

Differences in Diabetes Care Among Healthcare-Seeking Participants in Damascus and Homs, Syria: A Facility-Based Cross-Sectional Comparative Study

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Research Article

Keywords: Diabetes mellitus, Syria, conflict-affected healthcare, HbA1c, health inequities, global health

Posted Date: August 27th, 2026

DOI: <https://doi.org/10.21203/rs.3.rs-10380723/v1>

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Additional Declarations: No competing interests reported.

Abstract

Background:

Protracted conflict in Syria has severely disrupted healthcare delivery, with substantial regional variation in its impact. Although Damascus has retained comparatively functional healthcare services, Homs has experienced cumulative infrastructure damage and socioeconomic deterioration during conflict years. No previous studies examining geographic disparities influence on diabetes care particularly medication availability and HbA1c follow up. This study aims to explore these disparities among diabetic participants in a humanitarian setting.

Methods:

Facility-based cross-sectional study using consecutive total sampling of among 273 participants with physician-diagnosed diabetes attending humanitarian clinics in Homs (n = 171) and Damascus (n = 102), Syria, in November 2025. Data on sociodemographic characteristics, medication access, and HbA1c were collected using a standardised electronic questionnaire. Group differences were analysed using chi-square, Fisher's exact, and Mann–Whitney U tests, with multivariable logistic regression to control for confounding.

Results:

Participants in Homs were older and significantly less likely to be employed than those in Damascus. Despite reporting shorter travel times to healthcare facilities and greater access to oral diabetes medications, Participants in Homs were more likely to report receiving no pharmacological treatment compared to participants in Damascus (8.8% vs 1.0%). Among participants with available HbA1c data, mean HbA1c levels exceeded 7.5% in both regions, suggesting suboptimal glycaemic control among those with available measurements. A substantially greater proportion of participants in Homs lacked recent HbA1c measurements, suggesting potential gaps in diabetes monitoring and diagnostic capacity. Medication affordability was low in both regions and did not differ significantly between groups. Although exploratory, multivariable regression model analysis showed participants in Homs had a strong association with unavailable treatment and missing HbA1c.

Conclusions:

Geographic differences in diabetes care among healthcare-seeking diabetic participants in Damascus and Homs appear to extend beyond physical access to healthcare facilities. Participants in Homs reported greater access to oral diabetes medications yet were more likely to receive no pharmacological treatment, highlighting potential barriers related to affordability, continuity of care, or healthcare system

capacity. Strengthening diagnostic services and ensuring affordable medications may improve diabetes outcomes in humanitarian settings.

Trial registration

Not applicable.

Introduction

Diabetes mellitus is a chronic condition that requires sustained access to healthcare services, uninterrupted availability of essential medications, and ongoing patient education to prevent acute complications and long-term morbidity.[1–3] Effective diabetes management relies on pharmacological treatment, regular clinical follow-up, self-monitoring of blood glucose, and early detection of complications.[1, 2] In stable healthcare systems, poor glycaemic control is associated with increased hospitalisation rates and a higher burden of microvascular and macrovascular complications.[3, 4] Maintaining continuity of diabetes care becomes considerably more challenging in conflict-affected settings, particularly among vulnerable populations.[5, 6]

Since 2011, Syria has experienced a protracted conflict that has profoundly disrupted its healthcare system.[6, 7] Damage to healthcare infrastructure, shortages of trained healthcare workers, interruptions in medical supply chains, population displacement, and deteriorating socioeconomic conditions have collectively undermined the delivery of chronic disease care.[6, 7] Humanitarian responses have largely prioritised acute trauma and communicable diseases, often leaving non-communicable diseases such as diabetes comparatively neglected.[5, 8] Consequently, inadequate diabetes care in conflict settings contributes to preventable complications, avoidable hospital admissions, and excess mortality.[4, 5]

