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The Impact of War and Conflict on People Living with Diabetes: A Scoping Review

ABSTRACT

Objective: There is substantial literature detailing the interaction between war and conflict on overall human health. However, there is limited understanding of the impact of war and conflict on people living with diabetes. This scoping review describes the impact of short- and long-term effects of exposure to war and conflict settings on people living with diabetes.

Materials and methods: The scoping review was conducted between May and August of 2023, using articles published in the PubMed Central and Google Scholar databases. Articles published from 1950 to 2023 with the following key terms “diabetes”, “type 1 diabetes”, “type 2 diabetes”, “war”, “armed conflict”, “organized violence”, and “refugees” were reviewed.

Results: A total of 151,347 articles were reviewed. After applying review criteria, 21 applicable articles

were included in this scoping review. Three themes emerged from this review:

- 1) People living with diabetes in conflict zones are subject to elevated blood glucose and hemoglobin A1C (HbA1c) levels, which can lead to severe long-term complications.
- 2) The stress of war and conflict negatively impacts diabetes self-management and quality of life.
- 3) Healthcare access, including services and medication, is severely disrupted for people living with diabetes in these tumultuous environments.

Conclusions: The findings underscore the profound and direct impacts of war and conflict on people living with diabetes, highlighting the disparities in care and the urgent need for further research to identify factors that exacerbate these challenges and strategies to mitigate them.

Keywords: type 1 diabetes, type 2 diabetes, war, conflict, refugees

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Introduction

War is defined as violent conflict between nations or states, whereas conflict is defined as a competitive or opposing action of incompatibilities [1]. As of 2023, 32 countries are currently involved in conflict, varying in severity and accounting for tens of thousands of casualties since 2022 [1]. An astonishing 117.2 million individuals were displaced or stateless in 2023 as a result of war and conflict [2].

War not only devastates human lives but also imposes a heavy toll on the global economy and health-care systems. As of 2021, the global economic impact of violence including armed conflict, displaced persons, interpersonal war, and large militaries was estimated to be 14.4 trillion dollars [3].

The literature extensively documents the multifaceted short- and long-term impacts of war and conflict on human health [4]. In the short term, individuals often face stress, limited access to proper nutrition, and the distressing separation from family and community. This separation can adversely affect diabetes management, potentially leading to increased instances of hyperglycemia and hypoglycemia. Furthermore, inadequate nutrition can cause frequent hyperglycemia in the short term and may escalate to severe complications like vision loss or nerve damage over time [5].

The equally severe long-term effects include mental health disorders, displacement from homes, and disruptions to essential health and social services, all of which have been linked to negative outcomes [6]. Housing insecurity has been shown to influence diabetes management and care leading to lasting complications [7]. Additionally, the psychological impacts of violence are profound, prompting heightened rates of anxiety, depression, and post-traumatic stress disorder (PTSD) [8].

People living with diabetes are tasked with the ongoing management of a chronic illness, a state that is heavily reliant on regular access to medication and a stable environment to manage their condition daily [5]. The constant vigilance required for diabetes management, including monitoring and blood glucose management, is often complicated by the stress of high-conflict environments [8]. Securing medications, and accessing consistent healthcare become formidable tasks in these regions, potentially leading to detrimental impacts on the management of diabetes.

The purpose of this scoping review is to discuss the short- and long-term effects (such as effects on glycemic targets impacts on diabetes management, and access to medical services and medications) of exposure to war and conflict settings on people living with diabetes. With the number of ongoing conflicts

Table 1. Inclusive Search Criteria

Search	Search criteria
Search Period: May 22nd — July 6th, 2023	
1	Type 1 diabetes and war
2	Type 2 diabetes and war
3	Diabetes and War
4	Type 1 OR type 2 diabetes and armed conflict
5	Diabetes and armed conflict
6	Type 1 OR type 2 diabetes and organized violence
7	Diabetes and organized violence
Second Search Period: July 28th — August 11th, 2023	
1	Diabetes and refugees

around the world continuing to expand, the need for this review is as crucial as ever.

Materials and methods

This scoping review was conducted in accordance with the Preferred Reporting Items for Systematic Reviews (PRISMA) — Scoping Reviews guidelines following Arksey and O'Malley's methodologic framework [9].

Scoping review question

What are the effects of living in areas exposed to war and conflict on people living with diabetes?

