Medical aid to war victims in Syria in 2019: a report of organized healthcare support from a charity organization

Łukasz Przepiórka1, Mariusz Boguszewski2, Cezary Smuniewski3* and Sławomir Kujawski4

Abstract
Background: In 2011, a civil war started in Syria, which is on-going and has reached a death toll of over 400,000 people. Humanitarian organizations, including Aid to The Church in Need (ACN), have strived to provide help and medical support to the civilian victims.

Methods: We performed a retrospective analysis of data gathered in ACN projects in Syria in 2019. The datasets included descriptions of diseases, treatments, costs, cities, and hospitals. For each patient, we assigned the following additional categories: type of help (treatment, diagnosis, or nonmedical), type of treatment (medical or surgical), medical specialty, gross anatomic region, and presence of trauma.

Results: A total of 3835 patients benefited from ACN support in Syria in 2019. The majority of financial support went towards treatment (78.4%), while other support went towards nonmedical help (15.7%) or providing a diagnosis (5.9%). Among treatments, 66.6% were medical and 33.4% surgical. The most common medical specialty was internal medicine (48.4%), followed by public health (13.7%) and surgery (7.3%). Anatomic region was undefined in 68.3% of cases and, when defined, was most commonly the abdominal cavity and pelvis (13%). The vast majority of cases (95.1%) were not associated with trauma. Procedural costs were highest in the Valley of Christians region, and lowest in Tartous. Network graphs were used to visualize the three most common diagnoses and treatments for each medical specialty.

Conclusions: The present report describes the treatment of war victims in Syria in 2019. The patients lacked the most basic medical or surgical healthcare. Charity organizations, like ACN, constitute a valuable source of information about the healthcare of war victims. Unfortunately, the methods of describing medical treatment provided to civilian victims remain underdeveloped. Future studies will require the cooperation of healthcare providers, humanists, and social workers. The present findings can help to optimize the provision of humanitarian help by charity organizations, by tailoring projects to the specific needs of Syrian war victims.

Keywords: War victims, Report, Healthcare support, Syria

Introduction
In 2011, “the Arab Spring” uprisings reached Syria, starting a civil war that has not yet ended. The death toll is over 400,000 people, including around 20,000 children, and millions have been forced to leave their houses, leading to a refugee crisis [1]. Since the start of the conflict, multiple humanitarian organizations have...
closely observed the civilian suffering. For instance, Aid to The Church in Need (ACN) has played a major role in spreading news about the humanitarian disaster and genocide in Syria, while also providing help and medical support to the victims. ACN is a Pontifical Foundation of the Catholic Church, which supports all people, regardless of their faith. In the case of the Catholic faithful and other Christians where they are prosecuted, oppressed, or in pastoral need. Each year, ACN funds projects around the world, including stipends, construction and reconstruction projects, and the provision of medical aid [2].

In the present study, we aimed to describe and analyze data regarding the healthcare support provided to patients in Syria by ACN in 2019. In this context, we endeavored to illustrate the problems faced in providing organized help to the war victims, and to suggest solutions where possible. Finally, we discuss directions for future studies about the provision of healthcare support to war victims.

Methods
Materials
We performed a retrospective analysis of the data gathered in ACN projects in Syria in 2019. For each project, a local ACN council—comprising a medical doctor, social worker, and parish (or foundation) worker—decides whether the patient requires financial aid and, if so, the percentage of its coverage. The decision is based on the following inclusion criteria: being a war victim, poverty (determined by the local council), and preexisting need for medical treatment. There are no exclusion criteria. Importantly in such a religiously diverse region, the local council does not consider religion and denomination. Methods of aid can include partially or fully paying for the treatment, with the local council deciding the percentage of treatment coverage.

Data collection
ACN provided the anonymized data including financial (cost per treatment) and medical (type of diagnosis and therapy) information. Raw data were prospectively collected during each ACN project carried out in Syria in 2019, at hospitals located in Aleppo, Tartous, Damascus, and Marmarita (Homs).

Damascus, capital of Syria, with an estimated population of 2 million people in 2008 is the most important city accommodating national administration. It was heavily damaged during war and became shelter for many refugees from neighboring warzones. Aleppo, the largest city of Syria, is located near the Turkey border. Between 2012 and 2016, a major confrontation, known as battle of Aleppo, took place, yet some lesser fights continued afterwards. Tartous is located near the Libyan border on west of Syria. It suffered minimal damage during war and offered a sanctuary for many internal refugees as well as people awaiting departure from Syria to Lebanon or, through Lebanon, to other locations. Marmarita is located approximately 60 km from Homs. It avoided much of the warfare and offered shelter for many refugees from Aleppo and other Syrian cities. Homs is located 162 km north from Damascus and has population of approximately 600 thousand people.

For each patient assistance (i.e. provision of financial support to a specific patient with a specific medical condition), there was a description including the disease, treatment, date, group, costs, city, and hospital. These reports were translated into English, categorized using the methods described below, and analyzed. Cost of treatments was initially provided in Polish zloty (PLN). To increase clarity of data to a wide spectrum of recipients, we have converted currency to United States Dollar (USD) based on the mean currency from 2019. Data analysis was influenced by the guidelines for reporting economic evaluations – Consolidated Health Economic Evaluation Reporting Standards (CHEERS) [3]. We did not adhere to these guidelines because economic evaluation was not the aim of the study. Additionally, economic evaluations, by the definition, analyze “alternative courses of action in terms of their costs and their consequences” [4]. Due to no follow-up in our study, a proper economic evaluation cannot be performed.

