

Assessing violence in healthcare in the occupied Palestinian territories

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Abstract

Background: Violence in healthcare is a major challenge in fragile and conflict-affected countries such as the occupied Palestinian territories.

Aim: To analyse and compare violence in healthcare in the occupied Palestinian territories with other conflict-affected settings.

Methods: From the Safeguarding Health in Conflict Coalition database, we collected data for 2017 to 2021 on health workers killed, injured, kidnapped, assaulted, sexually abused, threatened, and arrested, and on the destruction and damage to health care facilities for 15 conflict-affected countries and the occupied Palestinian territories. We collected similar monthly data for September 2022 to July 2024 for the occupied Palestinian territories. Using mixed-effects negative binomial regression we compared data from the occupied Palestinian territories with the 15 countries. Using negative binomial models, we conducted a pre-post analysis of the data from the occupied Palestinian territories, using October 2023 as the reference point.

Results: Between 2017 and 2021, there were significantly higher rates of attacks on health workers [IRR = 20.75 (95% CI: 2.66, 161.60)] and of the total number of violence incidents (22.26 [2.17, 228.64]) in the occupied Palestinian territories than in the 15 countries, but no significant difference in the attacks on health facilities. Attacks on health workers [IRR = 110 (30, 413)] and health facilities [IRR = 150 (31, 751)], and total violence incidents [IRR = 73 (24, 220)], increased significantly after October 2023 in the occupied Palestinian territories.

Conclusion: There is a need for multinational, multisectoral support systems to enhance safety and security for health workers and health facilities and to enhance the resilience of health systems against current and future conflicts in the occupied Palestinian territories.

Keywords: violence in healthcare, conflict-affected country, attack on health, health system, healthcare resilience, Palestine

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Background

Workplace violence for healthcare workers (HCWs) refers to “incidents where staff is abused, threatened or assaulted in work-related circumstances, including commuting to and from work, involving an explicit or implicit challenge to their safety, well-being or health” (1). Globally, up to 63% of HCWs experience some form of violence (2). The psychosocial and physical effects of violence in healthcare (VIH) are well-documented, contributing to poor work performance, increased absenteeism and a reduced quality-of-life (3). Threats of violence and lack of security undermine efficiency and quality-of-care, jeopardizing health care delivery to patients, which in turn exert a considerable economic burden on the health sector (4). VIH has been identified as a key driver of the shortage of health care workers globally (5). It is not isolated and often reflects the systemic and structural violence in the broader society, due to multiple causes (6).

Fragile and conflict-affected countries often report high VIH incidents due to systemic issues like scarce medical supplies, high patient load, high disease burden, HCW shortage, and insufficient health financing, among

others (7,8). During the past 8 years, over 2000 VIH incidents have been reported in the occupied Palestinian territories (oPt) (9). The WHO reported 432 attacks on healthcare in oPt in 2018 (10), and since the inception of the most recent Israel-Hamas war in October 2023, high incidence of attacks on HCWs and health care facilities (HCFs) in Gaza, have been reported. Of the 1825 attacks on health care reported globally between 7 October 2023 and 30 September 2024, 1146 occurred in oPt (11). OPt reported 978 of the total 1210 attacks on HCWs and 786 of the total 1134 deaths associated with the attacks on health care (11,12). Until 18 September 2024, 166 HCFs and 542 ambulances were attacked in oPt. VIH has caused the collapse of the healthcare system in oPt, endangering those in need of care (13).

VIH in oPt has received greater attention since October 2023 (14,15), however, several observers have noted that VIH is a persistent and systemic issue in oPt due to several conflicts in the past (16,17). Yet, very few assessments have been conducted to understand the magnitude of VIH in the territory.

This study was therefore conducted to compare VIH incidents in oPt with 15 conflict-affected countries for

2017 to 2021. We also conducted a pre-post analysis of the monthly changes in VIH incidents and attacks on HCFs and HCWs in oPt from September 2022 to July 2024, using October 2023 as the reference point.