Protocol and eligibility criteria

The scoping review search terms included "type 1 diabetes" OR "type 2 diabetes" OR "diabetes", as well as "war" OR "conflict" OR "combat" OR "organized violence" OR "armed conflict" in the PubMed Central and Google Scholar databases (Tab. 1).

Human randomized controlled trials, non-randomized controlled trials, interrupted time series, controlled before-and-after studies, cohort studies, case reports, cross-sectional, mixed methods, and case series published between 1950 and 2023 in English language were eligible for inclusion. Studies that referenced people living with diabetes exposed to some form of war, organized violence, or armed conflict on a larger scale were included. The following were excluded from this review: animal studies, studies not in English, and those that were outside of the established time frame. Studies that only had included an abstract or were systematic or scoping reviews were excluded. Studies that did not reference diabetes specifically or directly or focused on the incidence of diabetes rather than the impact on people already living with diabetes were excluded. Studies where the context of "conflict" was related to diabetes-related conflict or other smaller-scale conflict were excluded (Fig. 1).

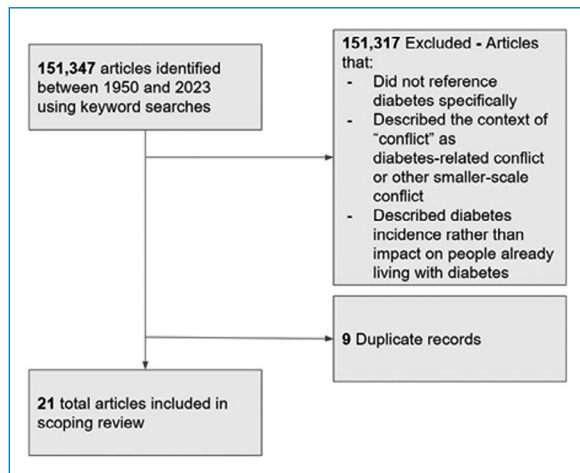


Figure 1. Scoping Review Flow Diagram

The first (EO) and third (HH) authors independently reviewed the titles and abstracts from 2 databases during an initial search conducted from May 22 to July 6, 2023. With input from a senior author (OE), all authors resolved any disagreements via consensus discussion. The initial PubMed search yielded 1358 results, specifically 691 when searching “war” and “diabetes”, 155 when searching “war” and “type 2 diabetes”, 36 when searching “war” and “type 1 diabetes”, 338 when searching “armed conflict” and “diabetes”, and 138 after searching “organized violence” and “diabetes”. After title reviews, removing duplicate articles and applying the above-mentioned exclusion criteria and screening the abstracts, 24 moved onto the next phase. The initial Google Scholar search yielded 130,100 results, specifically 33,800 when searching “war” and “diabetes”, 28,000 when searching “war” and “type 2 diabetes”, 28,000 when searching “war” and “type 1 diabetes”, 18,100 when searching “armed conflict” and “diabetes”, and 21,400 after searching “organized violence” and “diabetes”. After title reviews, removing duplicates, and applying the above-mentioned exclusion criteria and screening the abstracts, 18 moved onto the next phase, and the remaining articles were examined by the first and third authors. The first and third authors examined 42 remaining articles from the above two searches, reading the abstracts in depth and examining methodologies in a more detailed way, resulting in 11 studies included in this review.

An additional search was conducted from July 28 to August 11, 2023. The first 3 authors prompted an additional search to include refugees and diabetes in their search terms, after this topic had come up in

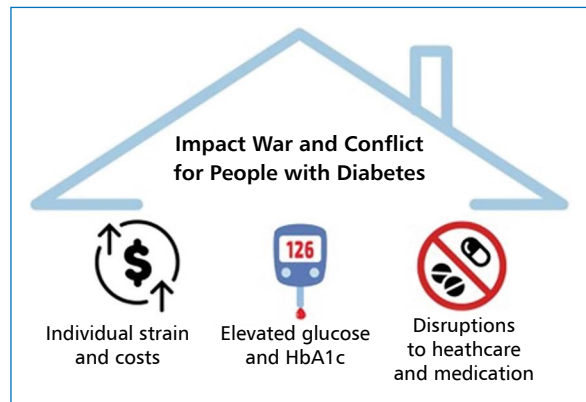


Figure 2. The Impact of War and Conflict on People with Diabetes

their first search on multiple occasions. This second PubMed search yielded 325 results when searching “refugee” and “diabetes”. The second Google Scholar search yielded 19,600 when searching “refugee” and “diabetes”. Similar exclusion criteria were applied for this search. After examining these articles, and applying inclusion and exclusion criteria, the number of eligible articles was reduced to 22. Following in-depth abstract and methodology review, 10 additional articles were included in the review (Fig. 1).

