

# Effects of the October 2023 war on diabetes treatment and medication adherence in Gaza

Hatem A Hejaz<sup>1</sup>

<sup>1</sup>Faculty of Pharmacy, Arab American University, Jenin, State of Palestine (Correspondence to Hatem Hejaz: [hatem.hijaz@aaup.edu](mailto:hatem.hijaz@aaup.edu)).

## Abstract

**Background:** Diabetes management requires lifelong medical and medication supervision. The war in Gaza has worsened essential care for diabetes patients, disrupting access to treatment and medications and causing non-adherence.

**Aim:** To evaluate the effects of the October 2023 war on diabetes treatment and medication compliance in Gaza.

**Methods:** Between February and May 2024, this cross-sectional study collected data from 278 diabetes patients residing in Rafah, Gaza Strip. It analysed the impact of the war on access to care and medications and medication adherence.

**Results:** Access to health care facility had decreased from 90% before the October 2023 war to 22% at the time of the study, and medication adherence had decreased from 85% to 45%. Financial constraints severely impacted medication affordability (55% significantly, 37% moderately, 7% lightly, and only 1% not at all) and medication adherence (65% due to mild constraint, 40% due to moderate constraint and 15% due to high constraint).

**Conclusion:** Findings from this study indicate the need for accelerated assistance to rehabilitate health infrastructure and services in Gaza to guarantee continuous care for diabetic patients and patients suffering from other chronic diseases.

Keywords: diabetes, medication adherence, health care access, financial constraints, October 2023 war, Gaza

Citation: Hejaz HA. Effects of the October 2023 war on diabetes treatment and medication adherence in Gaza. *East Mediterr Health J.* 2025;31(4):268–273. <https://doi.org/10.26719/2025.31.4.268>.

Received: 17/09/2024; Accepted: 04/03/2025

Copyright © Authors 2025; Licensee: World Health Organization. EMHJ is an open-access journal. This paper is available under the Creative Commons Attribution Non-Commercial ShareAlike 3.0 IGO licence (CC BY-NC-SA 3.0 IGO; <https://creativecommons.org/licenses/by-nc-sa/3.0/igo>).

## Introduction

Medication adherence is the degree to which a person's behaviour corresponds with the agreed recommendations of the health care provider (1). It is a patient's active, voluntary adoption of an acceptable behaviour to achieve the desired therapeutic outcomes (2,3). Medication noncompliance causes unfavourable consequences and increased costs (2).

For more than 500 days Gaza has continuously experienced extreme humanitarian crisis, which has affected the health and wellbeing of its citizens, including those dealing with life-threatening conditions such as diabetes. The October 2023 war has worsened Gaza's humanitarian crisis, disrupting the delivery of health care services, including medication, and the physical and psychological costs of the crisis have been worsened by socio-political instability, which is characterized by violence, mass displacement and widespread destruction of health facilities (4–9). The destruction of hospitals, clinics and pharmacies has hindered access to essential diabetes medicines by disrupting the supply of medicines, causing financial constraints that severely affect care for diabetes patients (10–14).

Diabetes is a chronic condition that requires lifelong monitoring, supervision and treatment, and medication adherence is one of the most important aspects of its management. Disruptions to medication access and non-adherence to the recommended treatment plan can

worsen the disease and increase the risks of developing complications such as neuropathy, retinopathy and cardiovascular disorders, and increase health care costs. However, medication adherence in conflict areas is often affected by scarcity or non-availability of essential medicines, broken supply chains and financial constraints. Previous studies in conflict-affected areas confirm these challenges (15,16).

This study examined the effect of the October 2023 war on diabetes treatment adherence, it analysed patient data to identify key issues and suggests improvements to diabetes patient care in Gaza and similar conflict zones. Understanding how armed conflict impacts the management of chronic illnesses can inform policies to mitigate future crises.