Categorization (classification of data concerning the provision of medical aid)
To our knowledge, there is presently no standard classification method for data concerning the provision of medical aid to war victims. To overcome this lack, we designed the following system to present details regarding Syrian patients. We developed additional categories based on the descriptions of diseases and treatments for each patient assistance in the available database. Firstly, each patient assistance was categorized as a “treatment”, a “diagnosis”, or “nonmedical”. Any notes containing depiction of a medical or surgical treatment were assigned to the “treatment” category. Notes containing no description of medical intervention, but depictions of diagnostic procedures were assigned to the “diagnosis” category. The third category, “nonmedical”, included types of help that were not strictly associated with hospital admission, outpatient appointment, etc.—for instance, buying medical equipment or therapeutic sessions. All patients in the “treatment” category were assigned a subcategory of “medical” or “surgical”, based on the nature of the specific help provided. Subsequently, each patient assistance, based on the description of the diagnosis or treatment, was categorized as being within one medical specialty.
When possible, a gross anatomic region was assigned, i.e. head and neck, upper limb, lower limb, thorax, abdominal cavity, or undefined/not applicable. Finally, each assistance was described as “traumatic” or “nontraumatic” according to whether there was a clear description of trauma. All categorizations were performed by a single author (ŁP), who is a medical doctor. Single author categorization asserted homogeneity throughout the process.

Data analysis
The economic evaluation and statistical analysis were conducted on data that included currency in USD and additional variables with categories regarding medical aid described above. The Mann-Whitney U test was used to compare costs in USD between patients with and without trauma. Differences in cost of treatment are presented as median ± interquartile range (IQR). In addition, sums and means of a treatment cost for specific geographical regions are provided. Qualitative data (type and quantity of specific treatments, medical specialty, anatomic region, presence of trauma, prevalence in cities) were presented as count and percentage. Network graphs were created using Cytoscape software version 3.8.1 [5]. Network graphs were used to present the most common medical diagnoses and medical treatments per specialty assigned to patients. Three most common categories were shown in each graph to increase its clarity. Statistical investigation was performed using Statistica 13.0 (StatSoft, Inc.). All analyses were performed with level of \( \alpha = 0.05 \).

Results
A total of 3835 patients benefited from ACN support in Syria in 2019. A gross majority of the financial support provided was focused on treatment (78.4%), while the rest went towards nonmedical support (15.7%) or providing a diagnosis (5.9%). Among the provided treatments, two-thirds (66.6%) were medical and one-third (33.4%) surgical. In terms of medical specialty, patient assistances were most commonly categorized as internal medicine (48.4%), followed by public health (13.7%) and surgery (7.3%). Anatomic region was undefined in over two-thirds of cases (68.3%) and, when defined, was most commonly the abdominal cavity and pelvis (13%), followed by head and neck (8%) and thorax (7.5%). The vast majority of cases were not associated with a trauma (95.1% vs 4.9%). The cost of treatment was lower for patients without trauma than for patients with trauma (median ± IQR: 59.75 ± 130.6 USD vs 350.96 ± 374.6 USD, respectively; \( Z = -10.40, p < 0.0001 \)). Details regarding the different categories are presented in Table 1 and Fig. 1.

| Table 1 Overview of healthcare aid provided to patients in Syria in 2019 by Aid to the Church in Need |
| --- |
| Category | Data |
| **Type of help** |  |
| Treatment | 3008 (78.4%) |
| medical | 2003 (66.6%) |
| surgical | 1005 (33.4%) |
| Diagnosis | 224 (5.9%) |
| Nonmedical | 603 (15.7%) |
| **Medical specialty** |  |
| Cardiology | 184 (4.8%) |
| Internal medicine | 1859 (48.4%) |
| Neurology | 139 (3.6%) |
| Neurosurgery | 39 (1%) |
| Obstetrics and gynecology | 236 (6.2%) |
| Oncology | 97 (2.5%) |
| Ophthalmology | 181 (4.7%) |
| Orthopedics | 172 (4.5%) |
| Otorhinolaryngology | 78 (2%) |
| Pediatrics | 14 (0.4%) |
| Psychiatry | 22 (0.6%) |
| Public health | 526 (13.7%) |
| Radiology | 8 (0.2%) |
| Surgery | 280 (7.3%) |
| **Anatomic region** |  |
| Head and neck | 305 (8%) |
| Thorax | 289 (7.5%) |
| Abdominal cavity and pelvis | 500 (13%) |
| Upper limb | 31 (0.8) |
| Lower limb | 92 (2.4%) |
| Undefined / not applicable | 2618 (68.3%) |
| **Trauma** | Yes | 186 (4.9%) |
| No | 3649 (95.1%) |
| **City** |  |
| Aleppo | 159 (4.1%) |
| Damascus | 121 (3.2%) |
| Homs | 707 (18.4%) |
| Tartous | 4 (0.1%) |
| Valley of Christians | 2844 (74.2%) |
| **Costs** | Total | 236,254.75 |
| Mean | 583.12 |
| Median | 240.86 |

Procedure costs were highest in the Valley of Christians region (325369USD for 2844 procedures; ~114,41USD per procedure), and lowest in Tartous (18,460 USD for 4 procedures in overall. However, mean cost per procedure was the highest in Tartous from all examined regions (~4614,88 per procedure). The next region with
the lowest sum of costs was Damascus (58,688 USD for 120 procedures in overall) with the second of the highest mean cost of procedure (~489,06 USD per procedure). Sum of costs in Homs was 109,896 USD, while in Aleppo it was 59,865 USD. The overall number of procedures was 3741 with total cost of 572,278 USD (Fig. 1). Figure 1 does not show Tartous, due to the lower number of health care assistances provided there (Table 1).