The impact of conflict on healthcare infrastructure has varied substantially across Syria.[6, 7] Differing historical levels of conflict-related healthcare disruption reported in previous literature. [6–9] Some regions experienced extensive destruction, whereas others remained relatively functional health services.[6] Homs was among the city's most heavily affected by prolonged conflict, with damage to hospitals, primary healthcare facilities, and medical supply networks.[7] These disruptions, combined with economic decline and population displacement, have limited access to essential medications, including insulin.[7, 9] Damascus generally experienced less healthcare infrastructure disruption than Homs according to published reports and continuity of care throughout much of the conflict period.[6, 7]

Previous studies of diabetes in conflict-affected populations have primarily focused on prevalence estimates, displacement-related barriers to care, or descriptive accounts of healthcare disruption.[5, 8] Few studies have simultaneously evaluated medication access, treatment adherence, and objective measures of glycaemic control.[5, 8] Furthermore, HbA1c—an essential indicator of long-term glycaemic control—is infrequently reported in conflict settings because of limited diagnostic capacity and data availability.[5] Consequently, the relationship between structural barriers to care and measurable clinical

outcomes remains poorly understood.[5,8,] Incorporating these factors into analyses of diabetes care is essential for understanding real-world barriers to effective disease management.[10]

Comparative analyses between regions with differing levels of healthcare disruption remain scarce. Few studies have leveraged within-country geographic variation to examine how conflict intensity and healthcare-system preservation translate into differences in diabetes care and outcomes.[11–13]

This study addresses these gaps by comparing diabetes care among participants attending humanitarian temporary clinics operated by Atlantic Humanitarian Relief (AHR) in Damascus and Homs governorates, Syria. By examining two regions with differing levels of conflict-related healthcare disruption, we aimed to explore geographic disparities in diabetes care among diabetic participants attending AHR clinics in a humanitarian setting. We hypothesised that participants attending clinics in Homs would demonstrate poorer continuity of diabetes care and lower medication availability than participants attending clinics in Damascus.

Methodology

Study Design and Setting

We conducted a facility-based cross-sectional study using consecutive total sampling of all eligible Participants attending humanitarian temporary clinics operated by Atlantic Humanitarian Relief (AHR) in Damascus and Homs governorates, Syria, during November 2025. The study aimed to evaluate diabetes care among healthcare-seeking individuals living in two governorates that experienced differing levels of conflict-related healthcare disruption.

A total of 3,043 participants attending AHR clinics were screened for eligibility. Of 3,043 participants attending AHR humanitarian clinics during November 2025, 275 (9.0%) had a physician diagnosis of diabetes mellitus. Two participants with gestational diabetes were excluded per the pre-specified exclusion criteria. No eligible participants declined to participate. A total of 273 participants were enrolled and included in the final analysis: 102 from Damascus and 171 from Homs (Fig. 1).

Security and logistical constraints limited access to several locations within both governorates. Because no published estimates were available for humanitarian clinic populations in Syria, all eligible diabetic participants were recruited during the study period which indicated a diabetes proportion of approximately 9% among participants. All eligible participants attending participating clinics during the study period were enrolled, yielding a census sample of the target population.

To maximise geographic and socioeconomic diversity, recruitment was conducted in both urban and semi-urban/rural settings. In Damascus governorate, participants were recruited from Altamayouz (urban), Al Zabadani, and Kafr Batna (semi-urban/rural). In Homs governorate, recruitment took place in Al Bayada (urban), Al Furqulus, Mheen, and Ter Maela (semi-urban/rural) (Fig. 2).

Inclusion Criteria

Participants were eligible if they met all of the following criteria:

1. Physician-diagnosed diabetes mellitus, confirmed through medical records or participant reports.
2. Attendance at an AHR humanitarian clinic during November 2025.
3. Diagnosis of type 1 diabetes mellitus, type 2 diabetes mellitus, or another/uncertain diabetes subtype.
4. Residency in Damascus or Homs governorate for at least six months before enrolment.
5. Provision of informed consent by the participant or legal guardian.

Both adult and paediatric participants were eligible for inclusion.