## Methods

### Study design and participants

This was a cross-sectional study involving 278 diabetes patients in the Gaza Strip, selected from medical facilities and neighbourhood associations using convenience sampling. Diabetes diagnosis and consent to participate in the study were prerequisites for inclusion. Ethics approval was obtained from the appropriate authorities in the Gaza Strip, in addition to approval by the Institutional Review Board. All participants provided informed consent.

Data collection and analysis

Data was collected from Rafah residents and refugees between February and May 2024. Structured interviews were conducted using a questionnaire that included questions on key variables, including medication adherence (self-reported use of diabetic drugs as prescribed), healthcare access (availability and usability of facilities), medication availability (access to diabetic drugs), and financial constraints.

Descriptive statistics was used to summarise the study variables and demographic characteristics. Pearson's correlation coefficient was used to analyse the relationships between financial constraints, medication availability, healthcare access, and medication adherence ( $P < 0.01$ ). Correlation analysis was used to analyse other relationships such as the changes in adherence and healthcare access due to the war. Chi-square test was used to assess associations between the categorical variables, and t-test was used to compare the means where applicable. Logistic regression was used to identify factors significantly linked to medication non-adherence.

Results

A total of 278 patients participated in the study, mean age 54.3 years (SD = 12.7), 52% male. Of these, 35% had type 2 diabetes and 65% had type 1 diabetes. Twenty-five percent reported high income (>6000 ILS, ~US\$ 1650/month), 35% middle income (3000–6000 ILS, ~US\$ 820–1650/month) and 40% low income (<3000 ILS, ~US\$ 820/month) (Table 1).

Table 1. Demographic characteristics of study participants

| Characteristics         | N (%)    |
|-------------------------|----------|
| <b>Gender</b>           |          |
| Male                    | 134 (48) |
| Female                  | 144 (52) |
| <b>Type of diabetes</b> |          |
| Type I                  | 181 (65) |
| Type II                 | 97 (35)  |
| <b>Income level</b>     |          |
| Low                     | 111 (40) |
| Middle                  | 97 (35)  |
| High                    | 70 (25)  |
| <b>Occupation</b>       |          |
| Healthcare professional | 11 (4)   |
| Student                 | 76 (27)  |
| Unemployed              | 188 (68) |
| Other                   | 3 (1)    |
| <b>Occupation</b>       |          |
| <1                      | 11 (4)   |
| 1–5                     | 76 (27)  |
| 6–10                    | 188 (68) |
| >10                     | 3 (1)    |

Table 2 highlights the challenges faced by diabetes patients during the conflict. Healthcare access decreased from 90% before the conflict to just 22% at the time of the study. Medication adherence decreased due to financial constraints (65% due to mild constraint, 40% due moderate constraint and 15% due high constraint). The deterioration of healthcare infrastructure further exacerbated access and adherence: 22% of patients reported no damage, 45% reported partial devastation and 33% reported total destruction. Financial constraints also affected medication affordability, with 55% of patients experiencing significant impact, 37% moderate impact, 7% minor impact, and only 1% no impact.

Table 3 shows access of diabetic patients to health care facilities, medication availability, adherence rates, and financial constraint before and during the conflict. There was a sharp decrease in diabetes drug availability and adherence rates due to disrupted supply chain. Seventy percent of the patients reported increased medical expenses due to conflict-related disruptions. There was a significant decrease in medication adherence during the conflict compared to pre-war levels: 85% pre-conflict and 45% during the conflict ( $P < 0.01$ ).

Table 4 presents the correlations between the key diabetes management factors—medication adherence, financial strain, healthcare access, and medication availability—during the conflict. There was statistical significance for each of the variables.