To analyze the full spectrum of diseases and treatments is beyond the limits of this paper. Therefore, to represent the database, we provided three most common diagnoses and treatments for each medical specialty (Table 2). Careful analysis reveals the diagnoses and treatments that are most conventional for each specialty, and not particularly difficult. None of the diseases in the database could be described as complex or requiring an academic center.

The relatively low percentages among most common descriptions indicate a wide variety of responses. For a handful of specialties, only two diagnoses or treatments are described. This is for two reasons: a lack of more responses, or the finding that all other responses had the same frequency of appearance and a third most common could not be identified. The three most common diagnoses and treatments are presented as network graphs in Figs. 2 and 3, respectively.

Reviewing the descriptions from the database revealed several reappearing problems. Firstly, many of the descriptions lacked sufficient medical expertise and seemed to be recorded by a non-medical translator, which affected the language quality. Secondly, the diagnosis and treatment descriptions often contained the same information, e.g. a cesarean section in obstetrics and gynecology that appeared in both categories. Thirdly, some descriptions were specific, while others were general, e.g. “medications”. Finally, in numerous cases, a particular diagnosis or treatment was described in several different ways—for example as “surgery to repair hernia” and “hernia repair surgery” (Table 2). Such repetition impeded categorization, and made more detailed analysis impossible.

The collected data were derived from all major hospitals in Syria—namely, those located in Aleppo, Tartous, Damascus, and Marmarita (Homms). Importantly, other hospitals are not significant sources of providing specialized medical healthcare, and often do not employ medical doctors or nurses. Therefore, our database provides a reliable report of treatments provided to the poorest and neediest patients in Syria.

**Discussion**

In this study, we analyzed data gathered by ACN during their medical aid projects supporting war victims in Syria in 2019. We introduced a simple categorization scheme to describe healthcare provided to war victims, which could be used by future researchers. We also identified
### Table 2  Three most common diagnoses and treatments for each medical specialty