Methods

Data sources and extraction

We extracted VIH incidence data for oPt and 15 countries, for 2017 to 2021, from the annual reports of Safeguarding Health in Conflict Coalition (SHCC) (9). Each incident had a unique identification. The countries/territories were identified by the World Bank as fragile and conflict-affected as of the financial year 2020 (18), based on the absolute number of conflict-related deaths, the presence of United Nations peacekeeping operations and patterns of population displacement (19). These included Afghanistan, Burkina Faso, Cameroon, Central Africa Republic, Democratic Republic of Congo, Iraq, Libya, Mali, Myanmar, Nigeria, occupied Palestinian territories, Sudan, Somalia, South Sudan, Syrian Arab Republic, and Yemen (20). We excluded Chad, Eritrea, Gambia, Guinea-Bissau, Haiti, Kosovo, Lebanon, Liberia, Niger, Papua New Guinea, Venezuela, and Zimbabwe because they did not have data for all the years studied (18). We extracted the data on incidents of HCWs killed, injured, kidnapped, assaulted, sexually abused, threatened, and arrested, and on the destruction of and damage to HCFs. We extracted all events that had a unique SHCC identification and conducted annual population counts from the World Bank data (21). We extracted similar incidence data for oPt for 1 September 2022 to 30 July 2024 (22–24).

Study design

We designed a panel of 80 country-years using oPt and the 15 countries for 5 years. A panel design allowed us to compare the VIH outcomes in oPt with the 15 countries, after adjusting for time and changes in VIH for 2017 to 2021, based on the data availability. Using data collated by SHCC in fragile and conflict-affected countries ensured that within-dataset comparisons were valid.

We also considered the monthly time series data of VIH outcomes for September 2022 to July 2024. We chose September 2022 because it was a year-long pre-period for the baseline. Because of the multiple previous conflicts in the oPt, data before September 2022 would not have provided a conflict-free baseline. We chose July 2024 for the endline because it was the last date with reliable data in the SHCC dataset. The SHCC time series was irregular and data were available for specific dates when incidents were reported. The daily, weekly and fortnightly data were not suitable for analysis, therefore, we chose the monthly data because it provided a consecutive time series. Aggregating the data by month also helped reduce the impact of autocorrelation, seasonality and lag to some extent. Using October 2023 as reference point for pre-post analysis was helpful in assessing if the current conflict has influenced VIH.

Statistical analysis

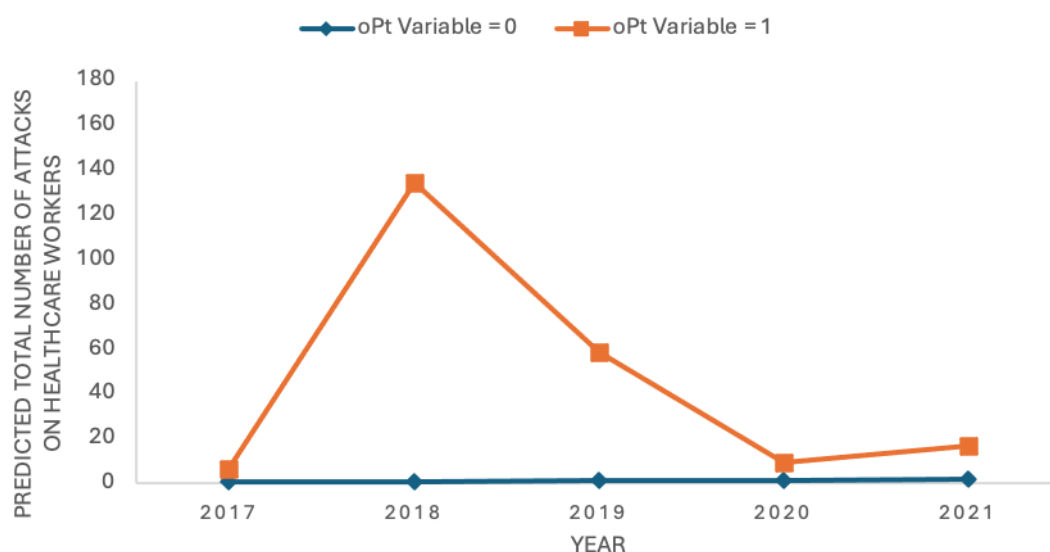
Data extraction, analyses and visualisation were conducted in Google Sheets and R version 4.4.3 accessed through RStudio version 2024.12.1+563.

