VIA MEDICA
REVIEW ARTICLE
ISSN 2450–7458
e-ISSN 2450–8187

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Barriers to Diabetes Care during Humanitarian Crisis during 2013–2022 in Five Arabian Countries: A Systematic Review

ABSTRACT

Objective: The purpose of this systematic review is to examine the difficulty in getting diabetes care in five Arab nations that experienced conflict and humanitarian crises between 2013 and 2022.

Materials and methods: Original published articles (2013–2022) reporting diabetes care challenges refugees and host community members were searched from Web of Sciences, PubMed and Europe PMC databases. Two impartial reviewers evaluated the methodological quality of the data from these studies.

Results: Of 670 searched studies, 41 studies were included in this systemic review. Fourteen were published between 2013 and 2017, and 27 were published between 2018 and 2022. The main barriers to diabetes care reported were; a) refugees who lacked diabetes knowledge and information, b) community members who complained of financial shortage and insufficient drug supply, c) government health providers who expressed hostility toward the refugees, and d) humanitarian organizations that provided subpar care due to financial hardship and lack of resources.

Conclusions: This review focuses on evidence of suboptimal diabetes care in humanitarian settings in five Arabic countries affected by wars and conflicts. There are numerous impediments to monitoring, investigating, and treating displaced and host community patients. These barriers can be overcome by improving the knowledge of both patients and healthcare providers, as well as overcoming the hosting communities' economic shortage. (Clin Diabetol 2023; 12; 2: 123–134)

Keywords: diabetic care, humanitarian crisis, Arabian nations, suboptimal care

Introduction

Conflicts, wars, and corruption crises plagued a number of the Northern African and Eastern Mediterranean nations. Among these countries are Iraq, Yemen, Palestine (West Bank and Gaza), Syria, and Lebanon (Fig. 1). In these countries, the conflicts and wars negatively impact the health services that are provided to the general population, and one of these services is related to diabetes care (Fig. 2). Despite the existence of a large number of medical centers, consultant clinics, and associations that deal with diabetes patients, a lack of health services combined with an increase in the number of diabetes patients results in unquestionably suboptimal diabetes care. According to each nation's most recent national statistics, diabetes affects the following populations: 13.9% in Iraq [1, 2], 5.4% of people aged 20 to 79 in Yemen [3], 15.4% in Gaza, the West Bank, and East Jerusalem in Palestine [4], 12.6% in Syria [5], and 14.6% of people in Lebanon [6]. In general, the World Health Organization (WHO) reported that 55,000,000 of the adult population in the Eastern

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Clinical Diabetology 2023, 12; 2: 123–134
DOI: 10.5603/DK.a2023.0009
Received: 27.12.2022 Accepted: 14.02.2023

Figure 1. Geographical Map Showing the Arabian Countries (Iraq, Syria, Lebanon, Gaza Strip, West Bank and Yemen) that Faced Wars and Humanitarian Crisis