| Medical specialty | Three most common diagnoses, number (percent in specialty) | Three most common treatment descriptions, number (percent in specialty) |
|-------------------|-----------------------------------------------------------|---------------------------------------------------------------------|
| Cardiology        | Angina pectoris, 121 (65.8%) | Surgery to install cardiac catheter and drug eluted cardiac stent, 67 (36.4%) |
|                   | Myocardial infarction, 23 (12.5%) | Surgery to install cardiac catheter, 38 (20.7%) |
|                   | Cardiac problems, 10 (5.4%) | Cardiac catheterization percutaneous coronary intervention, 28 (15.2%) |
|                   | The patient is suffering from: hypertension, high cholesterol, 518 (27.9%) | Medications, 1683 (90.5%) |
|                   | The patient is suffering from: hypertension, high cholesterol, diabetes, 157 (8.4%) | Hospital admission, 88 (4.7%) |
|                   | The patient is suffering from: hypertension, 110 (5.9%) | Lab analysis, 27 (1.5%) |
| Internal medicine | The patient is suffering from: hypertension, high cholesterol, 518 (27.9%) | Medications, 1683 (90.5%) |
|                   | The patient is suffering from: hypertension, high cholesterol, diabetes, 157 (8.4%) | Hospital admission, 88 (4.7%) |
|                   | The patient is suffering from: hypertension, 110 (5.9%) | Lab analysis, 27 (1.5%) |
| Neurology         | The patient is suffering from: Epilepsy, 51 (36.7%) | Medications, 83 (59.7%) |
|                   | The patient is suffering from a stroke, 7 (5%) | MRI, 14 (10.1%) |
|                   | The patient is suffering from cerebral palsy, 5 (3.6%) | Physical therapy, 11 (7.9%) |
| Neurosurgery      | The patient is suffering from problems with spinal vertebrea, 20 (51.3%) | Surgery of resection the tumor, 5 (12.8%) |
|                   | Basocervical fracture, 3 (7.7%) | Anchorage, 4 (10.3%) |
|                   | Brain tumor, 3 (7.7%) | MRI, 3 (7.7%) |
| Obstetrics and gynecology | The patient nine months pregnant, 125 (53.0%) | Cesarean section, 154 (65.3%) |
|                   | Breast Cancer Awareness, 24 (10.2%) | Hysterectomy surgery, 27 (11.4%) |
|                   | Cesarean section, 20 (8.5%) | Knowledge ways to detect breast Cancer, 24 (10.2%) |
| Oncology          | The patient is suffering from breast cancer, 21 (21.6%) | Medications, 35 (36.1%) |
|                   | The patient is suffering from benign prostatic hyperplasia, 15 (15.4%) | Surgery of resection the tumor, 9 (9.3%) |
|                   | The patient is suffering from breast tumor, 11 (11.34%) | Mastectomy, 9 (9.3%) |
| Ophthalmology     | The patient is suffering from cataract, 99 (54.7%) | Surgery of phaco and intra ocular lens, 91 (50.3%) |
|                   | The patient is suffering from myopia, 22 (12.2%) | Medications, 42 (23.2%) |
|                   | The patient is suffering from retinopathy, 7 (3.9%) | Medical glasses, 25 (13.8%) |
| Orthopedics       | The patient is suffering from a broken femoral bone, 23 (13.4%) | Medications, 66 (38.4%) |
|                   | The patient is suffering from a broken leg, 13 (7.6%) | Open reduction internal fixation surgery, 22 (12.8%) |
|                   | The patient is suffering from degenerative joint, 13 (7.6%) | Surgery for internal bone fixation with rods implants, 18 (10.5%) |
| Otorhinolaryngology | The patient is suffering from tonsillitis, 16 (20.5%) | Tonsillectomy, 21 (26.9%) |
|                   | The patient is suffering from deviated nasal septum, 12 (15.4%) | Nasal septal deviation surgery, 12 (15.4%) |
|                   | The patient is suffering from hearing deficiency, 9 (11.5%) | Medical earphone, 7 (9.0%) |
| Pediatrics        | The patient is suffering from growth deficiency, 4 (28.6%) | Hospitalization and incubator, 8 (57.1%) |
|                   | The newborn baby is suffering from hypoxia, 2 (14.3%) | Lab analysis, 2 (14.3%) |
|                   | /all other were singular/ | Medications, 2 (14.3%) |
| Psychiatry        | The patient is suffering from: depression, 8 (36.3%) | Medications, 21 (95.4%) |
|                   | The patient is suffering from: depression, insomnia, 3 (13.6%) | Electroconvulsive therapy, 1 (4.6%) |
|                   | The patient is suffering from: ADHD, 2 (9.1%) | /no other options/ |
| Public health      | Children with a disability (as a result of war or a congenital disability) at home pose a major challenge for their parents, on the one hand they accept the condition of their children, and society accepts them, 136 (25.9%) | The program helps parents to accept their handicapped child at home and to be freed from the estimation of community and not feeling ashamed showing him/her, offering educational courses and awareness sessions, which help them deal with their child at home. 183 (34.8%) |
|                   | We have some cases of violent behaviors, sometimes expressed by beating, the reason is what they have experienced during the war., 93 (17.7%) | Individual and collective sessions were done to children through some meaningful activities, games, plays, music and free drawing which help children discharge their energy, 93 (17.7%) |
|                   | Spreading the message of peace between volunteers of the association by participating in painting and coloring on the walls, 50 (9.5%) | Volunteers implement the activity by drawing on the garden walls reflecting the association values. 50 (9.5%) |
| Radiology         | Carcinoma, 3 (37.5%) | CT scan, 6 (75%) |
|                   | PET scan, 2 (25%) | PET scan, 2 (25%) |
|                   | /all other were singular/ | /no other options/ |
| Surgery           | Inguinal hernia, 30 (10.7%) | Inguinal hernia repair surgery, 25 (8.9%) |
|                   | The patient is suffering from acute cholecystitis, 21 (7.5%) | Cholecystectomy, 25 (8.9%) |
|                   | The patient is suffering from biliary inflammation, 17 (6.1%) | Lithotripsy, 21 (7.5%) |

Responses are presented as they appeared in the database. In certain cases, there were only two types of descriptions for the whole specialty. In some cases, only two types of descriptions were multiple occurrences, while all others were single instances. In those two scenarios, only two answers are provided.

*ADHD* Attention-deficit hyperactivity disorder, *CT* Computed tomography, *MRI* Magnetic resonance imaging, *PET* Positron emission tomography
the main advantages and disadvantages of the analysis of medical charts from charity organizations that provide healthcare support to war victims.

Research on medical aid to Syrian war victims

There are limited data available regarding medical aid provided to Syrian war victims in the setting of ongoing armed conflict. Many reports describe medical aid provided to Syrian refugees in other countries where they have found refuge [6–18]. However, this is fundamentally different from providing healthcare within a country under civil war, and the differences extend far beyond the setting of the healthcare system [19]. Compared to places without conflict, warzones face many problems, e.g. deliberate attacks on healthcare facilities in Syria, preventing healthcare workers from receiving education [20–28], and the reported use of chemical weapons [29, 30]. As a result, Syrian healthcare system has been significantly damaged [31–34]. Noteworthy, in 2012 the World Health Organization (WHO) reported only half of hospitals in Syria functional [35]. Furthermore, the level of care provided by medical facilities in developing countries is far below that provided in high-income countries. Finally, a follow-up for war victims in the setting of ongoing war is usually unobtainable. For instance, Fatima et al. analyzed over 41 thousand neurotrauma cases from 95 war-affected hospitals in Syria from 2013–2015, however their medical data was limited to the hospitalization period [36].

Novelty of studies of charity projects

Most articles describing treatment of war victims focus either on a specific medical specialty [37–41], or on a certain group of diseases [8, 42–48], commonly PTSD.
Surgical trauma case series are a special group of interest in the literature [50–53]. Some articles report a single-center experience [14, 54, 55] and some describe creating local clinics and facilities founded by outside sources [56]. Therefore, our manuscript introduces novelty to the literature and opens space for future research.

Notably, there have been reports, and even systematic reviews, of the provision of cash-based assistance for people who live in the area of conflict [57, 58]. However, such assistance is essentially different from the provision of medical support as presented herein.