For the 2 analyses, we considered 3 outcomes each. First, we calculated the total number of attacks on HCWs, which summed the unique incidents of killing, kidnapping, injury, assault, arrest, threat, and sexual abuse. Second, we calculated the total number of attacks on HCFs by adding the number of HCFs that were damaged or destroyed. Third, we summed up all the incidents with unique IDs regardless of whether they had further information on impact. The outcomes were then assessed for country-years and changes by months within oPt.

We used the mixed-effects negative binomial models because these models had better model fit than the Poisson and quasi-Poisson models. We modelled the count data on the 3 outcomes for a panel of 16 conflict-affected countries/territory for 2017 to 2021: the total number of attacks on HCWs, the total number of attacks on HCFs and the total number of violence incidents. The dichotomous variable for oPt ('1' for oPt and '0' for the 15 countries) was the primary exposure, while year and an interaction term for oPt*year served as covariates. We used population as the offset and individual countries as the random intercepts. For the model with attacks on HCFs as the outcome, we did not include the year and oPt*year terms because it caused convergence issues as there were no VIH incidents in some years for oPt. We report the measures of incidence rate ratio (IRR) as the exponentiated beta coefficients for the oPt variable, using 95% confidence intervals (CI).

We used the interrupted time series (ITS) design to estimate the intervention effect for oPt (25). In ITS, we assume that the pre-period trend is a valid counterfactual for the post-period trend, there is no time-varying confounding, and that there are no other competing shocks that may impact the outcome around the same time as the intervention. Essentially, the counterfactual in our analyses was the pre-period time series data for the outcomes. The method allows different lengths of pre- and post-intervention periods (i.e. no balance needed). In the primary analysis, our models included terms for intercept that represented the baseline (pre-period) rate, a continuous variable for time in months to mark the pre-period outcome trend, a dichotomous variable for marking the beginning of the conflict that captured the level change, and an interaction of time*conflict or time since the conflict that marked the slope change (i.e. trend change) in the post-period compared to the pre-period. The models in the primary analysis helped in investigating if the October 2023 conflict caused both a level change and a trend change, implying a sustained effect. Our main exposure of interest was the pre-post level change, noted by the 'conflict' variable coded as '0' during the pre-period and as '1' during the post-period. The pre-period was from September 2022 to September

Figure 1 Modeled year-wise differences between occupied Palestinian territories (oPt = 1) and 15 fragile and conflict-affected countries (oPt = 0) for the total number of (a) attacks on health care workers and (b) incidents of violence per million people, 2017–2021



Models for attacks on HCWs and the total number of incidents were adjusted for year and the year*oPt interaction terms. All models use population as the offset and individual countries as random intercepts. Year-wise confidence intervals are not presented in the line charts for simplicity.

2023, while the post-period was from October 2023 to July 2024.

We performed 2 sensitivity analyses. The first analysis included the time and level change terms, but not the interaction term. It investigated whether the conflict caused instant and permanent change in VIH outcomes, assuming that the trend remains the same. The second analysis used a dichotomous variable for marking the first 2 months of the conflict, i.e. the variable 'conflict' was coded as '1' for October and November 2023 and '0' for all other months in the study period. The model terms included this new conflict variable and time, but no interaction. Essentially, the analysis investigated if the first 2 months of the conflict caused a short-term deviation in VIH outcomes and eventually returned to baseline (e.g. a shock or temporary disruption).