Results

A total of 21 studies were reviewed in this scoping review. Of the reviewed studies, the largest percentage of studies (27%) utilized a qualitative study design followed by mixed-methods (18%), cross-sectional (18%), retroactive case-control (10%), time series (9%), secondary data analysis (9%), and case series (9%). Table 2 includes the list of all relevant studies.

During the second search, 10 new studies were added to the scoping review. Of these reviewed studies, 40% were cross-sectional and 30% were retrospective design, while surveys, qualitative studies, and cluster design were each 10%.

Overall, 3 major themes emerged from this review (Fig. 2): 1) People living with diabetes in war and conflict settings experience increased or prolonged glucose levels above range, which can lead to long-term complications; 2) People living with diabetes in war and conflict settings are exposed to stressors and other factors that negatively impact diabetes self-management and quality of life; and 3) People living with diabetes in war and conflict settings experience significant disruptions in healthcare access such as services and medication.

Table 2. Scoping Review Study Characteristics

Authors last name, year of publication	Type of study	Sample size	Exposure	Outcome	Main findings
Diabetes outcomes					
Al-Sharafi, 2017 [10]	Cross-sectional	430 people with T2D	War	HbA1c levels	People with diabetes experienced an elevated mean HbA1c during war, with an increase from 7.7 (61 mmol/mol) (SD 1.9) before the war to 9.4 (80 mmol/mol) (SD 2.4) (p value: < 0.001) during the war compared to those with no diabetes diagnosis or those with low risk
Kohrt, 2022 [11]	Case series	Data from 108 individuals including 85 Somali Ethiopians who self-reported a T2D diagnosis and 23 additional persons who are adult siblings of the individuals with diabetes	Repeated conflicts, displacements, disasters; droughts	T2D rates; HbA1c; obesity	Investigators sampled various biometrics during a spike in political violence in Ethiopia, and found that individuals without diabetes had a lower mean HbA1c compared to those with diabetes (6.06 vs. 8.8)
Roglic, 1993 [12]	Mixed methods	35 people with T2D	War-related protracted stress	HbA1c levels	Findings noted a slight increase (9.13 to 9.53) in HbA1c among individuals with T2D exposed to war for 3 months; however, this change in HbA1c was not significant
Yitshak-Sade, 2020 [13]	Time series	408,706 glucose tests of 37,214 subjects	Living near MO		Exposure to stressful circumstances related to MO, particularly living near one, was associated with increased fasting glucose levels, with an increased effect on individuals living with diabetes. Glucose levels were 1.29% higher (95% CI 0.63%; 1.96%) during MO among people without diabetes, and 3.35% higher (95% CI 1.23%; 5.52%) during MO among people with diabetes who were treated with glucose-lowering medications
Hammad, 2022 [14]	Retrospective cross-sectional study	418 patients with diabetes	Living in refugee camp, smoking status, insulin use, TyG index	HbA1c	Data was collected from 1577 Syrian refugees living with diabetes, and only 6% were found to have controlled diabetes, which was defined as participants having an HbA1c% of less than 7. Most refugees (94%) had uncontrolled HbA1c, with the potential to lead to long term complications
Self-management of diabetes and quality of life					
Elliot, 2018 [15]	Cross-sectional	292 people with diabetes	Refugee status	DSMES score which reflects the level of knowledge and understanding of diabetes self-management	The mean DSMES score was 6/10. Researchers assessing diabetes self-management, education, and support (DSMES) among adult Syrian refugees seeking care for diabetes at a medical humanitarian organization found that individuals diagnosed during the conflict were significantly more likely to have lower DSMES score compared to those who were previously diagnosed after controlling for confounders in multivariable regression modeling