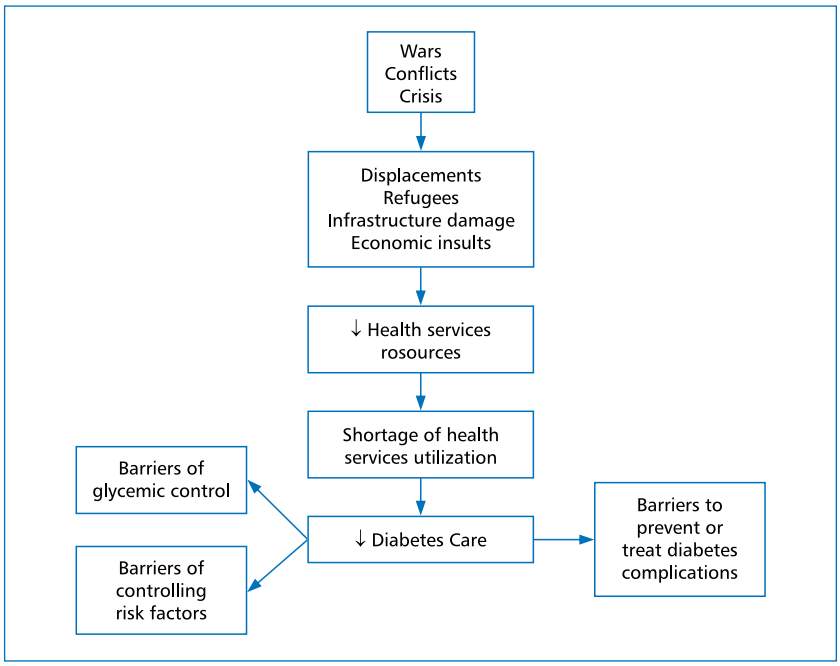

Figure 2. Impacts of Conflicts on the Humanitarian Health

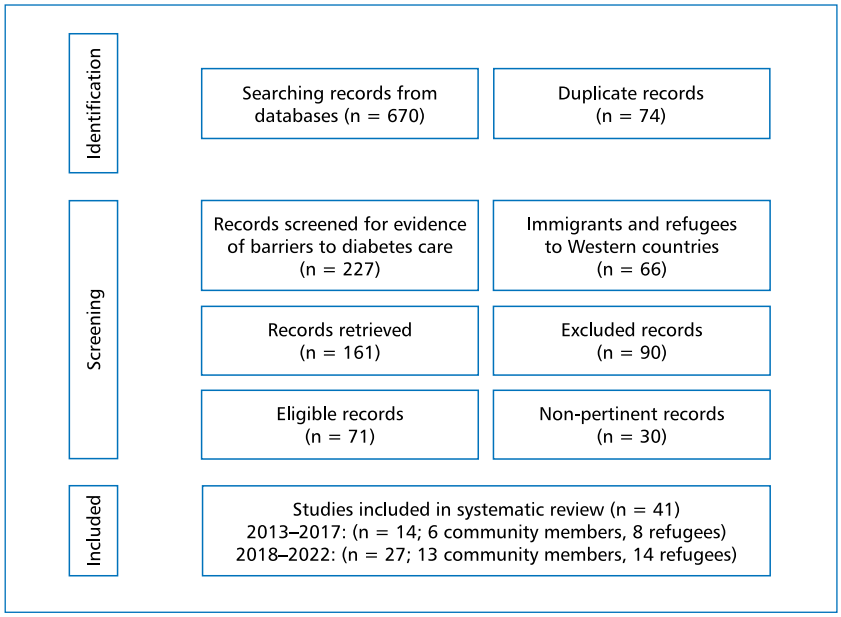

Figure 3. Schematic Diagram of Records Extracted and Retrieved from Databases

Mediterranean region have diabetes mellitus [7]. Another systematic review and meta-analysis reported that about 46 million individuals now have diabetes in the Middle East, with a prevalence of 14.6% that varied among countries from 2.6% to 21.9% [8]. Although the prevalence of diabetes mellitus among refugees and internally displaced persons was not precisely estimated in each of these nations, it was found in samples of refugees who were transferred to other nations [9–12]. Due to the multifaceted crisis that the Ministry of Health in these countries is facing, there are numerous criticisms of the prevalence of diabetes in these countries, including the updated population census and the accuracy of health services in registering and monitoring diabetes patients. The distribution of glucometers, specialized programming about the care of diabetes, shortages and the high cost of antidiabetic drug supply, low applications, or adherence to guidelines are some of the barriers that limit the delivery of diabetes care, according to a systematic review of 19 studies conducted in Middle Eastern nations [13]. Given the diversity, instability, and variety of humanitarian crises, it is essential to tailor diabetes care to the stage of the crisis, supplying the proper medications and preserving access to healthcare resources [14]. Among the diabetes medications prescribed to the displaced people were metformin, dapagliflozin, empagliflozin, glibenclamide, gliclazide, insulin, insulin analogues (insulin degludec, insulin detemir, and insulin glargine), and insulin intermediates. Metformin and glibenclamide medications were inexpensive and widely available to patients with diabetes. Diabetes care was provided to the local people by the ministry of health through primary health centers, diabetes centers, public clinics and hospitals (general and specialist), as well as private clinics and hospitals. For a variety of reasons, these services are not always available and are inaccessible to displaced people.

The rationale for this systematic review is that war and conflict are major concerns in the deterioration of public health services and are barriers to achieving better health. The goal of this systematic review is to assess the barriers to diabetes care in both hosted community members and refugees who were displaced to that community in five Arabian countries that faced a crisis of wars, conflicts, and economic insult between 2013 and 2022.