Studies of charity projects require the cooperation of people with various sets of talents, including healthcare providers, humanists, and social workers. No previous study has described the medical treatment of war victims in Syria in a comprehensive manner. Our presently utilized system of categorization is straightforward and could be reproduced and improved. However, a simpler and better solution would be to use already existing medical classification coding list for diseases—e.g. International Statistical Classification of Diseases and Related Health Problems (ICD) by the WHO—and procedure codes (e.g. ICD–10–CM). Proper reporting and understanding of the healthcare needs of war victims could enable charity organizations to undertake more tailored projects and optimize their use of resources [59].

**Ethical necessity of supporting war victims**

A brief analysis of the database reveals that healthcare support provided to war victims in Syria covers the most common and fundamental medical and surgical treatments among all specialties (Table 2). The authors did not identify any procedures that could be described as complex cases. This clearly illustrates that war victims...
in Syria are lacking some crucial medical procedures. Consequently, complex surgical cases are treated outside Syria [52] or with a help of foreign physicians [60]. Furthermore, many of the diagnoses are considered life-threatening and requiring urgent treatment, e.g. myocardial infarction. Statistical analysis revealed that cost of treatment was significantly higher for patients with trauma than for those without trauma. Ideally, providing adequate healthcare to war victims should be an area of interest and action for high-income countries outside of an armed conflict.

In 2009 there were 1485 organizations (including charitable organizations) registered with the Ministry of Social Affairs and Labour in Syria [61]. United Nations High Commissioner for Refugees Operational Portal lists 28 partners, “including government ministries, international non-governmental organisations (NGOs), national NGOs and UN agencies” [62]. Some of organizations that took action in Syria are faith-based organisations (FBOs), for instance Caritas, Islamic Relief, and World Vision [63]. Some authors noted that FBOs category is rather a fluid one, as no all organizations clearly establish their roots in faith. Additionally, some organizations became more secular over time [64]. A significant proportions of FBOs cooperate with national NGOs or other members of local civil society in Syria [63]. Motives of different FBOs organizations might differ because of variety of motives of charity in specific religions. FBOs grounded in Islam are related to “the zakat” one of commandments for Muslim that asks to care for the poor [65]. ACN action, as an embodiment of charity in Christianity, is inspired by Agape, which is a cardinal element of Christian faith, primarily defined as God's own love towards people. “Agape (...) is caused only by Jesus Christ, who died for us while we were still sinners. (...) Agape goes beyond justice. It reaches out to the unjust as well, and creates good, with no personal gain forthcoming” [66]. All people around the world require adequate healthcare, and armed conflicts should not impede that. Notably, war generates many more patients. In addition to issues that require immediate help, other problems arise that are visible only in long–term follow–up [67]—for instance, increased war-related family violence [68–70] and impaired parent–child interactions among Syrian refugees [71].

Limitations
The presented data are based on a database, which is an English translation of original files in Syrian; therefore, some information could have been lost in translation or be inaccurate. Furthermore, the database itself contains numerous internal insufficiencies that compromise its value, mostly related to the quality of medical descriptions or the English language. The current research primarily applied descriptive analysis in addition to comparison between groups of treatment costs. Due to sparse number of variables in database (e.g., no demographic patient data) models that would include those variables as co-factors could not be applied. Additionally, presenting treatment outcomes and follow–up should be performed in future studies.

Conclusions
In this report, we describe the projects undertaken by ACN in Syria, providing a reliable and comprehensive source of information about the treatment of war victims in Syria in 2019. Despite the imperfections of the collected data, we can conclude that the war victims in Syria required the most common and basic medical and surgical procedures. Additionally, the cost of treatment was higher for trauma patients than in patients without trauma.

Charity organizations, like ACN, and their projects provide a valuable source of information about the healthcare provided to war victims. Such data, if it were carefully collected with the aid of healthcare professionals, could provide valuable insight into the current condition of war victims and their needs. For this reason, more detailed data collection is needed. Notably, the methods of describing medical treatment of war victims are still underdeveloped. There remains a need for future studies of charity projects, which will require cooperation of people with various sets of talents, including healthcare providers, humanists, and social workers. The potential benefit of such studies will be to help optimize the humanitarian aid provided by charity organizations, through tailoring their projects to the specific needs of Syrian war victims.

Abbreviations
ACN: Aid to the Church in Need; FBO: Faith-based organisation; NGO: Non-governmental organization.

Acknowledgements
None.

Authors’ contributions
CS designed the project, critically reviewed it, and gave final approval of the version to be published. LP prepared the manuscript, and collected and reviewed data. MB provided data and helped in manuscript preparation. SK performed statistical analysis, prepared the figures, and revised the manuscript. All authors have sufficiently participated in the conception and design of this work or in the data analysis and interpretation, as well as in the writing of the manuscript, to take public responsibility for it. All authors contributed to the article and approved the submitted version.

Funding
None.
Availability of data and materials
The data supporting the findings of this study are available from Aid to the Church in Need. Restrictions apply to the availability of these data, which were used under license for the current study, and are thus not publicly available. However, data are available from the corresponding author upon reasonable request and with permission of Aid to the Church in Need.