Authors last name, year of publication	Type of study	Sample size	Exposure	Outcome	Main findings
Maar, 2011 [16]	Qualitative	13 focus groups with 76 participants consisting of sessions with health care providers, elders, and community members with diabetes	Structural violence	Self-management behaviors	Several participants explained that some aboriginal patients face cultural barriers communicating with some of the non-aboriginal health care providers. They discussed that some patients have good management knowledge but still experience overwhelming barriers, such as current or past, unresolved physical or sexual abuse issues, or violence or addictions within their families
Ejledi, 2006 [17]	Cross-sectional	197 people with diabetes	Refugee	Health related quality of life	All domains were strongly reduced in diabetic patients as compared to controls, with stronger effects in physical health (36.7 vs. 75.9 points of the 0–100 score) and psychological domains (34.8 vs. 70.0), and weaker effects in social relationships (52.4 vs. 71.4) and environment domains (23.4 vs. 36.2)
Access to healthcare and medication usage					
Saleh, 2021 [18]	Secondary data analysis	10,082 Syrian refugees	Refugee status and other predictors including age, gender, smoking status, alcohol intake, physical inactivity and location of diagnosis	Prevalence of diabetes	While access to medications was high, interval medication interruptions occurred due to financial barriers and lacking knowledge of where to buy medications. Additionally, females who were diagnosed with diabetes before being displaced were more likely to take medications (87.5%) compared to those who were diagnosed after displacement (63%)
Ratnayake, 2020 [19]	Cross-sectional	1022 randomly sampled households, 2798 adults aged 18 years or older	Armed conflict-related stress	Glucose level (mg/dL)	Among Syrian refugee populations living with diabetes, 26.8% of individuals 18 years and older had missed a medication dose in the past week and about 18% of individuals taking medication reported taking a smaller dose to prolong their supply. Of the refugee population living with diabetes, 49.1% sought care in the last month for diabetes. For those that did not receive care, the main reported barrier was costs, including transportation and lost time
Saleh, 2022 [20]	Cross-sectional	1700 Lebanese and Syrian refugees with diabetes	Fragility settings (urbanized area of greater Beirut vs. rural area of bequaa valley)	Comprehensiveness of service	Women were significantly less likely to be offered lifestyle counseling advice and referral to cardiologists (58.4% vs. 68.3% in Beqaa and 58.1% vs. 62% in Beirut) and ophthalmologists, compared with men. Across both settings, there was a significant trend for Lebanese people with diabetes to receive more services and more advice related to nutrition and diabetes management (89.8% vs. 85.2% and 62.4% vs. 55.5%, respectively)

Authors last name, year of publication	Type of study	Sample size	Exposure	Outcome	Main findings
Doocy, 2016 [21]	Cluster design with probability proportional to size sampling	1 363 cases of NCD 250 with diabetes	Post- conflict/refugees	Healthcare utilization	84.7% had received care in Jordan upon fleeing their country, emphasizing the importance of continuing care for those with NCD, and demonstrating an increasing burden on the existing health care system
Malembaka, 2020 [22]	Cross-sectional	1 266 participants	Protracted socio-political instability and conflict	Prevalence of healthcare utilization	Researchers examined healthcare service utilization in conflict-recovering South Kivu province, eastern DR Congo; findings demonstrate that most people (82%), including those who self-identified as having diabetes, utilized healthcare services during times of conflict, suggesting that this greater need for services requires increased availability and quality of care
Khader, 2014 [23]	Retrospective cohort study	1 19 people with diabetes	Refugees	Healthcare utilization/blood glucose level in mg/dL	In the first 3 years of follow-up among people living with diabetes among a cohort of Palestine refugees, the proportion of clinic attendees decreased from 72% to 64% and then to 61%; the proportion lost to follow-up increased from 9% to 19% and then to 29%. Overtime refugees attended less visits
Rimawi, 2022 [24]	Retrospective matched cohort study	30 people with DM	The implementation of the Health for Palestine (H4P) Community Health Worker Program in West Bank Camp refugee camps	HbA1c levels over time and systolic and diastolic blood pressure values over 9–12 months	Researchers found that refugees with access to CHW saw a greater decline (1.4 points) in their HbA1c values compared to those without access (95% CI = -0.66, -2.1; p < .001), suggesting that refugees without access to care may experience higher HbA1c values
Baxter, 2018 [25]	Qualitative	15 adults who had fled Mosul and presented to Médecins Sans Frontières clinics in the Kurdistan region with HTN and/or diabetes	Armed conflict	Access to care	Participants reported consistent barriers to NCD care during the so-called Islamic State period, including drug shortages, insecurity, and inability to afford privately sold medication. Coping strategies included drug rationing. All interviewed patients in conflict-affected settings had completely or partially lost access to care when a city in Iraq was occupied by the Islamic State group, and 100% of respondents reported cost and availability of drugs to be barriers to access
Mansour, 2008 [26]	Mixed methods	The subjects analyzed in this study were adults (≥ 18 years old) with previously diagnosed diabetes (n = 3522)	Armed conflict	Mean HbA1c	Majority of Patient opinion for not achieving good glycemic control among 2688 patients with HbA1c ≥ 7% included no drug supply from primary health care center (PHC) or drug shortages (50.8%), drugs and or laboratory expenses (50.2%), and migration related reasons (30%), while drugs and or laboratory expense were the cause in 50.2%, and related to migration was 30%