The correlation coefficient ( $r$ ) ranged from -1 to 1, with negative values indicating inverse relationship and positive values showing positive relationship. The  $P$  values reflect the likelihood that the observed correlation was due to chance, with  $P < 0.01$  suggesting statistical significance. There were significant relationships between the factors influencing diabetes management. Poor medication adherence during the conflict was strongly linked to limited healthcare access (OR 4.5, 95% CI: 3.2–6.4,  $P < 0.01$ ), high financial constraint (OR 5.7, 95% CI: 4.1–7.9,  $P < 0.01$ ), and reduced medication availability (OR 6.2, 95% CI: 4.5–8.6,  $P < 0.01$ ).

Discussion

Our study found a significant decrease in medication adherence among diabetes patients during the Gaza conflict, from 85% pre-conflict to 45% during the conflict, mainly due to major disruptions in health care access and medication availability. Similar challenges have been reported in other conflict zones, where chronic disease patients struggled to adhere to treatment plans due to broken medication supply chains and limited health care access (17–20). The destruction of health care facilities drastically reduced the ability of patients to manage diabetes, with access decreasing from 90% pre-conflict to 22% during the conflict. It caused significant delays in receiving medical care and prescription refills. Our findings align with previous studies in conflict zones that have linked healthcare infrastructure destruction to increased morbidity and mortality among chronic

**Table 2. Health care access, medication adherence and impact of financial constraint and infrastructure damage on patient care**

| Category   | Subcategory                              | Percentage of participants |
|--|--|----------------------------|
| Access to health care facilities                                     | Pre-conflict                             | 90                         |
|  | During conflict                          | 22                         |
| Impact of financial constraint on medication adherence               | Low financial constraint                 | 65                         |
|  | Moderate financial constraint            | 40                         |
|  | High financial constraint                | 15                         |
| Healthcare infrastructure destruction                                | No destruction                           | 22                         |
|  | Partial destruction                      | 45                         |
|  | Complete destruction                     | 33                         |
| Impact of financial situation on affordability of prescription drugs | Greatly impacted by financial situation  | 55                         |
|  | Somewhat impacted by financial situation | 37                         |
|  | Slightly impacted by financial situation | 7                          |
|  | Not impacted by financial situation      | 1                          |

**Table 3. Impact of conflict on medication availability, adherence and diabetes management**

| Category                      | Pre-conflict (%) | During conflict (%) |
|-------------------------------|------------------|---------------------|
| Medication availability       | 90               | 18                  |
| Medication adherence          | 85               | 45                  |
| Health care access            | 90               | 22                  |
| <b>Financial constraint</b>   |                  |                     |
| Low financial constraint      | 83               | 9                   |
| Moderate financial constraint | 7                | 21                  |
| High financial constraint     | 10               | 70                  |

**Table 4. Correlation matrix for diabetes management factors**

| Variable                | Medication adherence | Healthcare access    | Medication availability | Financial constraint |
|-------------------------|----------------------|----------------------|-------------------------|----------------------|
| Medication adherence    | 1.00                 | -0.78 ( $P < 0.01$ ) | -0.65 ( $P < 0.01$ )    | -0.70 ( $P < 0.01$ ) |
| Healthcare access       | -0.78 ( $P < 0.01$ ) | 1.00                 | 0.85 ( $P < 0.01$ )     | 0.55 ( $P < 0.01$ )  |
| Medication availability | -0.65 ( $P < 0.01$ ) | 0.85 ( $P < 0.01$ )  | 1.00                    | 0.60 ( $P < 0.01$ )  |
| Financial constraint    | -0.70 ( $P < 0.01$ ) | 0.55 ( $P < 0.01$ )  | 0.60 ( $P < 0.01$ )     | 1.00                 |

disease patients (21–24). This indicates the need to preserve health care infrastructure during conflicts.