Exclusion Criteria

Participants were excluded if they met any of the following criteria:

1. Absence of a diabetes diagnosis.
2. Gestational diabetes.
3. Cognitive impairment prevents informed consent and the absence of an available legal guardian.

Data Collection

Data were collected by the research team utilizing a standardized electronic questionnaire administered via an electronic form. The questionnaire was adapted from the WHO STEP wise approach to NCD risk factor surveillance. When medical records were unavailable, diabetes diagnosis was based on participant reports of a previous physician diagnosis but verification rates were not systematically recorded. These data were self-reported, previous laboratory tests within six months and independently verified. HbA1c measurements were obtained from participant-held laboratory reports irrespective of testing provider. Because updated population registries were unavailable in the conflict-affected setting, probability-based sampling was not feasible. Therefore, consecutive total sampling of all eligible participants was used. To minimise selection bias, recruitment was conducted consecutively throughout all clinic sessions during the study period.

Ethical Considerations

This study was conducted in accordance with the principles of the Declaration of Helsinki. Due to the post conflict setting and the absence of clear functional institutional ethics committee infrastructure in Damascus and Homs during the data collection period (November 2025), prospective ethical review could not be obtained prior to study commencement. Ethical approval was subsequently obtained from Aleppo University Faculty of Medicine (approval number 2611; date: 03 June 2026), which retrospectively reviewed the study protocol, data collection procedures, consent process, and data handling arrangements and confirmed compliance with applicable ethical standards. All participants provided verbal and electronic informed consent prior to enrolment. For paediatric participants, consent was obtained from a parent or accompanying legal guardian. Participants were informed that declining

participation would not affect their access to healthcare services. All data were anonymised at point of collection.

Statistical Analysis

We analysed the data using descriptive and inferential statistical methods. Categorical variables were summarised as frequencies and percentages and compared between participants in Damascus and Homs using Pearson's chi-square test or Fisher's exact test where appropriate. Continuous variables were summarised as means with standard deviations or medians with interquartile ranges, depending on data distribution. Normality was assessed using the Shapiro–Wilk test. Comparisons of continuous variables between groups were performed using independent-samples t-tests for normally distributed data and Mann–Whitney U tests for non-normally distributed data. HbA1c data were unavailable for 57.1% of participants overall, with a higher proportion of missing values in Homs. Consequently, analyses involving HbA1c were restricted to complete cases and analyses should be regarded as secondary exploratory findings. Missingness of HbA1c was considered likely to be Missing Not at Random (MNAR), making multiple imputation potentially inappropriate.

Bivariate associations were evaluated using independent t-tests for continuous data (age) and Fisher's Exact Tests for categorical data due to small cell sizes. To isolate independent effects and control for confounding, multivariable binary logistic regression models were constructed for two primary outcomes: untreated status ($n = 16$ vs. treated, $n = 257$) and missing HbA1c data ($n = 159$ vs. available, $n = 114$). In untreated status, only 2 variables are included in the analysis as the number of events is 16 and the conventionally recommended threshold is 10. Covariates for inclusion in multivariable models were selected a priori based on clinical plausibility and their known or theoretical associations with treatment receipt and HbA1c monitoring in conflict-affected settings: age (as a continuous variable, given significant between-group differences), sex, employment status (as a proxy for socioeconomic position), and distance to healthcare facility (as a proxy for physical access). Statistical significance was set at a two-tailed $p < 0.05$.

Variables and definitions

The primary outcome was Lack of pharmacological treatment (no current use of insulin or oral hypoglycaemic agents)

Secondary outcomes included

- glycaemic control, assessed using HbA1c as a continuous variable and categorised as controlled ($< 7.5\%$) or uncontrolled ($\geq 7.5\%$).
- Presence of self-reporting diabetes-related complications (microvascular and macrovascular)

Key explanatory variables included medication access, medication affordability, healthcare access, and sociodemographic characteristics.

Medication affordability was defined as self-reported ability to purchase prescribed diabetes medications either “all the time” or “some of the time” considered affordable or “not at all” considered unaffordable during the previous three months. Missing responses accounted for less than 2% and were handled by complete-case analysis.