Authors last name, year of publication	Type of study	Sample size	Exposure	Outcome	Main findings
Jacklin, 2017 [27]	Qualitative	32 participants in the study	Indigenous social determinants	Diabetic care	For several participants, diabetes care was mediated by traumatic historical relations between indigenous people in Canada and the government. The structural violence lens is useful in revealing and understanding barriers to diabetes care for indigenous people
Lyles, 2020 [28]	Household survey	1,376 refugee and 686 host community households	Refugee situation	Care seeking and healthcare utilization	Among 136 diabetes index cases in refugee households, most received care for the condition in Lebanon (88.2%, CI: 81.8–92.6%). Of all Lebanese diabetes cases, 8.5% (CI: 4.9–14.3) of all cases stopped medication without physician instruction. Again, the most common reason for stopping medication without physician instruction was cost
Ofosu, 2022 [29]	Qualitative	3 focus groups (2 groups of 8 and one of 13 participants) and 22 individual interviews (13 community members and 9 brokers)	The syndemic interactions of immigrant and refugee context. With diabetes and obesity.	The challenges faced by individuals in the vulnerable ethnocultural with newcomer communities living with diabetes and obesity	Lack of understanding of pre-migration factors, immigration route/status, and post-migration stressors culminates in a gap in support for diabetes and obesity care. Consequently, care for people with diabetes and/or obesity from vulnerable immigrant and refugee situations should include a holistic approach
Aziz, 2020 [30]	Retrospective case-control	A total of 2317 people with diabetes visited the clinic regularly with 2722 diabetes-related foot symptoms. Study found 2006 lesions belonging to 1630 people with diabetes	War injuries in the diabetic foot	Occurrence of minor and major amputations	Findings demonstrate that that people with diabetes with foot complications are at higher risk of neglect during long term crisis in Syria, potentially resulting in infection (42% experienced infection) and an increased rate of amputations (38.5% for minor amputations and 8.44% for major amputations)

BMI — body mass index; CHW — community health worker; DFU — diabetic foot ulcers; DM — diabetes mellitus; DSMES — diabetes self-management, education and support; FBG — fasting blood glucose; HbA1c — hemoglobin A1c; HTN — hypertension; MO — military operations; NCD — non-communicable diseases; PAD — peripheral occlusive artery disease; PHC — primary health care center; SEM — structural equation modeling; T2D — type 2 diabetes; TG — triglycerides

Diabetes outcomes

Five studies described the impact that exposure to war and conflict can have on glycemic outcomes for individuals living with diabetes, particularly examining how exposure may affect an individual's fasting glucose levels and HbA1c before, during, and after a conflict event.

Three studies reviewed patients with type 2 diabetes (T2D) relating specifically to glycemic outcomes. Findings from one study demonstrated that people living with diabetes experienced an elevated mean HbA1c during war, with an increase from 7.7 (61 mmol/mol) (SD 1.9) before the war to 9.4 (80 mmol/mol) (SD 2.4) (p-value: < 0.001) during the war, compared to those with no diabetes diagnosis or those with low risk [10]. In another study, investigators sampled various biometrics during a spike in political violence in Ethiopia, and found that individuals without diabetes had a lower mean HbA1c compared to those with diabetes (6.06 vs. 8.8) [11]. One small study (n = 35) noted a slight increase (9.13 to 9.53) in HbA1c among individuals with T2D exposed to war for 3 months; however, this change in HbA1c was not significant [12].

One study [13] found exposure to stressful circumstances related to military operations (MO), particularly living in close proximity, to be associated with increased fasting glucose levels, with an increased effect on individuals living with diabetes. Glucose levels were 1.29% higher (95% CI 0.63%; 1.96%) during MO among people without diabetes, and 3.35% higher (95% CI: 1.23%; 5.52%) during MO among people living with diabetes who were treated with glucose-lowering medications. Additionally, when data was collected from 1577 Syrian refugees living with diabetes, only 6% were found to have controlled diabetes, which was defined as participants having an HbA1c% of less than 7. Most refugees (94%) had uncontrolled HbA1c, which has the potential to lead to long-term complications [14].