The oPt analyses used negative binomial models because they accommodated over-dispersed count outcome data. Based on visualisations of outcomes/residuals, we did not find evidence of seasonality and temporal autocorrelation. There were no other VIH predictors that we could test because of the limited theory and the lack of data at the required temporal resolution. We did not use any offset because monthly population data were not available. We report measures of IRR as the exponentiated beta coefficients for the model terms, using 95% CI.

Ethics approval

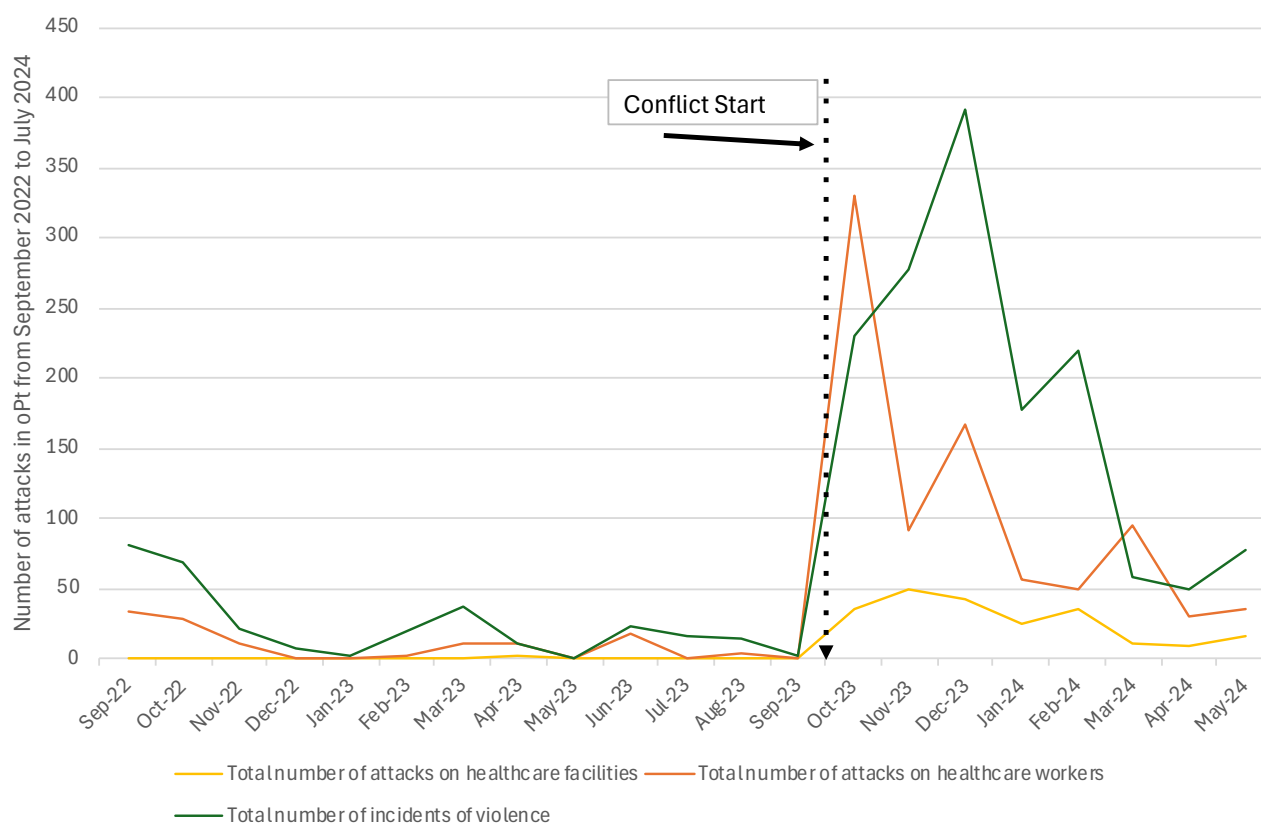
We used publicly available data and no patients were recruited for the study, therefore, there was no need to seek institutional review board approval.