Materials and methods

Search strategy and inclusion criteria

A systematic review was conducted according to the PRISMA guidelines. PubMed, Europe PMC, and Web of Science were searched from January 2013 to December 2022. Search terms are: diabetes mellitus, Middle East, Iraq, Yemen, Syria, Lebanon, Palestine, Jordan, care, barriers, diabetes control, refugees, and displacement. Furthermore, the reference lists of the publications were used for further searching.

Study selection

Studies on diabetes mellitus conducted in the aforementioned nations included prospective cohort studies, observational studies, surveys, cross-sectional

Table 1. Impact of Humanitarian Crisis to the Diabetes Care among Community Members and Refugees during the Period between 2013 and 2017

Nationality		Author	Study	Sample size (n)	Conclusion
Community members	Lebanese	Azar et al., 2014 [16]	Cross-sectional	1,571 patients and 115 physicians	Maintaining adherence to international guidelines necessitated the promotion of patient education and the enhancement of physician knowledge
		Doocy et al., 2017 [18]	Longitudinal Cohort study	793	The m-Health app has the potential to improve adherence to guidelines and care quality
	Palestine	Sweileh et al., 2014 [19]	Interview survey	405	Improving patients' knowledge of their illness may have a positive impact on medication adherence
		Sharif et al., 2016 [20]	Cross-sectional	401	Diabetes patients' attitudes and behaviors toward treatment guidelines varied according to time constraints, availability of the guidelines, availability of laboratory tests, and training on how to apply the guidelines
		Elsous et al., 2017 [21]	Cross-sectional	369	The rate of complete adherence to diabetes medications was suboptimal
	Iraqi	Haddad et al., 2014 [15]	Cross-sectional cohort	42	Short message services are acceptable, cost-effective, and feasible in supporting diabetes care in the challenging resource-poor environment of modern-day Iraq
Refugees	Syrian	Zamzam et al., 2013 [26]	Qualitative approach	12	Active listening and creating a free flow of ideas and information between patients and healthcare providers can help to improve relationships. Therefore, healthcare providers can help their patients overcome barriers to more effectively managing their diabetes
		Doocy et al, 2015 [27]	Cross-sectional	1,550	The primary barrier cited by a significant minority of Syrian refugees housed in Jordan was cost
		Doocy et al., 2016 [28]	Cluster design survey	1,363	For people with non-communicable diseases, forced displacement poses significant challenges, with the potential to seriously impact both quality of life and life expectancy among refugees
		Doocy et al., 2016 [29]	Cross-sectional	1,400	The implications for both people with non-communicable diseases and Lebanon's health system are enormous due to the protracted nature of the Syrian crisis and the burden on Lebanon's health system
	Palestine	Khader et al., 2013 [22]	Descriptive cohort study	288	Diabetes has a high disease burden in Jordan's primary health care clinics. e-Health system is an important tool for evaluating management and follow-up
		Khader et al., 2014 [23]	Retrospective cohort	2,974	The use of e-health and cohort analysis in the monitoring and management of patients with diabetes is a highly valuable application in diabetes care
		Khader et al., 2014 [24]	Retrospective cohort	119	Using E-Health and cohort analysis principles, Nuzha primary health care clinic was able to track a group of patients with diabetes for three years
		Alabed et al., 2014 [25]	Interview survey	154	Drug access appeared to be a problem in UNRWA clinics for patients with diabetes, and patients' knowledge of their condition was limited

studies, qualitative studies, and nested case-control studies. Experimental, biochemical, randomized clinical trials, genetic studies, and non-English studies carried out on diabetes mellitus were excluded. Studies on refugees displaced to countries other than the neighboring countries were not included. The literature screening was done by two independent medical professionals.

Terms

Refugees are defined as individuals who have been uprooted from their homes and are now living elsewhere, whether they were displaced within the same nation and resided in camps or abroad. UNRWA is the acronym for United Nations Relief and Works Agency for Palestine Refugees in the Near East. This humanitarian organization was established in 1949. MSF is the acronym of Médecins Sans Frontières, which is an independent humanitarian organization that provides healthcare to people in crisis.

Data extraction

The following data were extracted from each study: authors' names, publication year, country where the study was conducted, name of the study, study period, sample size, number of cases, and participants. Double checking was used in the data extraction.