Financial constraint significantly reduced medication adherence, high constraint was linked to 15% adherence compared to 65% low constraints. We found negative correlations between financial constraint and health care access, medication availability and adherence. Improved healthcare access and medication availability correlated with higher adherence but were associated with increased financial constraints. Healthcare access positively correlated with medication availability and financial constraints but negatively with adherence. Medication

availability strongly correlated with healthcare access and moderately with financial constraints, both negatively impacting adherence. These statistically significant correlations highlight the complex interplay between financial constraints, health care access and medication availability, all of which adversely affect adherence. This aligns with previous research linking financial hardship to health care challenges, as patients in conflict zones often prioritize basic needs over medication, worsening their health outcomes (21).

These findings highlight the need for more robust emergency health care planning in conflict zones and

the need for financial support for patients in such environments and align with previous recommendations to maintain health care infrastructure and support systems during crises (21,25–27). Aid agencies need to prioritize comprehensive emergency healthcare plans and financial aid to preserve medication adherence and healthcare access in conflict areas.

There was a strong correlation between access to medications and poor adherence. In conflict zones like Gaza, reduced access to medications is often due to damaged infrastructure, restricted movement or supply chain disruptions, which significantly impact adherence. Therefore, interventions should focus on strategies and policies to create alternative delivery systems such as establishing mobile clinics where possible and/or using community health workers to deliver medications to inaccessible areas.

There was correlation between psychological stress and glycaemic control, which worsens diabetes outcomes. Thus, it is necessary to advocate for the integration of mental health into diabetes care programmes. The Gaza war has likely heightened psychological stress, which worsened glycaemic control among the diabetes patients through stress-induced hormonal changes and behavioural disruptions such as neglecting medication routines. Integrating mental health services, such as counselling, stress management and peer support, into diabetes care would be helpful. Telehealth services could also bridge gaps where in-person care is limited.

The study showed a link between socioeconomic status and treatment adherence. The damage to infrastructure caused scarcity or limited access to medications, economic instability, loss of income, increased health care costs, poverty, and unhealthy eating habits. There is a need to focus on alleviating the economic barriers such as subsidies for diabetes medications and supplies and voucher systems for low-income families to access healthy food and medications.

This study was conducted in Rafah before the Israeli occupation took control of the Palestinian side of Rafah crossing. Over 1.5 million displaced Palestinians had sought refuge in Rafah due to the war. During the study, hospitals, health care services and medications were scarce but still available, and living conditions were harsh yet manageable. The situation may have worsened after the Israeli occupation of Rafah, suggesting more negative outcomes than at the time of the study. Further

research is needed to update and compare the results. Longitudinal assessments are needed to understand the long-term effects of the conflict on chronic disease management, alongside practical strategies to improve medication adherence and health care access during the emergency. Other research should focus on developing resilient healthcare models that can withstand disruptions caused by armed conflicts and identifying effective interventions and support systems to enhance chronic disease management.

Access restrictions in the conflict zone may limit the generalizability of the study, as some areas were inaccessible, potentially skewing representativeness of the findings. Self-report of adherence measures and financial constraints may have introduced some bias, as participants may over- or underreport. Objective measures, such as pharmacy refill records or financial hardship indicators could improve accuracy. The study focused on the Rafah district before the Israeli occupation, therefore, the findings may not fully reflect the situation in the broader Gaza Strip or other conflict zones. Unfortunately, expanding the geographic scope was extremely challenging and not feasible.

Targeted and context-specific interventions in this conflict zone are necessary to address the lack of access to diabetes treatment and decreases in medication adherence. These include enhancing local healthcare infrastructure, maintaining regular medication supply chain, education and awareness programmes on diabetes management during conflicts for patients, financial and psychosocial assistance, monitoring and incentives for adherence, advocacy and policy adjustments for health care provision in conflict zones, and further investigation and research.

## Conclusion

These findings offer a comprehensive analysis of the impact of the conflict in Gaza on diabetes management, including medication adherence and access to health care. The study emphasizes the need for accelerated assistance and upgrade of health facilities to guarantee continuous care for diabetic patients in Gaza. Medication adherence has been severely impacted by the destruction of health care facilities and the interruption of pharmaceutical supply chains. Coordinated efforts are needed to address these issues and guarantee the continuity of care and support for the impacted populations.