Self-management of diabetes and quality of life

Three studies examined how exposure to the direct and indirect effects of war and conflict may lead to negative implications for diabetes self-management and care, leading to a diminished quality of life. Researchers assessing diabetes self-management, education, and support (DSMES) among adult Syrian refugees seeking care for diabetes at a medical humanitarian organization found that individuals diagnosed during the conflict were significantly more likely to have lower DSMES score compared to those who were previously diagnosed after controlling for confounders in multi-variable regression modeling [15]. In a qualitative study,

[16] aboriginal populations shared their perspective on barriers that negatively affect their self-management of diabetes as it related to structural violence including cultural safety, health literacy, colonialism, and multigenerational trauma. One physician noted that "[These patients] know what they need to do – but they cannot identify what stops them from acting — they know they must exercise, watch their diet, and take their medications, but sometimes perhaps due to their busy lifestyles, or problems in the extended family or preexisting social issues are blocking them so they cannot make (self-management) a priority." In a matched case-control study implementing health-related quality of life (HRQOL) analysis, researchers found that individuals living with diabetes in refugee camps scored significantly lower in all 4 domains of physical health (36.7 vs. 75.9), psychosocial (34.8 vs. 70.0), social relationships (52.4 vs. 71.4), and environmental (23.4 vs. 36.2) compared to those living without diabetes on a 100-point scale [17]. These results suggest that individuals with diabetes living in refugee camps experience a lower quality of life compared to those living without diabetes.

Access to healthcare and medication usage

Studies also described, through various methods, the impact of war and conflict on healthcare services and medication access and usage. Five studies used cross-sectional and secondary data analysis methodologies to review the impact on healthcare access. The first study analyzed medication use among Syrian refugees in Lebanon for a variety of non-communicable diseases (NCD), including diabetes. Researchers found that while access to medications was high, interval medication interruptions occurred due to financial barriers and a lack of knowledge of where to buy medications. Additionally, females who were diagnosed with diabetes before being displaced were more likely to take medications (87.5%) compared to those who were diagnosed after displacement (63%) [18]. The second study found that among Syrian refugee populations living with diabetes, 26.8% of individuals 18 years old and above had missed a medication dose in the past week, and about 18% of individuals taking medication reported taking a smaller dose to prolong their supply. Of the refugee population living with diabetes, 49.1% sought care in the last month for diabetes. For those who did not receive care, the main reported barrier was cost, including transportation and lost time [19]. Another study highlighted the inequity in treatment for Syrian refugees, especially females and older adults when comparing Lebanese and Syrian refugees. Lebanese people living with diabetes had more access to educa-

tion, nutrition, and diabetes management compared to their counterparts, and they received significantly more advice on diabetes management compared with Syrians in a health service setting (85.2% vs. 55.5%) [20]. Finally, 2 studies described the need for continued care and effects on health care bandwidth among refugees. In a survey of Syrian refugees, 84.7% had received care in Jordan upon fleeing their country, emphasizing the importance of continuing care for those with NCD and demonstrating an increasing burden on the existing health care system [21]. Researchers examined health-care service utilization in conflict-recovering South Kivu province, eastern DR Congo; findings demonstrated that most people (82%), including those who self-identified as having diabetes, utilized healthcare services during times of conflict, suggesting that this greater need for services requires increased availability and quality of care [22].

Two studies utilized a cohort design. One study showcased the decline in clinic visits among people living with diabetes in refugee camps in the first three years from 72% to 61% and an increase in loss to follow-up from 9% to 29% [23]. Another study emphasized the importance of community health workers (CHW). Using a matched retroactive cohort design, researchers found that refugees with access to CHW saw a greater decline (1.4 points) in their HbA1c values compared to those without access (95% CI -0.66 , -2.1 ; $p < .001$), suggesting that refugees without access to care may experience higher HbA1c values [24].