Results

We found that oPt had significantly higher incidence than the 15 fragile and conflict-affected countries during 2017–2022, of the total number of attacks on HCWs [IRR = 21.28 (95%CI: 2.89, 156.74)] and total number of violence incidents [IRR = 23.73 (2.38, 236.67)], but the difference was not significant for attacks on HCFs (Table 1, Figures 1a & 1b).

From September 2022 to July 2024, VIH incidence became higher after October 2023 (Figure 2). Before October 2023, and in the absence of conflict, the baseline expected count of total attacks on HCWs was 25 (95% CI: 10, 59) events per month (Table 2). Each month, the expected count decreased by 15% (4%, 24%), and the decrease was statistically significant. At the beginning of the conflict, there was an immediate and statistically significant increase in VIH incidence: the expected count of the total number of attacks on HCWs was 110 times (30 times, 413 times) higher than before the conflict. After the conflict began, the trend decreased by 15% per month, relative to the pre-conflict trend; however, this

Figure 2 Number of attacks on health care workers and facilities and total number of incidents of violence in the occupied Palestinian territories, September 2022 to July 2024



October 7, 2023 (vertical grey line) marks the point of change in the time series as it was the start of the ongoing conflict impacting oPt – largely Gaza.

decrease was not statistically significant. Overall, there were large and statistically significant increases in the levels of total attacks on HCWs [IRR = 110 (30, 413)], total attacks on HCFs [IRR = 150 (31, 751)] and the total number of violence incidents [IRR = 73 (24, 220)] after October 2023, compared to the previous year (Table 2). There were decreases in post-conflict trends but the decreases were not statistically significant and they were much smaller than the level increases.

Sensitivity analysis of the level change without the trend change showed large and statistically significant level increases in all the 3 VIH outcomes during the post-period (Table 2). Sensitivity analysis of the short-term impact (i.e. temporary disruption) for the first 2 months of the conflict showed statistically significant level increases for the total number of attacks on HCWs and HCFs. The point estimate of the level change for the total number of violence incidents was positive. However, the 95% confidence interval was not significant.

Discussion

We found over 20-fold higher incidence rates of attacks on health care workers and violence incidents in oPt than the 15 fragile and conflict-affected countries for 2017 to 2021. This indicates a persistently high number

of violence incidents in oPt. There were 110 times level changes for attacks on health care workers, 150 times for attacks on health care facilities and 73 times for the total number of violence incidents since October 2023, compared to the year before. The sensitivity analyses ensured that the findings were robust even if we looked at level changes alone and short-term changes in the first 2 months after the onset of the conflict. These findings however have multiple limitations (Table 3).

Our findings show that VIH in oPt is not comparable to other fragile and conflict-affected settings even before the October 2023 conflict. This thus supports our choice of pre-period outcomes as the only possible valid comparison for constructing the counterfactual to investigate the impact of the conflict on VIH outcomes. These findings suggest that VIH is persistent in oPt and has only worsened during the current conflict, significantly impacting health care delivery.

Our findings agree with other literature reporting that the recent conflict has exacerbated the health care crisis in oPt (26). As of 29 September 2024, only 17 of 36 hospitals in Gaza were partially functional (27). VIH directly impacts vulnerable patients seeking care in hospitals. Mortality and morbidity among care-seeking patients and their caregivers have been reported during the current conflict in Gaza (28). Attacks on HCWs and

Table 1 Statistical analysis of the total number of attacks on health care workers, healthcare facilities, and incidents of violence in oPt compared to 15 fragile and conflict-affected countries, 2017–2021

Outcome	Incident rate ratio (95% CI)	P
Total number of attacks on health care workers	21.28 (2.89, 156.74)	0.003
Total number of attacks on health care facilities	9.11 (0.82, 101.21)	0.072
Total number of incidents of violence	23.73 (2.38, 236.67)	0.007

Negative binomial models for attacks on HCWs and the total number of incidents were adjusted for year and the year*oPt interaction terms, while that for attacks on HCFs only had the oPt term. All models used population as the offset and individual countries as random intercepts. CI = confidence intervals.