Results

Six hundred seventy search records yielded a total of 41 articles that identified obstacles to diabetes care (Fig. 3). Table 1 showed that 14 studies were carried out between 2013 and 2017. Six studies were carried out on the population of the hosted communities in Lebanon, the West Bank, and Gaza, while eight studies were done on displaced Syrian and Palestinian people in neighboring nations.

The total number of hosted community population (n=3,581) and displaced people (n = 7,860) was 11,441 patients. The results of these studies showed that poor knowledge of diabetes patients was the main cause of barriers to providing diabetes care and resulted in non-adherence to medications in the hosted community population. One study demonstrated that the knowledge and attitudes of 115 Lebanese physicians required further educational programs about providing diabetes care. The main barriers to providing diabetes care to displaced people were shortages in accessing healthcare sources and the economic crisis that faced the hosting country. Table 2 shows that 13 out of 27 studies were carried out on the host community population from 2018 to 2022. These studies assessed the barriers to providing healthcare to patients in Gaza and the West Bank (9 studies), Lebanon (three studies), and Iraq (one study). The total number of hosted community patients was 11,751 (Palestinian), 743 (Lebanese), and 475 Iraqi. The results of these studies showed that there are many barriers to providing diabetes care, including poor knowledge, the economic crisis, the education level of healthcare providers, and the relationship between patients and healthcare providers. Table 3 shows that 14 out of 27 studies were carried out on the displaced people in the hosted community from 2018 to 2022. These studies assessed the displaced people from Syria, the West Bank, and Gaza in the surrounding countries and the Iraqi displaced people in the Kurdistan region. Only three studies were cross-sectional, while the others had different design modalities. A total number of 79,224 was included in this study, and several barriers were observed including, financial and drug shortage, inadequate heath resources that provided by the humanitarian societies, and knowledge of patients. Hostility toward the Syrian displaced patients in Lebanon was a reason for providing diabetes care in one study. Studies carried out on the host community or displaced people in Yemen did not detect any trends.

Discussion

During a period between 2013 and 2017, 14 articles mentioned the barriers to accessing care for people with diabetes among populations affected by humanitarian crises. These studies showed that the main obstacle to providing healthcare in the host countries was a lack of resources, and that this issue could be solved by using m-Health and e-Health. Between 2013 and 2017, Yemen and Iraq experienced a severe humanitarian crisis that was best summed up by ISIS's occupation of some regions in the north and west of Iraq as well as the corruption-related destruction of the health infrastructure. Unfortunately, a review of the literature revealed no studies that had identified issues with providing diabetes care to Iraqi displaced people.

1. Impact of the humanitarian crisis from 2013 to 2017 on the host community's population

The humanitarian crises in low- and middle-income countries, like Lebanon, Syria, the Gaza Strip, Yemen, and the West Bank, have a burden on diabetes, utilize health services, and provide access to care for both host populations and refugees. This burden was reported in 6 studies on the host population of Iraqi (1), Lebanon (2), and West bank and Gaza Strip (3). One study found that using short message service (e-Health) to increase knowledge in Iraqi patients resulted in improved HbA1c in newly diagnosed diabetes patients [15]. The study's limitations are its small sample size and the non-random recruitment of the patients. Only 29.6% of the people in Lebanon who had diabetes had their blood glucose under control, which indicates that the host population's diabetes was not being adequately controlled [16]. e-Health, often known as "electronic health", refers to health services and information delivered via information and communication technology, e.g., computers, mobile phones, and satellite commu-

Table 2. Impact of Humanitarian Crisis to the Diabetes Care among Community Members Ring the Period between 2018 and 2022