Employment was defined as engagement in any income-generating activity during the preceding 30 days, including salaried employment, self-employment, or daily wage work.

Access to clean water was defined as availability of piped or bottled drinking water within 500 metres of the participant's residence. Food security was defined as not skipping meals because of insufficient resources during the previous month.

Medication access was defined as the reported availability of insulin or oral diabetes medications either consistently or most of the time at the participant's usual source of care during the preceding three months, irrespective of affordability. Missing responses were conservatively classified as lack of access.

Any missing value in access to glucometer, oral medication and insulin were considered not accessible. The total number of missing value does not exceed 3 participants

The HbA1c values are taken for previous Laboratory tests within six months by the participants.

Results

Sample description

A total of 273 participants with diabetes mellitus were included in the analysis, comprising 102 participants from Damascus and 171 from Homs. These participants were identified from 3,043 individuals attending AHR humanitarian clinics during November 2025, corresponding to a diabetes proportion of 8.97% among clinic participants (Fig. 1). Participants were recruited from multiple sites across Damascus and Homs governorates to ensure geographic diversity. In Damascus, recruitment occurred in Altamayouz (urban; n = 67), Al Zabadani (n = 18), and Kafr Batna (n = 16). In Homs, participants were recruited from Al Bayada (urban; n = 127), Mheen (n = 17), Al Furqulus (n = 15), and Ter Maela (n = 15) (Fig. 2). As participants were recruited from humanitarian clinics rather than the general population, findings should be interpreted as representative of healthcare-seeking individuals attending these services rather than the wider population of Syria.

Demographic and Socioeconomic Characteristics

Significant differences were observed between participants from Damascus and Homs (Table 1). Participants in Homs were significantly older than those in Damascus (mean age 58.69 ± 8.59 years vs 49.15 ± 13.0 years; $p < 0.001$). Females constituted the majority of participants in both governorates; however, the proportion of male participants was significantly higher in Homs (43.9% vs 21.6%; $p < 0.001$). Participants from Homs were more likely to reside in urban areas (31.2% vs 19.6%; $p = 0.034$), be married (72.5% vs 44.1%; $p < 0.001$), Educational attainment differed significantly between governorates, with a greater proportion of participants from Homs reporting higher education. ($p = 0.012$). In contrast, employment was substantially lower among participants in Homs, where only 19.2% reported employment compared with 44.9% in participants in Damascus ($p < 0.001$). Significant differences were also observed in selected social determinants of health. Access to clean water and adequate food supplies was more frequently reported by participants in Homs than in Damascus (73.7% vs 43.1%; $p < 0.001$). Smoking prevalence and physical activity levels did not differ significantly between governorates (Table 1)

Healthcare Access, Medication Availability, and Affordability

Participants from Homs reported substantially shorter travel times to healthcare facilities than those from Damascus. More than one-third of participants in Homs lived within 10 minutes of a healthcare facility compared with 11.8% of participants in Damascus ($p < 0.001$). Access to oral diabetes medications was significantly higher in Homs than in Damascus ($p < 0.001$). However, access to insulin and glucometers did not differ significantly between governorates ($p = 0.573$ and $p = 0.292$, respectively). Medication affordability remained low in both settings. Only 12.7% of participants in Homs and 15.7% in Damascus reported that diabetes care was affordable, with no statistically significant difference between governorates ($p = 0.485$) (Table 2).

Diabetes Management

Oral glucose-lowering medications were the most common treatment modality among participants in both governorates, accounting for 55.9% of treatment strategies in Damascus and 56.1% in Homs (Figs. 3 and 4). In Damascus, participants took oral medication followed by combined insulin and oral therapy (19.6%) and insulin monotherapy (22.5%). In Homs, participants took insulin monotherapy and combination therapy accounted for 18.7% and 9.9% of treatment strategies, respectively. A notable difference was observed in the proportion of participants receiving no pharmacological treatment. Only 1.0% of participants in Damascus reported receiving neither insulin nor oral diabetes medication, compared with 8.8% in Homs.