Five studies utilized patient interviews to understand the impacts of war and conflict on healthcare and medication access. In one study, researchers interviewed patients with NCD, including diabetes, and examined their experience with drug shortages, insecurity, and inability to afford privately sold medications. All interviewed patients in conflict-affected settings had completely or partially lost access to care when a city in Iraq was occupied by the Islamic State group, and 100% of respondents reported cost and availability of drugs to be barriers to access [25]. One study assessed patient-reported barriers to glycemic control among adults (≥ 18 years old) with previously diagnosed diabetes in a clinic in the south of Iraq where war has caused damage to healthcare infrastructure. People living with diabetes declared that causes for poor glycemic control were most likely related to no drug supply or a shortage of drugs (50.8%), the cost of drugs (50.2%), and migration (30%) [26]. Another study examined patients in a very different context by interviewing indigenous people living with T2D in Canada on their healthcare experiences. Participants reflected on experiences in their past relating to residential schools

and mentioned that memories can be easily triggered in clinical encounters when doctors are too authoritarian, making participants feel “tired of being told what to do.” One participant related such experiences to what physicians sometimes label “noncompliance,” noting that physicians often “can’t figure out why [people living with diabetes] are doing a certain thing, or why they’re not looking after their sugar properly.” People living with diabetes revealed that their healthcare was impacted by the colonial legacy and related perpetuation of inequities in medical care and denial in services and treatment [27]. Researchers facilitated interviews in Syrian refugee households living in Lebanon to better understand care seeking behaviors and reasons for interruptions in care. Refugees living with diabetes were most likely to select facilities to seek care based on financial reasoning (78.4%, CI: 69.1–85.5%), whereas residents of Lebanon were most likely to select care based on the care quality and provider factors (50.8%, CI: 42.1–59.4%). Additionally, 25% (CI: 9.5–51.3) of the population reported stopping medication for 2 weeks or more due to costs (76.5%, CI: 57.8–88.5) [28]. Another study highlighted that post-immigration stress, lack of social network, and cost can negatively impact diabetes outcomes and result in gaps of care or loss of follow-up. One individual stated “They tell me to buy diabetes supply... So I go to the pharmacy and they say it costs me about 90 bucks and bring like that. No coverage. I have to pay. But that time I don’t got money in my pocket, so I say I have to wait until I get the pension coming.” Barriers such as physician shortages, geographic isolation, appointment time allocation, and healthcare worker turnover or continuity of care impacted healthcare experience [29].

Finally, one study investigated the impact of war and conflict on refugees with diabetes with foot complications. The results of this study demonstrated that this population is at an increased risk of medical neglect during war and conflict, with 42% experiencing infection, 38.5% requiring a minor amputation, and 8.44% requiring a major amputation [30].

Discussion

Clinical and policy implications

This review provided a limited number of articles on this specific topic. Analytic methods varied, ranging from qualitative to cross-sectional methodologies. Several studies examined the impact of war and conflict and its effects on glycemic outcomes among those living with diabetes. Some studies found links to increased mean HbA1c during war, particularly among older adults, higher risk of long-term complications for those diagnosed during conflict, and unfavorable gly-

emic outcomes for individuals living in refugee camps after having fled a war zone [11, 14, 15].

Additionally, a few studies examined the impact that stress related to structural violence may have on diabetes self-management. Exposure to this kind of stress was associated with increased fasting glucose levels and a decrease in self-management due to identified barriers such as cultural safety, health literacy, colonialism, and multigenerational trauma [13, 16, 17].

Many studies described the impact of war and conflict on healthcare services and medication access including patterns of healthcare utilization during and following war or conflict, inequity in treatment for refugees, drug shortages, insecurity, and inability to afford privately sold medications, and loss of access to care as barriers in conflict settings [18, 20–25, 27–29].

Many of the articles focused on people with T2D. Additionally, many of the listed articles describe the immediate or short-term outcomes (during or up to 5 years post-conflict) of structured violence.

Related topics not explored in this manuscript include the impact of neighborhood-level violence or crime, mirroring similar results found in this study. Tung et al. [31] found that people living with diabetes exposed to community violence had a more difficult time managing chronic conditions. Additionally, Smalls et al. [32] demonstrated that social support and access to healthy foods were significantly associated with diabetes self-care compared with exposure to neighborhood violence, which was not.

Factors predisposing people living with diabetes to deteriorated access to care in conflict settings included mass displacement, medication storage constraints, and disrupted communication between patients and care teams. Healthcare workers are often re-positioned to focus on trauma events during high-conflict settings, and financial challenges and disrupted healthcare supply lines made it extremely difficult for patients to receive more routine care and life-saving supplies [33]. Lack of access to education, medication, and routine care are reported to lead to a higher prevalence of diabetes ketoacidosis (DKA) and lower diabetes compliance in rural and high-conflict settings [34].