Nationality	Author	Study	Sample size (n)	Conclusion
Palestine	Mosleh et al., 2002 [30]	Questionnaire based cross-sectional	479	Strengthening the patient-health care professional relationship, as well as expanding the role of preventive education and the use of alternative medicine improve glycemic control, result in lower costs for patients and family members
	Venkateswaran et al., 2022 [31]	eRegQual cluster-randomized controlled trial	8,669	The e-Registry's clinical decision support for antenatal care was superior for the majority of process outcomes. Digital health interventions may aid in achieving effective antenatal care coverage
	Mosleh et al., 2021 [32]	Retrospective cross-sectional	330	It is critical to examine prescription modes and educational programs that emphasize diabetes self-care and the role of health care providers in improving health outcomes
	Albelbeisi et al., 2021 [33]	Cross-sectional study using a structured survey tool	400	Identifying and removing major barriers is critical for increasing access to physical activity infrastructure, affordable healthy diet options, and strengthening the shift toward healthy behaviors at all levels
	Jebril et al., 2020 [11]	Cross-sectional survey	1,000	Diabetes mellitus affected both citizens and refugees in Palestine. A higher sugar intake is linked to an increased risk of undiagnosed T2D
	Khdour et al., 2020 [34]	Cross-sectional questionnaire-based approach	380	Assessing patients' beliefs about medicine is critical for identifying patients at risk of low adherence and developing a strategy to assist patients with diabetes in achieving better glycemic control
	Yahya et al., 2020 [35]	Qualitative screening study	24	The barriers to achieving diabetes mellitus screening are multifaceted, including financial, personal, educational, health-care system, and cultural factors
	Al-Halaweh et al., 2019 [36]	Longitudinal, quasi-experimental study	100	Integrative diabetes care appears to be particularly well suited for resource-constrained healthcare systems
	Radwan et al., 2018 [37]	Cross-sectional study	369	Glycemic control was inadequate, and factors contributing to this included poor medication adherence and low health literacy
Lebanon	Chaiban et al., 2022 [38]	Semi-structured in-depth phone interview	8	Diabetes patients' conditions have deteriorated as a result of the economic crisis. Governments and nongovernmental organizations must devise strategies for those people to gain access to healthcare
	Ayoub et al., 2019 [39]	Cross-sectional study	500	In Lebanon, adherence to oral hypoglycemic treatment is suboptimal
	El Khoury et al., 2019 [40]	Cross-sectional study	235	The development and implementation of guideline insulin orders constitutes a comprehensive insulin education plan
Iraq	Al-Waeli et al., 2022 [41]	Cross-sectional study	475	Educating doctors and patients, as well as providing optimal doses of oral hypoglycemic drugs through primary care center, may help to solve the problem of drug-adverse reactions

nications [17]. On the other hand, the use of smart or portable gadgets for health services and information is referred to as "m-Health," or mobile health [17].

According to another study, the use of mobile health (m-Health) services significantly improves the standard of care for people with diabetes and ensures that recommended practices are followed in 10 primary health centers [18]. The same observation was reported by Sweileh et al. 2014, that e-Health service system could reduce the on both diabetes population and health centers [19]. The knowledge, the attitude, and the behavior of medics toward diabetes patients are related to different variables related to the economic shortage [20], as is the suboptimal adherence of diabetes patients to their medications, which is related to a poor education level [21].

Table 3. Impact of Humanitarian Crisis on the Refugees Seeking Diabetes Care During the Period 2018–2022