Declarations

Ethics approval and consent to participate
The study has been performed in accordance with the Declaration of Helsinki and was approved by the Bioethics Committee of Medical University of Warsaw. The study presented herein is a retrospective analysis of a non-governmental organization datasets. These datasets were not patients' medical records, but representative records of cost estimations. Furthermore, the research described herein does not involve experiments on humans of any kind, and it does not include identifiable human data. For that reason, a signed consent from each patient, or legal representative, was waived by The Bioethics Committee of Medical University of Warsaw.

Consent for publication
In present study there are no details on individuals reported within the manuscript nor identifiable images, therefore consent for publication is not required.

Competing interests
Authors declare no conflict of interest.

Author details
1 Department of Neurosurgery, Medical University of Warsaw, Warsaw, Poland.
2 Faculty of Theology, Cardinal Stefan Wyszynski University in Warsaw, Warsaw, Poland.
3 University of Warsaw, Warsaw, Poland. 4 Department of Exercise Physiology and Functional Anatomy, Ludwik Rydygier Collegium Medicum in Bydgoszcz Nicolaus Copernicus University in Torun, Bydgoszcz, Poland.

Received: 15 March 2022   Accepted: 10 August 2022

Published online: 10 September 2022

References
1. El Arnaout N, Rutherford S, Zreik T, Nabilou D, Yassin N, Saleh S. Assessment of the health needs of Syrian refugees in Lebanon and Syria’s neighboring countries. Confl Heal. 2019;13:31.
2. Aid to the Church in Need | Home [Internet]. Aid to the Church in Need. [cited 2021 Feb 28]. Available from: https://acnuk.org/.
3. Husseau D, Drummond M, Petrou S, Carswell C, Moher D, Greenberg D, et al. Consolidated Health Economic Evaluation Reporting Standards (CHEERS) statement. BMC Med. 2013;25(1):80.
4. Drummond MF, Sculpher MJ, Torrance GW, O’Brien BJ, Stoddart GL. Methods for the economic evaluation of health care programme. 3rd ed. Oxford: Oxford University Press; 2005.
5. Shannon P, Markiel A, Ozier O, Baliga NS, Wang JT, Ramage D, et al. Cytoscape: a software environment for integrated models of biomolecular interaction networks. Genome Res. 2003;13(11):2498–504.
6. Zarka S, Barhoum G, Bader T, Zoaretz I, Glassberg E, Embon O, et al. Israel’s medical support to victims of the civil war in Syria. Ist Med Assoc J. 2014;16(2):71–2.
7. Hunter K, Knettel B, Reisinger D, Ganapathy P, Lian T, Wong J, et al. Examining Health Access for Refugee Children and Families in the North Carolina Triangle Area. N C Med. 2020;81(6):348–54.
8. Godfrey N, Kalache A. Health needs of older adults displaced to Sudan by war and famine: questioning current targeting practices in health relief. Soc Sci Med. 1989;28(7):707–13.
9. Parkinson SE, Behrouzan O. Negotiating health and life: Syrian refugees and the politics of access in Lebanon. Soc Sci Med. 2015;146:324–31.
10. Jirmanus L, Ziadie M, Usta J. Confronting Structural Inequities: The Limits of Participation when Developing a Community Health Intervention with Syrian Refugees and Host Communities in Lebanon. Soc Sci Med. 2021;272:113699.
11. Doocy S, Lyles E, Robertson T, Akhu-Zaheya L, Oxweis A, Burnham G. Prevalence and care-seeking for chronic diseases among Syrian refugees in Jordan. BMC Public Health. 2015;15(10):1097.
12. Weine SM, Arellano A, Gómez V, Lagenerske S, Demitras H. Conducting research on building psychosocial support for Syrian refugee families in a humanitarian emergency. Confl Heal. 2021;15(1):31.
13. Fouad FM, McCall SJ, Ayoub H, Abu-Raddad LJ, Mumtaz GR. Vulnerability of Syrian refugees in Lebanon to COVID-19: quantitative insights. Confl Heal. 2021;15(13).
14. Aarethen V, Sandal GM, Gunibye E, Markova V, Bye HH. Explanatory models and help-seeking for symptoms of PTSD and depression among Syrian refugees. Soc Sci Med. 2021;277:113889.
15. The refugee post-migration stress scale (RMPS) – development and validation among refugees from Syria recently resettled in Sweden | Conflict and Health | Full Text [Internet]. [cited 2021 Nov 22]. Available from: https://conflicthealth.biomedcentral.com/articles/10.1186/s13381-019-0246-5.
16. El-Khatib Z, Scales D, Vearey J, Forsberg BC. Syrian refugees, between rocky crisis in Syria and hard inaccessibility to healthcare services in Lebanon and Jordan. Confl Heal. 2013;7(1):18.
17. Strong J, Varady C, Chahda N, Doocy S, Burnham G. Health status and health needs of older refugees from Syria in Lebanon. Confl Heal. 2015;9:12.
18. Munirshidi MM, Hjijawi MQ, Jeriesat S, Elton A. Syrian refugees and Jordan’s health sector. Lancet. 2013;382(9888):206–7.
19. Garber K, Kushner AL, Wren SM, Wise PH, Spiegel PB. Applying trauma systems concepts to humanitarian battlefield care: a qualitative analysis of the Mosul trauma pathway. Confl Heal. 2020;14(1):5.
20. Wong CH, Chen CYT. Ambulances under siege in Syria. BMJ Glob Health. 2018;3(6):e001003.
21. Omar A. Understanding and Preventing Attacks on Health Facilities During Armed Conflict in Syria. Risk Manag Healthc Policy. 2020;13:191–203.
22. Badiawi Y, Rayes D, Sabouni A, Murad L, Fouad F, Zakaria W, et al. Challenges of providing healthcare worker education and training in protracted conflict: a focus on non-government controlled areas in north west Syria. Confl Heal. 2020;14(1):42.
23. Briody C, Rubenstein L, Roberts L, Penney E, Keenan W, Horbar J. Review of attacks on health care facilities in six conflicts of the past three decades. Confl Heal. 2018;12:19.
24. Haar RI, Read R, Fast L, Blanchet K, Rinaldi S, Taieb T, et al. Violence against healthcare in conflict: a systematic review of the literature and agenda for future research. Confl Heal. 2021;15(1):37.
25. Druce P, Bogatyreva E, Siem FF, Gates S, Kaade H, Sundby J, et al. Approaches to protect and maintain health care services in armed conflict - meeting SDGs 3 and 16. Confl Heal. 2019;13:2.
26. Elamein M, Bower H, Valdenlama C, Zedan D, Rihawi H, Almilaj K, et al. Attacks against health care in Syria, 2015–16: results from a real-time reporting tool. Lancet. 2017;390(10109):2278–86.
27. Patel P, Gibson-Fall F, Sullivan R, Irwin R. Documenting attacks on health workers and facilities in armed conflicts. Bull World Health Organ. 2017;95(1):79–81.
28. Ri S, Blair AH, Kim CJ, Haar RJ. Attacks on healthcare facilities as an indicator of violence against civilians in Syria: An exploratory analysis of open-source data. PLoS One. 2019;14(6):e0217905.
29. Brooks J, Erickson TB, Kaydien S, Ruiz R, Wilkinson S, Burke F. Responding to chemical weapons violations in Syria: legal, health, and humanitarian recommendations. Confl Heal. 2018;12(1):12.
30. Rodriguez-Llanes JM, Guha-Sapir D, Schlüter BS, Hicks MHR. Epidemiological findings of major chemical attacks in the Syrian war are consistent with civilian targeting: a short report. Confl Heal. 2018;12:16.
31. Ben Taleb Z, Bahelah R, Fouad FM, Coutts A, Wilcox M, Mazak W. Syria: health in a country undergoing tragic transition. Int J Public Health. 2015;60(Suppl 1):S63–72.
32. Coutts A, Mckee M, Stuckler D. The emerging Syrian health crisis. Lancet. 2013;381(9865):6–7.
33. Kherallah M, Alahfez T, Sahloul Z, Eddin KD, Jamil G. Health care in Syria before and during the crisis. Avicenna J Med. 2012;2(3):51–3.
34. Alahdab F, Omar MH, Alsakka S, Al-Moqahjed A, Attasi B. Syria’s alternative to a health care system: “field hospitals.” Avicenna J Med. 2014;4(3):51–2.
35. Sankari A, Atassi B, Sahlo MZ. Syrian field hospitals: A creative solution in urban military conflict combat in Syria. Avicenna J Med. 2013;3(3):84–6.