## Acknowledgments

We appreciate the participation of the Gaza-based health care providers and the patients who participated in the study. We thank the local organizations that continue to provide care in these difficult circumstances.

**Funding:** None.

**Competing interests:** None declared.

## Effets de la guerre d'octobre 2023 sur le traitement du diabète et l'observance thérapeutique à Gaza

### Résumé

**Contexte :** La prise en charge du diabète nécessite un suivi médical et médicamenteux à vie. La guerre à Gaza a gravement compromis les soins essentiels prodigués aux patients atteints de diabète, perturbant ainsi l'accès aux traitements et aux médicaments et entraînant la non-observance thérapeutique.

**Objectif :** Évaluer les effets de la guerre d'octobre 2023 sur le traitement du diabète et l'observance médicamenteuse à Gaza.

**Méthodes :** Entre février et mai 2024, la présente étude transversale a permis de recueillir des données auprès de 278 patients atteints de diabète résidant à Rafah, dans la bande de Gaza. Elle a été analysée dans le cadre de l'étude. L'impact de la guerre sur l'accès aux soins et aux médicaments ainsi que sur l'observance thérapeutique.

**Résultats :** L'accès aux établissements de soins de santé est passé de 90 % avant la guerre d'octobre 2023 à 22 % au moment de l'étude, tandis que l'observance thérapeutique a chuté de 85 % à 45 %. Les contraintes financières ont gravement affecté l'accessibilité économique des médicaments (55 % significativement, 37 % modérément, 7 % légèrement et seulement 1 % pas du tout) et l'observance médicamenteuse (65 % en raison de contraintes légères, 40 % en raison de contraintes modérées et 15 % en raison de contraintes importantes).

**Conclusion :** Les résultats de la présente étude indiquent la nécessité d'une assistance accélérée pour réhabiliter les infrastructures et services sanitaires à Gaza afin de garantir des soins continus pour les patients atteints de diabète et ceux souffrant d'autres maladies chroniques.

## آثار حرب أكتوبر / تشرين الأول 2023 على علاج السكري والالتزام بالتدوي في غزة

حاتم حجاز

### الخلاصة

**الخلفية:** يتطلب علاج داء السكري إشرافاً طبياً والتزاماً بالتدوي مدى الحياة. وقد أدت الحرب في غزة إلى تدهور الرعاية الأساسية المقدمة إلى مرضى السكري، وهو ما أعاق الحصول على العلاج والأدوية وتسبب في عدم الالتزام بالتدوي.

**الأهداف:** هدفت هذه الدراسة إلى تقييم آثار حرب أكتوبر / تشرين الأول 2023 على إتاحة علاج السكري والالتزام بالتدوي في غزة.

**طرق البحث:** وفي الفترة ما بين فبراير / شباط ومايو / أيار 2024، جمعت هذه الدراسة المقطعية بيانات من 278 مريضاً بالسكري يقيمون في رفح بقطاع غزة. وحللت الدراسة أثر الحرب في الحصول على الرعاية والأدوية ومستوى الالتزام بالتدوي.

**النتائج:** انخفضت نسبة الوصول إلى مرافق الرعاية الصحية من 90% قبل حرب أكتوبر / تشرين الأول 2023 إلى 22% وقت إجراء الدراسة، وانخفض الالتزام بالتدوي من 85% إلى 45%. وقد أثرت القيود المالية بشدة على القدرة على تحمل تكاليف الأدوية (55% بدرجة كبيرة، و37% بدرجة معتدلة، و7% بدرجة خفيفة، و1% فقط لا تؤثر على الإطلاق) والالتزام بالتدوي (65% بسبب القيود الخفيفة، و40% بسبب القيود المتوسطة، و15% بسبب القيود الشديدة).