Refugees	Author	Study	Sample size (n)	Conclusion
Palestine, Syrian, and Lebanese hosted in Shatila camp	Mohamad et al., 2021 [49]	Mixed methods design	361	Adherence to diabetes was good, most likely as a result of a patient-centered approach combined with educational interventions
Palestine and Syrian displaced to Lebanon	Saleh et al., 2018 [42]	Community-based screening for diabetes and hypertension	3,481	In underserved communities, a low-cost eHealth netbook application was found to be effective in identifying new cases of non-communicable diseases and establishing appropriate referrals
Syrian displaced to Lebanon	Sibai et al., 2020 [44]	Mixed method approach	1,876	Guidelines for the delivery of non-communicable diseases care in crisis settings required monitoring and evaluating healthcare physical facilities and documentation processes, provider knowledge and guideline-concordant performance, and refugee and host community awareness
Syrian displaced to Lebanon	Lyles et al., 2020 [43]	Cluster design	1,376	Lower and more predictable health-care costs for refugees and vulnerable host community members are needed
Syrian displaced to Lebanon	Karaki et al., 2021[46]	Randomized group survey	101	The barriers to health-care access, most notably the discovery of perceived discrimination by healthcare workers in a linguistically and culturally related host community
Syrian displaced to Lebanon	Haderer et al., 2021 [45]	In-depth interviews	29	Due to their vulnerable status and lack of knowledge of the host country's systems, Syrian refugees with diabetes in Lebanon face significant challenges navigating the health care system
Syrian displaced to Lebanon	Saleh et al., 2022 [47]	Cross-sectional study	1,700	There are significant differences in outpatient service use based on setting, nationality, and gender
Syrian displaced to Jordan	Rehr et al., 2018 [50]	Two-stage cluster design	8,041	The burden of non-communicable diseases and multimorbidity is high among Syrian refugees in northern Jordan, with the elderly and those with a lower level of education being particularly vulnerable
Syrian displaced to Jordan	Ratnayake et al., 2020 [9]	Cross-sectional study	59,617	The high prevalence of complications and obese or overweight status during this humanitarian crisis suggests that management was inadequate and non-adherence was widespread
Syrian displaced to Jordan	McNatt et al., 2019 [51]	Qualitative study	68	Global and national funding must be aligned with front-line realities in order to improve service coordination among host-country health systems, private actors, and non-governmental organizations
Syrian displaced to Jordan	Bani Hani et al., 2019 [52]	Cross-sectional	696	Inadequate primary healthcare, subpar living conditions, a lack of funding, and a loss of patient contact are just a few of the major issues confronting Syrian refugees in Jordan
Palestinian refugees from Syria	Chaaya et al., 2021 [54]	Cross-sectional	1,100	Noncommunicable diseases are more common among Palestine refugees living in Palestinian camps than among those living elsewhere and their access to health care is limited
Palestinian refugees from Jordan	Canali et al., 2018 [56]	Cross-sectional	763	Low adherence was linked to the use of multiple providers of care and diabetes medication, whereas high adherence was linked to complete satisfaction with the quality of care, disease explanation and treatment, and trust in UNRWA healthcare staff
Iraqi displaced to Kurdistan Region	Baxter et al., 2018 [57]	Rapid qualitative study	15	During the so-called Islamic State period, displaced people reported consistent barriers to health care, such as drug shortages, insecurity, and inability to afford privately sold medication

2. Impact of the humanitarian crisis from 2013 to 2017 on the displaced population and refugees

Eight studies that were conducted on Syrians (4 studies) and Palestinians (4 studies) reported on the impact of the humanitarian crisis on those who have been displaced and have diabetes mellitus. The UNRWA primary healthcare (PHC) clinics experienced a significant burden in the second half of 2013 due to the 288 newly diagnosed and 12548 registered diabetes cases among Palestine refugees living in Jordan [22]. The e-Health policy could therefore be a crucial tool for managing and monitoring patients. In another two retrospective studies done in 2014, e-Health and cohort analysis were found to be vital in providing diabetes care to 2,974 registered DM and 119 newly registered DM in Nuzha PHC [23, 24]. Another study brought attention to UNRWA PHC's neglect of Palestine refugees living in Syria, which is caused by a lack of diabetes medications as a result of the country's economic hardship [25]. Lack of information being given to diabetes patients and resulting in poor diabetes control are both symptoms of the poor relationship between Syrian refugees and healthcare professionals [26]. Due to the poor relationship between refugees and healthcare professionals at PHC, this issue was identified in 2015 as Syrian refugees living in Jordan's north seeking better diabetes care than those living in Jordan's center [27]. According to a cluster design survey, 31.6% of 1,363 diabetes patients experienced financial hardship when trying to access medical care [28]. In one cross-sectional study, which included 1,400 Syrian refugees and 700 Lebanese hosted in Lebanon, the economic shortage was a major barrier to providing health care to both populations at the same time [29].

3. Impact of the humanitarian crisis from 2018 to 2022 on the host population

A total of 13 out of 27 studies on providing diabetes care to the host community population who were not displaced or lived in the campaign were conducted between 2018 and 2022. The majority of these studies discussed the DM complications that burden low- and/ /or middle-income countries' economies.