Table 2 Pre-post analysis of total number of attacks on health care workers, health care facilities, and incidents of violence using interrupted time series design and negative binomial models, September 2022 to July 2024 (IRR; 95% CI)

	Primary analysis	Sensitivity analysis I - level change only (October 2023)	Sensitivity analysis II - short-term level change (October–November 2023) with no slope change
Total number of attacks on healthcare workers			
Baseline (pre-October)	25 (10, 59)*	36 (15, 86)*	11 (4, 28)*
Time	0.85 (0.76, 0.96)+	0.81 (0.73, 0.90)*	1.10 (1.00, 1.15)^
Level change	110 (30, 413)*	91 (25, 325)*	7.20 (1.29, 40)^
Trend change	0.85 (0.70, 1.04)	–	–
Total number of attacks on healthcare facilities			
Baseline (pre-October)	0.46 (0.08, 2.60)	1.50 (0.62, 3.67)	0.14 (0.03, 0.75)^
Time	1.00 (0.80, 1.24)	0.81 (0.75, 0.88)*	1.30 (1.16, 1.44)*
Level change	150 (31, 751)*	600 (160, 2290)*	7.30 (1.42, 37.10)^
Trend change	0.79 (0.63, 1)	–	–
Total number of incidents of violence			
Baseline (pre-October)	58 (29, 119)*	76 (37, 153)*	27 (11, 65)*
Time	0.86 (0.78, 0.94)+	0.83 (0.76, 0.90)*	1.10 (1.00, 1.14)^
Level change	73 (24, 220)*	56 (20, 160)*	3.60 (0.76, 17.50)
Trend change	0.88 (0.74, 1.04)	–	–

IRR notes incidence rate ratio, while CI depicts confidence intervals.

*P < 0.001; +P < 0.01; ^P < 0.05

HCFs disrupts service delivery, thus limiting access to care and reducing the quality-of-care. Poor health care provision in an active conflict with the increased burden of injury, trauma, mortality, etc. further exacts burdens on the health system, resulting in significant reductions in services and reducing the chances of survival (29). VIH violates the Geneva Conventions that prohibit attacks on HCWs and HCFs at all times, including during conflicts (30). Upholding the Geneva Conventions and other international humanitarian laws is essential to protect and rebuild the health system in oPt (31).

Since October 2023, violence incidents have been several times higher when compared to the previous year. A recent modelling exercise projecting cause-specific mortality from 7 February to 6 August 2024 found that a ceasefire could have averted 55 000 deaths (32). Together, these findings call for a permanent ceasefire and other interventions. Emerging literature, especially from conflict settings, have noted several effective approaches. First, establishing support systems for health care workers, including psychotherapeutic and peer support, could be helpful in building resilience (33). Second, strategic negotiations for the security of health workers and health facilities are essential, with international

organizations such as the Red Cross, Doctors Without Borders and others playing a key role (34). Third, safety measures, including blast protection (tempering films to the glass of buildings and ambulances), bunkers and sandbag fortification could help prevent physical damage to facilities and harm to health workers, patients and facilities (34).

Future research should incorporate the experiences of health workers, systematically studied using mixed methods. However, research in conflict settings is challenging and may require a mix of in-person and remote approaches. Remote research should be conducted with careful planning and appropriate methodologies alongside online engagement among the target population, and in compliance with international and local ethics standards (33). Future research should be tailored to the specific context of the conflict.