Disruptions in food distribution, housing, routine medical care, medications and supplies, and psychosocial care make it nearly impossible for people living with diabetes to manage diabetes effectively [35]. Limited access to insulin in a high stress environment has been shown to cause an increase in HbA1c [10]. These negative impacts can be greatly felt by displaced individuals who are living in refugee camps experiencing even greater interruptions and barriers to care [17, 20, 21, 23, 24, 28].

Long-term solutions that may mitigate these adverse effects during or after exposure to war or conflict would be improved by policies addressing the root causes of war and conflict [35]. The healthcare sector has a role to play in advocating for peace, including “preventing or mitigating the outbreak, escalation, continuation, and recurrence of conflict and addressing its root causes and drivers, including health inequity” [36]. Advocacy efforts can support conditions for people living with diabetes exposed to conflict. Organizations such as the American Diabetes Association (ADA) advocate for access to affordable and evidence-based insulin preparations for all people living with diabetes [37]. Providers in Lebanon are calling on advocacy efforts for more affordable insulin delivering devices, particularly insulin pen injection devices, especially for individuals in humanitarian settings [38]. ADA in collaboration with organizations such as DEFA (Diabetes Education for All) and iADA (international Alliance for Diabetes Actions) put forth resources including insulin switching guides and healthcare professional and patient-facing capacity building and education focusing on conflict and low-income settings [39]. Nonprofit organizations are also aiding in providing diabetes care and supplies for those in areas of war and conflict [40]. These efforts can help to increase access to care in conflict-ridden and post-conflict environments.

While peace advocacy would be most impactful, addressing the direct, short-term impacts of war and conflict on people living with diabetes would support glycemic outcomes, management, and sustained access to healthcare. Having CHW present has been documented to show improvements in glycemic outcomes among people living with diabetes who are living in refugee conditions [24]. Additionally, the potential role of medical students to fill gaps in medical workforce shortages during humanitarian crises is currently being explored as an approach to further assist individuals during war and conflict scenarios [41]. Involvement in support groups to share on stress, diabetes-related complications, and lack of resources is beneficial for people living with diabetes to lessen the emotional and mental burden [42]. War and conflict can, understandably, minimize prioritization of healthcare and quality of life needs for people living with diabetes. In disruptive scenarios like war, the limited articles that met inclusion criteria for this review suggest a need for continuity of healthcare, reliable sources of medication, and customized support for people living with diabetes who have experienced this kind of stress.

Future direction

The search terms of this paper were limited to “war” and “conflict” that were openly and clearly defined as such. Related but less explicit or colloquially defined as structural violence related to colonialism and structural racism against indigenous populations may illuminate similar impacts on people living with diabetes through stress, historical trauma, and impacts on social determinants of health. Future research should continue investigation of the impact of structural violence on these communities, as well as sharing of best practices to support optimal glycemic outcomes in indigenous populations. Additionally, limited evidence exists to show the intergenerational impact of colonialism and trauma on diabetes self-management.

Recent global developments significantly influence individuals living with diabetes, and ongoing research is deepening our understanding of how events like the COVID-19 pandemic, climate change, and war and conflict affect people living with diabetes. The need for immediate attention and support for advocacy efforts pushing policy changes addressing the cost and other barriers that are adversely affecting the needs of individuals living with diabetes in war and conflict settings is crucial.

Strengths and limitations

Strengths of this study include the fact that the authors conducted a structured review process to identify current literature on this topic with a long study period. Limitations of this study include the small sample size of identified studies. Due to the lack of variety and quantity of different study methodologies, the quality of evidence could not be appraised. Only publications in English were considered; it is possible that studies on this topic may have been published in other languages.

Conclusions

The effects of war and conflict on people living with diabetes are profound and multifaceted, directly influencing their glycemic control and other health outcomes, and indirectly affecting individuals through social determinants of health (SDOH), access to care, and availability of medications. There is a pressing need for more extensive research to fully comprehend the nuances of this relationship and to unravel the long-term consequences, both over individual lifespans and across generations, of war and conflict on the health and well-being of people living with diabetes.

Article information

Author contributions

O.E conceptualized the manuscript. E.O., H.H., and A.M. wrote the draft manuscript and performed the review. All authors critically reviewed and approved the final version. E.O is the guarantor of this work and takes responsibility for the integrity of the data and the accuracy of the data analysis.

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Conflict of interest

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