Palestinian population

Nine out of 13 studies were carried out on the Palestinian population who lived in the Gaza Strip and West Bank. The cost of providing health care per year to the diabetes patient and her/his family members was $307,509, which cannot be covered by patients [30]. Therefore, it is necessary to enhance the knowledge and awareness of diabetes complications through the use of preventive education programs. In one large-scale study including 8,669 women with gestational diabetes, it has been found that antenatal care in the e-Registry system was superior for the outcomes of gestational diabetes [31]. Another retrospective study with 330 DM patients found that relationships between patients and healthcare professionals and preventive healthcare programs were the most important factors in managing the disease [32]. Due to a flaw in the social support system for diabetes in the Gaza Strip, adherence to non-pharmacological intervention in diabetes control was suboptimal [33]. The percentage of undiagnosed adult DM was 16.8% of the 1,000 subjects included in the cross-sectional study, which is strongly associated with sugar intake [11]. DM can be controlled with the help of social support. Among 380 diabetes patients, 42.1% were grouped as having low adherence to anti-diabetes drugs due to their beliefs that these medications are useless in controlling diabetes [34]. Social support is therefore required to change their beliefs. Financial shortages are the main obstacle preventing patients from visiting the clinic and receiving quality care, according to a study with a small sample size that involved 24 diabetes patients with retinopathy [35]. Al-Halaweh et al. (2019) found that the application of Diabetes Comprehensive Care Model-based intervention would improve glycemic control parameters, indicating that education programs are useful in providing health care during crises [36]. Another study found that low adherence to the diabetes management guidelines as a result of low health literacy was the root cause of poor diabetes control as measured by HbA1c [37].

Syrian population

Four studies between 2018 and 2022 were excluded because they did not mention the difficulties faced by diabetes patients hosted in Syria during the crisis. These studies detailed the diabetes complications, such as diabetes foot ulcers and diabetes retinopathy.

Lebanese population

The economic crisis that Lebanon's government faced exacerbated the situation for eight diabetes patients who had their lower limbs amputated and were included in semi-structured, in-depth phone interviews during the COVID-19 epidemic in Lebanon [38]. Diabetes-related foot ulcers (DFUs) in patients from Syria did not have this issue. Another problem with diabetes care was that 39.2% of the 500 patients who participated in the descriptive cross-sectional study did not take their oral diabetes medications as directed [39]. Over an eight-month period, 500 patients were

recruited from two endocrinology hospital clinics and four private clinics in Beirut, and data were collected using a structured questionnaire that included variables related to socio-demographic and lifestyle characteristics, diabetes disease and treatment characteristics, and patient knowledge. A comprehensive education course on the appropriate use of insulin is ultimately important, as a higher percentage of 70% of the 235 patients admitted to the hospital complaining of hyperglycemia were mismanaged by nurses [40]. One article was excluded because it omitted information about the obstacles to providing diabetes care.

Yemen population

A review of the literature revealed no studies on diabetes care in Yemen during the multifaceted crisis.

Iraqi population

Only 4.3% of 475 diabetes patients in Iraq used the recommended dosage of oral antidiabetic medications [41] due to a lack of drug supply and patients' unwillingness to take their medications as prescribed.

4. Impact of the humanitarian crisis from 2018 to 2022 on the displaced people

Syrian population displaced to Lebanon

The majority of Syrian refugees were relocated to nearby nations like Turkey, Jordan, and Lebanon. Therefore, some studies were conducted on the Syrian and Palestinian refugees at the same time because Lebanon also hosts Palestinian refugees. In such a situation, the application of a low-cost e-Health notebook was effective in spotting new cases of diabetes and reducing the economic burden on the host country [42]. According to one study, members of the host community (Lebanon) sought diabetes care without having their medications interrupted more frequently than Syrian refugees who complained of financial hardships [43]. Compared to their knowledge of managing diabetes, which is adequate, healthcare professionals' understanding of the basis for diabetes diagnosis was limited [44]. Syrian refugees who hosted in Lebanon gained their information about diabetes from social media, and they were not seeking a scientific approach to gathering information because of limited community health services [45].

The discrimination between Syrian refugees and Lebanon residents by healthcare providers, as noted by Karaki et al. (2021), added to the high cost of diabetes health care services that Syrian refugees in Lebanon had to deal with [46]. In a cross-sectional study conducted in 2022 on 1,700 Syrians with diabetes mellitus, Saleh et al. reported that there were significant nationality-related differences in the provision of diabetes healthcare in outpatient clinics, with the host community receiving superior medical care to Syrian refugees [47]. When applied to 2644 Syrian refugees living in the Shatila campaign, the Médecins Sans Frontières (MSF) model of healthcare for DM was found to be workable and to have positive health outcomes [48]. Médecins Sans Frontières (MSF) is an international independent medical humanitarian organization that provides medical assistance to people affected by humanitarian crises and whose actions are guided by medical ethics. In addition, the principles guiding MSF's actions are characterized by impartiality, independence, and neutrality (www.msf.org/com).