36. Fatima N, Mowafi H, Hariri M, Alnahhas H, Al-Kassem A, Saqquir M. Neurotrauma in the Syrian War: analysis of 41,143 cases from July 2013-July 2015. Neuro Sci. 2022;43(6):3769–74.

37. El Hajj AY, Beveridge J, Chan M, Deeb T, Mowafi H, Al-Nuaimi S, et al. Devastating neurologic injuries in the Syrian war. Neurol Clin Pract. 2019;9(1):15.

38. Duramaz A, Bilgili MG, Bayram B, Ziroğlu N, Bayrak A, Avkan MC. Orthopedic trauma surgery and hospital cost analysis in refugees; the effect of the Syrian civil war. Int Orthop. 2017;41(5):877–84.

39. Maziak W, Asfar T, Mazyek F, Foad FM, Klibi H. Socio-demographic correlates of psychiatric morbidity among low-income women in Aleppo. Syrian Soc Sci Med. 2002;54(9):1419–27.

40. Bayrak A, Ozturk V, Koluman A, Ziroglu N, Duramaz A. Injury characteristics and management of orthopaedic trauma in refugee children. Int Orthop. 2021;45(3):649–56.

41. Jamous MA. Outcome of Craniocerebral Penetrating Injuries: Experience from the Syrian War. J Neurol Surg A Cent Eur Neurosurg. 2019;80(5):345–52.

42. Riyadh S, Abdulrazaq SS, Zirjawi AMS. Surgical Management of the Recent Orbital War Injury. J Craniofac Surg. 2018;29(5):1123–6.

43. Boggs D, Atijosan-Ayodele O, Yonso H, Scherer N, O’Fallon T, Deniz G, et al. Emergency endovascular treatment of peripheral arterial injuries occurring during the Syrian civil war: Gaziantep Dr. Ersin Arslan Education and Research Hospital Experience. Anatol J Cardiol. 2016;16(4):304–8.

44. Ulcak M. Incidence and Severity of Maxillofacial Injuries During the Syrian Civil War in Syrian Soldiers and Civilians. J Craniofac Surg. 2019;30(4):992–5.

45. Alhannamd A, Maaz B, Alhaneedi GA, Alnouri M. External fixation for primary and definitive management of open long bone fractures: the Syrian war experience. Int Orthop. 2019;43(12):2661–70.