**الاستنتاجات:** تشير نتائج هذه الدراسة إلى الحاجة إلى الإسراع في تقديم المساعدة لإعادة تأهيل البنية التحتية والخدمات الصحية في غزة، وذلك لضمان استمرار الرعاية المستمرة لمرضى السكري والمرضى الذين يعانون أمراضاً مزمنة أخرى.

### References

1. Jimmy B, Jose J. Patient medication adherence: measures in daily practice. *Oman Med J*. 2011;26(3):155-9. doi: 10.5001/omj.2011.38.
2. Ho PM, Bryson CL, Rumsfeld JS. Medication adherence: its importance in cardiovascular outcomes. *Circulation* 2009;119(23):3028-35. <https://doi.org/10.1161/CIRCULATIONAHA.108.768986>.
3. Sahoo J, Mohanty S, Kundu A, Epari V. Medication adherence among patients of type II diabetes mellitus and its associated risk factors: a cross-sectional study in a tertiary care hospital of eastern India. *Cureus*. 2022;14(12). doi: 10.7759/cureus.33074.
4. World Health Organization. Gaza Strip: Health situation report. Conflict in Israel and the occupied Palestinian territory. Geneva: World Health Organization, 2023. <https://www.who.int/emergencies/situations/conflict-in-Israel-and-oPt>.
5. United Nations Office for the Coordination of Humanitarian Affairs. Gaza Strip: Humanitarian Overview. Geneva: UNOCHA, 2023. <https://www.unocha.org/>.
6. B'Tselem. Humanitarian catastrophe as policy. The Gaza Strip, 07 December 2023. [https://www.btselem.org/gaza\\_strip/20231207\\_humanitarian\\_catastrophe\\_as\\_policy](https://www.btselem.org/gaza_strip/20231207_humanitarian_catastrophe_as_policy).