Clinical Outcomes

Type 2 diabetes mellitus was the predominant diabetes subtype in both governorates (Table 3). Participant-reported microvascular complications, including retinopathy and neuropathy, were frequently reported in both cohorts. Participants from Homs reported numerically higher rates of cardiovascular disease, although the difference was not statistically significant.

HbA1c data were unavailable for 156 of 273 participants (57.1%), with a significantly higher proportion of missing values in Homs compared with Damascus (64.3% vs. 45.1%; $p = 0.003$, chi-square test). Given the non-random pattern of missingness – differential by geographic location – analyses involving HbA1c were restricted to complete cases and are presented as secondary exploratory findings. Multiple imputation was not performed given the exploratory nature of these analyses and the high proportion of missing data, which would require strong distributional assumptions inappropriate to this setting. Results involving HbA1c should be interpreted with corresponding caution. Among participants with available HbA1c measurements, mean HbA1c values exceeded 7.5% in both governorates, indicating suboptimal glycaemic control. Mean HbA1c was $8.30 \pm 1.85\%$ among participants in Damascus and $8.00 \pm 1.22\%$ among participants in Homs ($p = 0.359$). A substantial proportion of participants lacked recent HbA1c measurements, particularly in Homs.

Factors Associated with no treatment and missing HbA1c results.

In the multivariable analysis evaluating the factors associated with a complete lack of diabetic treatment (table S 1) including only 2 variables included in the analysis as number of events is 16 and the conventionally recommended threshold is 10. Place of residence approached, but did not reach, statistical significance, with Homs's participant showing a strong trend toward higher odds of being untreated aOR 7.563 (95% CI 0.877–65.187; $p = 0.060$). Age was not significantly associated with treatment status ($p > 0.05$).

In the multivariable model evaluating missing HbA1c data (table S 2), biological sex and diabetes treatment status were identified as non-significant predictors. Male participants demonstrated significantly lower adjusted odds of having missing HbA1c records compared to female participants (aOR = 0.470; 95% CI: 0.268–0.825, $p = 0.009$). Conversely, untreated participants exhibited a higher likelihood of missing HbA1c data compared to their treated counterparts aOR 11.808 (95% CI 1.410–98.880; $p = 0.023$). Both increasing participants age aOR 1.018 (95% CI 0.999–1.03; $p = 0.053$) and living in Homs aOR = 1.750 (95% CI 0.992–3.086; $p = 0.053$) narrowly missed the threshold for strict statistical significance, demonstrating a marginal trend toward data missingness. Employment status and distance to care were not predictive.

Discussion

The diabetes proportion identified among AHR clinic participants (8.97%) is lower than reported national prevalence estimates for Syria (approximately 13–17% per IDF Atlas data), likely reflecting the specific healthcare-seeking population attending humanitarian clinics and possible under-diagnosis in conflict-affected areas rather than a genuinely lower burden. Although the findings are not generalisable beyond

humanitarian clinic participants, they provide insight into potential inequities in diabetic care access, treatment availability, and HbA1c follow up in a conflict-affected setting.

The Access-Care relationship in Homs

Healthcare-seeking diabetic participants attending AHR clinics in Homs were more than four times as likely to live within 10 minutes of a healthcare facility than participants in Damascus. This finding may partly reflect the concentration of humanitarian services in accessible urban locations and areas targeted for healthcare recovery initiatives.[15] Despite shorter travel times, participants attending AHR clinics in Homs were substantially less likely to have recent HbA1c measurements available. Nearly two-thirds of healthcare-seeking diabetic participants attending AHR clinics in Homs lacked documented HbA1c results, compared with fewer than half of participants in Damascus. The absence of recent HbA1c measurements may indicate interrupted chronic disease surveillance, limited laboratory availability, or a combination of these factors.[16–18] Interpretation of HbA1c-related findings requires caution should be regarded as secondary exploratory findings. Diabetic Participants attending AHR clinics with available HbA1c measurements likely represent individuals with greater healthcare engagement and access to diagnostic services, introducing potential ascertainment bias. Furthermore, the high proportion of missing data may limit the validity of comparisons between participants in two governorates.