46. Riyadht S, Abdurrazaq SS, Sizawai AMS. Surgical Management of the Recent Orbital War Injury. J Craniofac Surg. 2018;29(5):1123–6.

47. Akkurt A, Gökçe DG, Atiş D, Oktay M, Oktay M, Yıldırım S, et al. Muscle weakening and atrophy among Syrian refugees living in Sultanbeyli, Turkey: prevalence, cause, diagnosis and need for related services and assistive products. Confl Health. 2021;15(1):29.

48. Children at risk: A nation-wide, cross-sectional study examining post-traumatic stress symptoms in refugee minors from Syria, Iraq and Afghanistan resettled in Sweden between 2014 and 2018 | Conflict and Health | Full Text [Internet]. [cited 2021 Nov 22]. Available from: https://conflictandhealth.biomedcentral.com/articles/10.1186/s13031-020-00311-y

49. Arafat S, Alsabek MB, Ahmad M, Hamo I, Munder E. Penetrating abdominal injuries during the Syrian war: Patterns and factors affecting mortality rates. Injury. 2017;48(5):1054–7.

50. Gasaimeh GR, Shotar AM, Alkhail SJA, Gasaimeh MG. The pattern of the Syrian refugee’s injuries managed in King Abdullah University Hospital (Jordan). Eur J Trauma Emerg Surg. 2017;43(5):587–94.

51. Özdoğan HK, Karateke F, Özdoğan M, Cetinbaş S, Ozaycić S, Gezercan Y, et al. The Syrian civil war: The experience of the Surgical Intensive Care Units. Pak J Med Sci. 2016;32(3):529–33.

52. Mowafi H, Harini M, Alnahhas H, Ludwig E, Allodiai T, Mahameed B, et al. Results of a Nationwide Capacity Survey of Hospitals Providing Trauma Care in War-Affected Syria. JAMA Surg. 2016;151(9):815–22.

53. Naaman O, Yulevich A, Sweed Y. Syrian civil war pediatric casualties treated at a single medical center. J Pediatr Surg. 2020;55(5):523–9.

54. Ert E, Çorbacıoğlu SK, Guler S, Aylan S, Seviner M, Aksel G, et al. Analyses of demographical and injury characteristics of adult and pediatric patients injured in Syrian civil war. Am J Emerg Med. 2017;35(1):82–6.

55. Aburas R, Najebe A, Baageel L, Mackey TK. The Syrian conflict: a case study of the challenges and acute need for medical humanitarian operations for women and children internally displaced persons. BMC Med. 2018;16(165).

56. Doocy S, Tappis H. Cash-based approaches in humanitarian emergencies: a systematic review. Campbell Syst Rev. 2017;13(1):1–200.

57. Falb K, Annan J. Pre-positioning an evaluation of cash assistance programming in an acute emergency: strategies and lessons learned from a study in Raqqa Governorate, Syria. Confl Health. 2021;15(1):12.

58. Flaherty MG, Roberts LF. Internet searching produces misleading findings regarding violent deaths in crisis settings: short report. Confl Health. 2019;13:4.

59. Homez E, Ramira P, Mocellin N, Bajard X, Legodouzeve S, Charpail C, et al. 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. 2015;41(2):143–7.

60. Laura Ruiz de Elvira Carrascal. State/Chari- tes relation in Syria: between reinforcement, control and coercion. Civil Society and the State in Syria. The Outsourcing of Social Responsibility, Lynne Rienner Publishers. St Andrews Papers on Contemporary Syria, 2012 p. 23.

61. Davis TJ. Religion in philanthropic organizations: Family, friend, foe? Indiana University Press; 2013. p. 256.

62. Kochuyt T. God, Gifts and Poor People: On Charity in Islam. Social Compass - SOC COMPASS. 2009;56:88–116.

63. Benton JF. A theology of charity for Christian social agencies. Social Thought. 1981;7(4):2–13.

64. Devakumar D, Birch M, Rubenstein LS, Osrin D, Sundorp E, Wells JCK. Child health in Syria: recognising the lasting effects of warfare on health. Confl Heal. 2015;9(1):34.

65. Sriskandarajah V, Neuner F, Catani C. Predictors of violence against children in Tamil families in northern Sri Lanka. Soc Sci Med. 2015;80(5):345–52.

66. Saile R, Neuner F, Ertl V, Catani C. Prevalence and predictors of partner violence against women in the aftermath of war: a survey among couples in northern Uganda. Soc Sci Med. 2013;86:17–25.

67. Vinck P, Pham PN. Association of exposure to intimate-partner physical violence and potentially traumatic war-related events with mental health in Liberia. Soc Sci Med. 2013;77:41–9.

68. Sim A, Fazel M, Bowes L, Gardner F. Pathways linking war and displacement to parenting and child adjustment: A qualitative study with Syrian refugees in Lebanon. Soc Sci Med. 2018;200:19–26.

Publisher’s Note
Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

Publisher Note

Ready to submit your research? Choose BMC and benefit from:
- fast, convenient online submission
- thorough peer review by experienced researchers in your field
- rapid publication on acceptance
- support for research data, including large and complex data types
- gold Open Access which fosters wider collaboration and increased citations
- maximum visibility for your research: over 100M website views per year

At BMC, research is always in progress.

Learn more biomedcentral.com/submissions