7. International Crisis Group. The Gaza Strip: No place to hide. Geneva: International Crisis Group, 2021. <https://www.crisisgroup.org/middle-east-north-africa/east-mediterranean-mena/israel-palestine/b90-way-out-gaza>.
8. United Nations Office for the Coordination of Humanitarian Affairs. Gaza Strip | The humanitarian impact of 15 years of the blockade. Geneva: UNOCHA, 2022. <https://www.ochaopt.org/content/gaza-strip-humanitarian-impact-15-years-blockade-june-2022>.
9. United Nations Office of the High Commissioner for Human Rights. About humanitarian crises and human rights. Geneva: OHCHR, n.d. <https://www.ohchr.org/en/humanitarian-crises>.
10. AlSamhori AR, AlSamhori JF, Al-Deffaie AF, Alhadidi LA, Khoury M, Bader NS, AlSamhori AF, Al-Jafari M. Diabetes in the shadow of conflict understanding and addressing the crisis in Gaza. *JAP Acad J*. 2024;11. <https://journal.japacademy.org/index.php/Home/article/view/183>.
11. Jebiril M, Liu X, Shi Z, Mazidi M, Altaher A, Wang Y. Prevalence of type 2 diabetes and its association with added sugar intake in citizens and refugees aged 40 or older in the Gaza Strip, Palestine. *Inter J Environ Res Pub Health* 2020;17(22):8594. <https://doi.org/10.3390/ijerph17228594>.
12. Di Maio M, Leone Sciabolazza V. Conflict exposure and health: Evidence from the Gaza Strip. *Health Economics* 2021;30(9):2287-95. doi: 10.1002/hec.4364.
13. Keelan E. Medical care in Palestine: working in a conflict zone. *Ulster Med J*. 2016;85(1):3. PMID: 27158157. <https://pubmed.ncbi.nlm.nih.gov/articles/PMC4847844/>.
14. Ospelt E, Mungmode A, Hardison H, Wirsch A, Rioles N, Dawson J, et al. The impact of war and conflict on people living with diabetes: A scoping review. *Clin Diabetol* 2024;13(6):373-385. doi: 10.5603/cd.100617.
15. Mendelsohn JB, Schilperoord M, Spiegel P, et al. Adherence to antiretroviral therapy and treatment outcomes among conflict-affected and forcibly displaced populations: a systematic review. *Conflict Health* 2012;6:9. <https://doi.org/10.1186/1752-1505-6-9>.
16. Leyh BM, Gispén ME. Access to medicines in times of conflict: overlapping compliance and accountability frameworks for Syria. *Health and Human Rights* 2018;20(1):237. PMID: 30008566. <https://pubmed.ncbi.nlm.nih.gov/articles/PMC6039728/>.
17. Mesfin B, Mersha Demise A, Shiferaw M, Gebreegziabher F, Girmaw F. The effect of armed conflict on treatment interruption, its outcome and associated factors among chronic disease patients in North East, Amhara, Ethiopia, 2022. *Pat Related Out Measures* 2023;243-51. <https://doi.org/10.2147/PROM.S388426>.
18. Khanyk N, Hromovik B, Levytska O, Agh T, Wettermark B, Kardas P. The impact of the war on maintenance of long-term therapies in Ukraine. *Front Pharmacol*. 2022;13:1024046. <https://doi.org/10.3389/fphar.2022.1024046>.
19. Garry S, Checchi F. Armed conflict and public health: into the 21st century. *J Public Health* 2020;42(3):e287-298. doi: <https://doi.org/10.1136/bmj.324.7333.346>.
20. Aderinto N, Olatunji D. The consequences of Sudan's armed conflict on public health: a closer look at the devastating impact. *IJS Glob Health* 2023;6(4):e0179. doi: 10.1097/GH9.0000000000000179.
21. Jaung MS, Willis R, Sharma P, Aebischer Perone S, Frederiksen S, Truppa C, et al. Models of care for patients with hypertension and diabetes in humanitarian crises: a systematic review. *Health Pol Plan* 2021;36(4):509-32. <https://doi.org/10.1093/heapol/czab007>.
22. Asgary R, Garland V, Ro V, Stribling JC, Waldman R. A systematic review of effective strategies for chronic disease management in humanitarian settings; opportunities and challenges. *Prev Med*. 2022;161:107154. <https://doi.org/10.1016/j.ypmed.2022.107154>.
23. Mahmoud H, Abuzerr S. State of the health-care system in Gaza during the Israel–Hamas war. *Lancet* 2023;402(10419):2294. <https://doi.org/10.1002/wmh3.642>.
24. Ahuja M, Cimilluca J, Stamey J, Doshi RP, Wani RJ, Al-Ksir K, Adebayo-Abikoye EE, Karki A, Annor EN, Nwaneki CM. Association between financial barriers to healthcare access and mental health outcomes in Tennessee. *S Med J*. 2023;116(2):176-180. doi: 10.14423/SMJ.0000000000001512.
25. Elsous A, Radwan M, Al-Sharif H, Abu Mustafa A. Medications adherence and associated factors among patients with type 2 diabetes mellitus in the Gaza Strip, Palestine. *Front Endocrin*. 2017;8:100. <https://doi.org/10.3389/fendo.2017.00100>.
26. Abu-El-Noor NI, Aljeesh YI, Bottcher B, Abu-El-Noor MK. Assessing barriers to and level of adherence to hypertension therapy among Palestinians living in the Gaza strip: A chance for policy innovation. *Inter J Hypert*. 2020;(1):7650915. <https://doi.org/10.1155/2020/7650915>.
27. Radwan M, Sari AA, Rashidian A, Takian A, Elsous A, Abou-Dagga S. Factors hindering the adherence to clinical practice guideline for diabetes mellitus in the Palestinian primary healthcare clinics: a qualitative study. *BMJ Open* 2018;8(9):e021195. doi:10.1136/bmjopen-2017-021195.