Socioeconomic Barriers and Untreated Diabetes

A particularly important finding was the substantially higher proportion of participants receiving no pharmacological treatment among healthcare-seeking diabetic participants attending AHR clinics in Homs compared with participants in Damascus (8% vs 1%). This disparity is unlikely to be explained solely by medication availability, as healthcare-seeking diabetic participants attending AHR clinics in Homs reported significantly greater access to oral diabetes medications. Instead, the findings may suggest that socioeconomic barriers such as employment may partially explain an important role in treatment utilisation. Employment rates were considerably lower amongst healthcare-seeking diabetic participants attending AHR clinics in Homs, potentially reflecting reduced household income and diminished capacity to purchase medications despite their reported availability. Previous studies from Syria and other conflict-affected settings in the region (i.e.: Gaza) have similarly identified affordability as a major determinant of treatment adherence and continuity of care for chronic diseases.[9, 19] However, healthcare-seeking diabetic participants attending AHR clinics in Homs were significantly older than those in Damascus, which may have contributed to differences in treatment patterns, self-reported complication burden, employment status, and glycaemic outcomes.

Demographic Vulnerability and Chronic Disease Care in Conflict Settings

Healthcare-seeking diabetic participants attending AHR clinics in Homs were significantly older and demonstrated a higher rate of cardiovascular disease than those in Damascus. This pattern may reflect

demographic shifts commonly observed in conflict-affected settings, whereby younger and healthier individuals are more likely to migrate, while older individuals with chronic illnesses remain in areas experiencing prolonged disruption.[21] The substantially older age profile of healthcare-seeking diabetic participants attending AHR clinics in Homs may partially explain the greater burden of untreated diabetes and cardiovascular disease observed in this cohort especially in humanitarian aid seeking populations.

Among healthcare-seeking diabetic participants attending AHR clinics with available HbA1c measurements (n = 114), mean HbA1c levels exceeded 7.5% in participants in both governorates, indicating generally suboptimal glycaemic control. However, the substantial proportion of missing HbA1c data, particularly amongst participants in Homs, limits interpretation of these findings and raises the possibility of selection bias. Humanitarian health responses have historically prioritised acute trauma, communicable diseases, and maternal-child health services. The findings of this study highlight the ongoing burden of non-communicable diseases among older populations residing in conflict-affected areas and emphasise the importance of incorporating chronic disease management into long-term health system recovery strategies.[5, 22]

Implications for Health System Recovery

The geographic differences observed among healthcare-seeking diabetic participants attending AHR clinics in Damascus and healthcare-seeking diabetic participants attending AHR clinics in Homs may reflect a combination of healthcare infrastructure disruption, socioeconomic disadvantage, and reduced diagnostic capacity rather than a single underlying factor. Strengthening diabetes care in post-conflict settings therefore requires a multidimensional approach. Efforts to improve diabetes outcomes may benefit from the development of standardised national non-communicable disease programmes that integrate medication provision, laboratory monitoring, participants follow-up, and self-management education.[23] Expanding access to affordable diabetes medications through centralised procurement mechanisms, while simultaneously strengthening decentralised diagnostic services and routine follow-up systems, may help reduce treatment gaps and improve continuity of care.[24, 25] Taken together, these findings suggest that improving diabetes outcomes in conflict-affected settings requires addressing affordability, continuity of care, and diagnostic capacity in addition to geographic access to healthcare facilities.

The findings of this study carry particular relevance in the context of Syria's evolving political landscape following the political transition of late 2024. As the country enters a period of potential health system reconstruction, evidence identifying specific gaps in chronic disease care — including inadequate monitoring capacity and treatment gaps in areas with historically greater conflict-related disruption — may directly inform prioritisation frameworks for health system recovery. Humanitarian organisations such as AHR, which currently fill critical gaps in primary care delivery, will be central to bridging the transition between emergency humanitarian response and the restoration of formal health system infrastructure.