A mixed methods design study carried out on 361 refugees (Syrian, Palestinian, and Lebanese) hosted in Shatila Camp found good adherence to the antidiabetic medication because the approach of the MSF model is concentrated on the educational interventions [49].

Syrian population hosted in Jordan

Out of 8,041 patients with non-communicable diseases, 17.6% had diabetes without or with hypertension, and 10.1% had both, according to one study. These patients had a low level of literacy and had trouble taking their medications as prescribed [50]. According to one study, ineffective programs to increase patient adherence to treatment and lessons to prevent comorbidities were to blame for the high prevalence of diabetes with comorbidities in Syrian refugee women [9]. The diabetes refugees will be physically and financially prevented from participating in the health sector by the insufficient and expensive health services provided by the Jordanian government, NGOs, and private clinics [51]. Insufficient healthcare resources and a lack of funding were blamed in another study for the heart diseases that are linked to diabetes [52]. Inadequate primary healthcare, suboptimal living conditions, a lack of funding, and a loss of patient contact are among the major challenges facing this vulnerable population. Some authors believed that humanitarian organizations could provide optimal healthcare by continuously monitoring the health status of the refugees [53]. The unstable humanitarian environment can be overcome by programming the data of refugees and providing low-cost healthcare.

Palestinian refugees displaced to Syria

In a cross-sectional study of 1,100 Palestinian refugees from Syria, it was found that 13% of the refugees had diabetes, and that the UNRWA's insufficient health resources prevented these patients from receiving the

best care possible [54]. The UNRWA established an e-Health system in 2012 to screen the Palestine refugees hosted in Syria, Gaza, the West Bank, Jordan, and Lebanon. Ballout et al. (2021) investigated the efficacy of the e-Health system and found that the results of their observational study, which involved 144 PHC centers, showed that the percentage of people with diabetes increased from 13% in 2012 to 21% in 2017 [55].

Palestinian refugees displaced to Jordan

Because they used multiple healthcare providers, 73% of the 557 diabetes refugees did not take their medications as prescribed, and they were dissatisfied with the standard of diabetes care they received from UNRWA [56].

Iraqi population displaced to Kurdistan Region of Iraq

Following the ISIS invasion of parts of northern and western Iraq, a sizable population was displaced and scattered across numerous campaigns. In the north of Iraq, when Mosul was under ISIS control, Baxter et al. (2018) reported that financial constraints and drug shortages were obstacles to diabetes care [57].

Therefore, the barriers to diabetes care in these countries are multifactorial and include:

a) Inadequate knowledge and attitude of healthcare providers.
b) The literacy of the patients, which is the main cause of non-adherence to medications.
c) Shortage of healthcare sources due to the economic burden on the hosted community and refugees.
d) Some healthcare providers did not provide healthcare independently, as two studies highlighted, and refugees were not managed as members of the community.
e) In some parts of Iraq and Syria, the ISIS played a role in the destruction of the health infra-structures and displaced large number of population, which made economic burden on the community governments.
f) Interestingly, e-Health and m-Health policies to manage and follow-up on diabetes patients could be helpful in reducing the problems that faced humanitarian organizations. e-Health and m-Health provided value-based health care that was not limited by time or location, allowing people to engage in medical decision-making, adhere to treatment, and achieve proper health outcomes.
g) According to evidence from more studies that looked into this issue between 2018 and 2022 than they did between 2013 and 2017, the best diabetes care becomes less effective over time.

Conclusions

It is possible to improve diabetes care for the population experiencing a humanitarian crisis by improving the quality of the services provided by humanitarian organizations and by using e-Registry for refugee screening because the humanitarian crisis setting is unstable. Applications of m-Health and e-Health services in patient management and follow-up are straightforward and low-cost. It is essential to raise the economic standing of the community that is hosting the refugees and locals, as this will ultimately result in better medication compliance. Education programs for healthcare professionals and refugees are crucial.

Acknowledgments

The author thanks Dr. Ismail Ibrahim Latif, Dr. Rawa Ratha, and Dr. Talar A. Merza for providing valuable help and comments.

Conflict of interests

None declared.

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