1–12 years old   | 3 (13.6%)   |
| 12–17 years old  | 0 (0%)      |
| 18–44 years old  | 5 (22.7%)   |
| 45 + years old   | 8 (36.3%)   |
| <i>Problem before death</i>                                |             |
| Injury   | 5 (11.8%)   |
| Wound not due to an injury                                 | 2 (4.7%)    |
| Mass (Growth/Swelling)                                     | 1 (2.4%)    |
| Deformity Congenital                                       | 2 (4.7%)    |
| Deformity Acquired   | 8 (19.0%)   |
| None of the above  | 19 (45.2%)  |
| Died at birth  | 2 (4.7%)    |
| Neonatal problems  | 2 (4.7%)    |

SD Standard deviation; IQR Interquartile range

financial assistance for this vulnerable population. The majority of respondents in our study were unemployed and tended toward poor education, with greater than half of the adult population reporting illiteracy. In contrast, the literacy rate of the general population in Syria is 86% [22]. Many of the refugees we surveyed were displaced to Lebanon at a young age and thus did not have access to the education they would have otherwise had in their home country. This, in light of laws banning the employment of Syrian refugees beyond a limited number of minimum-wage professions, further underscores their exposure to impending, if not ongoing, financial ruin.

### Access to care

Access to care among respondents was consistently problematic and, by international standards, dismal, with less than 16% of those referred to see a surgical specialist actually seeing any level of provider. The majority report finances as the main barrier to access. Compared to refugee populations in other low and middle income countries, the availability of resources was surprisingly a rarely cited reason for not seeking care [23–25]. For instance, lack of skilled physicians was one of the two main perceived barriers for access to healthcare in a surveyed population in Rwanda and more than 70% of respondents reported needing at least 2 h of travel time to the nearest operative facility [13]. In contrast, only 2% of participants in our study reported lack of health services resources as a barrier to access to care. There is much anecdotal evidence in the Bekaa region, where many refugees are settled, to support this sentiment: a hospital just down the road from one of

**Table 4** Breakdown of surgical conditions for the 374 injured patients

|  | Wound—<br>injury<br>related | Wound—<br>not<br>injury<br>related | Burn     | Mass/goiter | Congenital<br>deformity | Acquired<br>deformity | Other         | Total      |
|--|-----------------------------|------------------------------------|----------|-------------|-------------------------|-----------------------|---------------|------------|
| Patients with surgical<br>condition <sup>1</sup> | 105 (7.0%)                  | 23 (1.5%)                          | 7 (0.5%) | 34 (2.3)    | 57 (3.8%)               | 135 (9.0%)            | 13 (0.9%)     | <b>374</b> |
| Total number of<br>injuries                      | 120                         | 29                                 | 10       | 44          | 70                      | 165                   | 19            | <b>457</b> |
| Head/Neck/Face <sup>2</sup>                      | 37 (30.8%)                  | 11 (37.9%)                         | 3 (30%)  | 12 (27.3%)  | 25 (35.7%)              | 56 (33.9%)            | 37<br>(30.8%) | <b>145</b> |
| Chest <sup>2</sup>                               | 5 (4.2%)                    | 2 (6.9%)                           | 2 (20%)  | 9 (20.5%)   | 20 (28.6%)              | 4 (2.4%)              | 0 (0%)        | <b>42</b>  |
| Back <sup>2</sup>                                | 10 (8.3%)                   | 6 (20.7%)                          | 0 (0%)   | 4 (9.1%)    | 3 (4.3%)                | 25 (15.2%)            | 1 (5.3%)      | <b>49</b>  |
| Abdomen <sup>2</sup>                             | 8 (6.7%)                    | 5 (20.7%)                          | 1 (0%)   | 9 (9.1%)    | 6 (4.3%)                | 28 (15.2%)            | 6 (5.3%)      | <b>63</b>  |
| Groin <sup>2</sup>                               | 8 (6.7%)                    | 1 (3.4%)                           | 0 (0%)   | 5 (11.4%)   | 8 (11.4%)               | 24 (14.5%)            | 10<br>(52.6%) | <b>56</b>  |
| Extremities <sup>2</sup>                         | 52 (43.3%)                  | 4 (13.8%)                          | 4 (40%)  | 5 (11.4%)   | 8 (11.4%)               | 28 (17%)              | 1 (5.3%)      | <b>102</b> |

<sup>1</sup>Percentages are of the total number of injured patients (n = 374)

<sup>2</sup>Percentages are of the total number of injuries

the main camps was well-equipped, with several expertly-trained surgeons performing advanced-laparoscopic cases.