Limitations

This study has several important limitations.

First, participants are recruited from humanitarian temporary clinics representing healthcare-seeking individuals rather than the general population of Damascus and Homs governorates. This sampling approach may have introduced **selection bias**.

Second, consecutive total sampling of all eligible participants was used due to population displacement, security constraints, restricted access to several areas, and the absence of updated population registries precluded probability-based sampling. Consequently, the findings may **not be generalisable** to all populations residing in conflict-affected Syria.

Third, a high proportion of unavailable HbA1c data, particularly in Homs, may have introduced selection bias and affected the validity of comparisons relating to glycaemic control. Participants with available HbA1c measurements likely had greater healthcare engagement and access to diagnostic services, further increasing the possibility of **ascertainment bias**.

Fourth, the **cross-sectional design** precludes assessment of temporal relationships and limits causal inference. Observed associations should therefore be interpreted as exploratory and hypothesis-generating.

Fifth, some observed differences may reflect **demographic differences** rather than healthcare-system factors alone. In particular, the older age profile of participants in Homs may partially explain differences in treatment utilisation, complication burden, and healthcare-seeking behaviour.

Finally, given the limited number of untreated participants, the regression analyses were exploratory and intended primarily to **assess robustness of observed associations** rather than to develop predictive models. Furthermore, the relatively small number of participants with available HbA1c measurements may have reduced statistical power and increased the risk of model overfitting in the multivariable regression analysis. Consequently, regression findings should be interpreted cautiously.

Collectively, these limitations may have introduced selection bias, information bias, and outcome misclassification, potentially affecting estimates of healthcare access and glycaemic control.

Conclusion

Among healthcare-seeking diabetic individuals attending humanitarian clinics in Syria, closer geographic proximity to healthcare facilities did not correspond to better indicators of diabetes care. Healthcare-seeking diabetic participants attending AHR clinics in Homs reported greater physical access to services but demonstrated higher levels of untreated diabetes and lower availability of HbA1c monitoring. These findings suggest that affordability, continuity of care, and diagnostic capacity may represent more important determinants of diabetes care than geographic access alone in conflict-affected settings.

Further population-based studies are needed to confirm these observations and guide post-conflict health-system recovery.

Declarations

Ethics approval and consent to participate

The study has retrograde IRB approval from Aleppo University - Faculty of Medicine no 2611 obtained in 03/06/2026, informed consent was obtained from all participants prior to enrolment, and strict data anonymization protocols were implemented to protect participant privacy. For paediatric participants, consent was obtained from a parent or accompanying legal guardian. This study was conducted in accordance with the principles of the Declaration of Helsinki.

Consent for publication

Not applicable. This manuscript does not contain data from any individual person in any identifiable form.

Availability of data and materials

The anonymised dataset supporting the conclusions of this article is available from the corresponding author upon reasonable request. Data cannot be publicly deposited due to the sensitivity of participant data collected in a conflict-affected setting and the need to protect participant confidentiality in accordance with the ethical approval conditions.

Competing interests

The authors declare no financial or non-financial competing interests.

Funding

No external funding was received for this study. Atlantic Humanitarian Relief (AHR) provided logistical support and access to humanitarian clinic facilities but had no role in study design, data collection, analysis, interpretation of results, or the decision to submit for publication.

Author Contributions

BA conceptualised and designed the study. HeA, BeA, OA, AfA, and BA contributed to methodology development, data curation, investigation, and formal analysis. BA, DA and ThA drafted the original manuscript. BA, HM, BS performed writing review and editing, and BA provided overall supervision. All authors read and approved the final version of the manuscript.

Acknowledgements

The authors thank Atlantic Humanitarian Relief (AHR) for facilitating access to humanitarian clinic facilities and for their logistical support during data collection by their research team. The authors are grateful to all participants who took part in this study and to the healthcare staff at AHR temporary clinics in Damascus and Homs.

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Tables

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