Study limitations

This study has some limitations. Our analyses relied solely on the SHCC data, which may vary from other sources due to differences in the definition of violence, incidents covered and reporting mechanisms. This is an

inherent limitation of the data source, which may not be the case with other data sources. Our analyses were on oPt as a whole and was not disaggregated by Gaza and the West Bank. Better surveillance data can help overcome this limitation in the future. Due to the aggregation of incidents over months, there may have been aggregation bias. However, due to our sensitivity analyses, the aggregation bias would not have qualitatively changed the direction of the effect. The absence of a control group in the pre-post ITS analysis limits our ability to make more robust causal inferences. We have presented multiple reasons why the pre-period comparison was the only possible and valid comparison here. Future research should consider better models that can distinguish between the short-term level changes and subsequent decline in violence. We acknowledge that some incidents could be attributed to interpersonal violence between visitors at health care facilities and the HCWs. We did not have enough information to exclude such incidents. However, these are likely to be a minority, and the inclusion of such incidents would be similar between oPt and other conflict-affected and fragile settings used for the comparisons.

Reflexivity and positionality

As global health researchers working on violence in healthcare for the past few years, we acknowledge the limitations of our perspective. We primarily adopted an epidemiologic perspective to investigate violence in

healthcare settings in the oPt. In our previous work, we had noticed higher rates of such violence in oPt, which got us concerned about the conflict and motivated us to pursue further investigation of the issue. We recognise our lack of lived experience in the context and that we do not possess the first-hand knowledge or the social and geopolitical insights essential for a comprehensive understanding. Our expertise lies in technical knowledge about data collection and analysis, which we hope reflects the harsh realities faced by health workers and patients in conflict-affected areas, including oPt. Consequently, our positioning as external researchers may have made us to overlook the complex socio-political dimensions of this issue. Therefore, we have consciously limited our discussion in this paper to the epidemiologic aspects of violence in healthcare. We declare that this work is investigator-initiated and does not reflect the views of the authors' employers or any affiliations they may hold.

Conclusion

Our findings have revealed alarming high rates of violence in healthcare in oPt when compared to other fragile and conflict-affected settings, and the situation has worsened since October 2023. To protect healthcare and the lives of vulnerable patients, there is a dire need for collective efforts to protect health workers and health facilities during conflicts and to secure lasting ceasefire early.

Évaluation de la violence liée aux soins de santé dans le Territoire palestinien occupé

Résumé

Contexte : La violence dans le domaine des soins de santé est un problème majeur dans les pays en situation de fragilité et touchés par des conflits tels que le Territoire palestinien occupé.

Objectifs : Analyser et comparer la violence dans le domaine des soins de santé dans le Territoire palestinien occupé avec celle observée dans d'autres contextes touchés par des conflits.

Méthodes : À partir de la base de données de la Coalition de protection de la santé dans les conflits, appelée en anglais « Safeguarding Health in Conflict Coalition », nous avons recueilli des données couvrant la période 2017-2021 sur les agents de santé tués, blessés, kidnappés, agressés, victimes de violence sexuelle, menacés et arrêtés, ainsi que sur la destruction et les dommages subis par les établissements de santé dans 15 pays touchés par des conflits et dans le Territoire palestinien occupé. Nous avons collecté des données mensuelles similaires pour la période allant de septembre 2022 à juillet 2024 pour le Territoire palestinien occupé. À l'aide d'une régression binomiale négative à effets mixtes, nous avons comparé ces données avec celles des 15 pays. Nous avons réalisé une analyse avant/après des données provenant du Territoire palestinien occupé en utilisant des modèles binomiaux négatifs, avec octobre 2023 comme point de référence.