It should be noted that not all Lebanese hospitals are contracted by the UNHCR and only those contracted are reimbursed for the care they provide to refugees [26]. Healthcare facilities in Lebanon have experienced an escalation in the costs of service provision and are now incapable of covering the needs for all the refugee population despite UNHCR subsidies [27]. This has been, understandably, cause for even greater frustration for the local Lebanese population who have seen their access to primary care reduced, forcing a push toward private healthcare providers which cost much higher [28]. Failure to meet the healthcare needs of host and refugee communities could lead to further social tension.

**Table 5** Onset of surgical conditions

| Onset of surgical condition              | <i>N</i> (%) |
|--|--------------|
| In the last month                        | 51 (11%)     |
| In the last year but longer than 1 month | 133 (29%)    |
| Longer than 12 months ago                | 227 (50%)    |
| Unknown or missing                       | 46 (10%)     |

**Table 6** Reasons for not seeking care

| Variables   | <i>N</i> = 1500 |
|---|-----------------|
| No care though surgery recommended—'All' body regions | 238 (15.9%)     |
| Reason for no care ( <i>N</i> = 238)                  |                 |
| No money for health care                              | 150 (75.4%)     |
| No (money for) transportation                         | 1 (0.5%)        |
| No time   | 12 (6.0%)       |
| Fear/no trust   | 5 (2.5%)        |
| Not available (facility/personnel/equipment)          | 4 (2.0%)        |
| Lack of perceived need                                | 18 (9.0%)       |
| No money and another factor                           | 9 (4.5%)        |

**Table 7** Healthcare expenditure per household

| Values are in Lebanese Lira              | <i>N</i> = 750        | USD equivalent* |
|--|-----------------------|-----------------|
| Rent, mean (SD)                          | 537,200 (724,217)     | 354 (478)       |
| Living cost, mean (SD)                   | 595,621 (496,013)     | 393 (327)       |
| Healthcare cost, mean (SD)               | 1,600,000 (2,700,000) | 1,056 (1,782)   |
| Households that spent money on surgery   | 201 (26.8%)           |                 |
| Total cost of surgery, mean (SD)         | 2,600,000 (3,000,000) | 1,716 (1,980)   |
| No hospital care due to lack of finances | 493 (65.8%)           |                 |
| Death because cannot afford healthcare   | 22 (2.9%)             |                 |

\*Conversion rate of 2019 Lebanese Liras (1515 Liras = 1 USD)

Our study calls for an investment in surgical care to save lives and promote economic growth [29]. Although politically challenging, state authorities should consider integrating Syrian refugees and the vulnerable Lebanese population into one health system. This would help reduce disparities in access to care and enhance cohesiveness between public, private, and humanitarian sectors [27]. A similar health system has successfully been implemented in Iran whereby more than more million Afghan refugees were provided access to secondary and tertiary care that is comparable to that of the average Iranian [1]. Legislations should also aim at regulating the treatment costs at private hospital to help provide equitable and accessible surgical care to host and refugee populations.

### Limitations

Our study has a few limitations. First, surgical conditions were self-reported and not independently validated by physical exam. Second, sampling was not performed randomly. Rather, a convenient cluster sampling strategy was used. Though the distribution of disease burden may differ somewhat across the sampled camps, we believe that surveying not only houses along the main road but also difficult to reach camps helped us mitigate sampling bias. Finally, the survey was conducted prior to the severe economic collapse, civil unrest and coronavirus pandemic that hit Lebanon hard since the beginning of 2020. One can only imagine that things have gotten even worse for refugees since.

### Conclusions

Our study is the first attempt to systematically quantify the burden of burns, injuries and surgical disease in a Syrian refugee population in the Middle East and demonstrates the feasibility of studying this population under challenging conditions. Our data strongly suggest that the burden of surgical disease is extremely high, and that the financial

barriers to accessing care are paramount. Such vulnerability to catastrophic health expenditure risks pushing large segments of the refugee population into a vicious cycle of poverty and economic dependence. While more resources are always needed, we believe there is ample room for improved access to care within the constraints of the existing resources.

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#### Declarations

**Conflict of interest** The authors have no financial or non-financial competing interests to disclose.

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