Résultats : Entre 2017 et 2021, les taux d'attaques contre les personnels de santé étaient significativement plus élevés [rapport du taux d'incidence (IRR) = 20,75 (IC à 95 % : 2,66-161,60)], tout comme le nombre total d'incidents violents [22,26 (2,17-228,64)] dans le Territoire palestinien occupé par rapport aux 15 pays. Cependant, aucune différence significative n'a été observée concernant les attaques contre les établissements de santé. Les attaques contre les agents de santé [IRR = 110 (30-413)] et contre les établissements de santé [IRR = 150 (31-751)], ainsi que le nombre total d'incidents violents [IRR = 73 (24-220)], ont augmenté de manière significative après octobre 2023 dans le Territoire palestinien occupé.

Conclusion : Des systèmes d'appui multinationaux et multisectoriels sont nécessaires pour renforcer la sûreté et la sécurité des agents de santé et des établissements de santé, ainsi que la résilience des systèmes de santé face aux conflits actuels et futurs dans le Territoire palestinien occupé.

تقييم العنف في الرعاية الصحية بالأراضي الفلسطينية المحتلة

أوما جوبتا، سيديش زادي

الخلاصة

الخلفية: يمثل العنف في الرعاية الصحية تحديًا كبيرًا في البلدان الهشة والمتضررة من النزاعات، مثل الأراضي الفلسطينية المحتلة.

الأهداف: هدفت هذه الدراسة إلى تحليل العنف في الرعاية الصحية بالأراضي الفلسطينية المحتلة، ومقارنته بأمكان أخرى متضررة من النزاعات.

طرق البحث: من قاعدة بيانات "اتلاف الحفاظ على الصحة أثناء النزاعات" جمعنا بيانات عن العاملين الصحيين الذين قُتلوا أو أُصيبوا أو اختطفوا أو اعتُدي عليهم أو تعرضوا للاعتداء الجنسي أو للتهديد أو للاعتقال، وعن تدمير مرافق الرعاية الصحية وإتلافها في 15 بلدًا من البلدان المتضررة من النزاعات وفي الأراضي الفلسطينية المحتلة، وذلك خلال المدة من عام 2017 إلى عام 2021. وجمعنا بيانات شهرية مماثلة عن الأراضي الفلسطينية المحتلة في الفترة من سبتمبر/ أيلول 2022 إلى يوليو/ تموز 2024. وباستخدام الانحدار الثنائي السلسلي ذي الآثار المختلطة، قارنا البيانات الواردة من الأراضي الفلسطينية المحتلة مع بيانات 15 بلدًا. وباستخدام النماذج الثنائية السلبية، أجرينا تحليلًا قبليًا وبعديًا للبيانات الواردة من الأراضي الفلسطينية المحتلة، مع اتخاذ شهر أكتوبر/ تشرين الأول 2023 كنقطة مرجعية.

النتائج: بين عامي 2017 و2021، كانت معدلات الهجمات على العاملين الصحيين [نسبة معدل الوقوع = 95% (20.75 فاصل الثقة: 2.66، 161.60)] وإجمالي عدد حوادث العنف (22.26 [2.17، 228.64]) في الأراضي الفلسطينية المحتلة أعلى كثيرًا مقارنةً بالبلدان الخمسة عشر، ولكن لم يكن هناك فرق كبير في الهجمات على المرافق الصحية. وشهدت الهجمات على العاملين الصحيين [نسبة معدل الوقوع = 413 (30) 110] وعلى المرافق الصحية [نسبة معدل الوقوع = 751 (31) 150]، وإجمالي حوادث العنف [نسبة معدل الوقوع = 220 (24) 73]، زيادةً كبيرةً بعد أكتوبر/ تشرين الأول 2023 في الأراضي الفلسطينية المحتلة.

الاستنتاجات: يوجد احتياج إلى نُظم دعم متعددة الجنسيات ومتعددة القطاعات لتعزيز سلامة وأمن العاملين الصحيين والمرافق الصحية، ولزيادة قدرة النُظم الصحية على الصمود في وجه الصراعات الحالية والمستقبلية في الأراضي الفلسطينية المحتلة.

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