

SUDAN CONFLICT OBSERVATORY

HUMANITARIAN IMPACT OF FIGHTING AND
BOMBARDMENT ACROSS KHARTOUM STATE

REPORT 11 | 25 SEPTEMBER 2023

METHODOLOGY

Yale SCHOOL OF PUBLIC HEALTH
Humanitarian Research Lab

The Yale Humanitarian Research Lab's data fusion methodologies combine remote sensing analysis with open-source data to assess and geolocate events. Yale HRL uses remote sensing data including moderate and very high resolution (VHR) satellite imagery, NASA thermal detection data, as well as open-source social media, local news reporting, multimedia, and other verified reports. When necessary, sources are redacted for protection purposes; a redacted source list is available to authorized users.

The conflict in Sudan is marked by a lack of data generally. This includes limited remote sensing data including moderate and VHR satellite imagery and open-source data, including social media. The lack of open-source multimedia may be attributed partially to the widespread power and telecommunications blackouts across the region. This means that (a) many events are unreported or under-reported, and (b) where reports of events exist there may not be sufficient data at this time to corroborate or assess alleged events.

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The Faculty Director of the Humanitarian Research Lab (HRL) at Yale is Dr. Kaveh Khoshnood. Report production was overseen by Nathaniel Raymond, HRL Executive Director, and managed by Caitlin Howarth, HRL Conflict Observatory Director. Analysis was conducted by the Humanitarian Research Lab.

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KEY FINDINGS

- Airstrikes and fighting in densely populated civilian areas have likely led to an increase in civilian casualties, including fatalities, since 2 September 2023.
- Satellite imagery analysis corroborates online reports of key buildings considered landmarks across Khartoum set ablaze as a result of clashes on 16 and 17 September 2023.
- Satellite imagery analysis assesses damage to civilian structures as a result of alleged SAF airstrikes.
- Satellite imagery analysis corroborates reports of significant structural damage to the Doctors' Hospital in Khartoum.
- RSF have reportedly imposed restrictions on the movement of civilians in areas under their control.

Humanitarian Impact of Fighting and Bombardment across Khartoum State

Impact on Civilians

Civilian Casualties Due to Airstrikes and Fighting in Khartoum State

SAF airstrikes in Khartoum have continued to intensify, likely leading to increased casualties over the first three weeks in September 2023.

Starting on 2 September 2023, there was an alleged SAF airstrike on El Kalakla El Gubba neighborhood that reportedly killed 20 civilians.¹ On 9 September 2023, a SAF airstrike allegedly hit El Haj Yousef al-Wahda neighborhood in East Nile.² Yale HRL satellite imagery analysts identified potential damage sustained to civilian homes in El Haj Yousef al-Wahda (slide: El Haj Yousef al-Wahda). There is credible reporting, including from Médecins Sans Frontières (MSF), that the 10 September 2023 alleged SAF airstrike on Quoro Market in the Mayu neighborhood killed at least 43 people and injured 60. This represents the highest death toll as a result of an airstrike since the start of the conflict in April.³ On 12 September 2023, a reported airstrike killed 25 people in Hillat Koko Sheep Market in Dar al-Salaam, East Nile.⁴ At least 104 civilians have been reported killed and hundreds injured from these three alleged SAF airstrikes.⁵ In addition to being subjected to continuous shelling and fighting, civilians report that RSF continues to physically assault civilians in their homes and loot their belongings.⁶

1. <https://www.dabangasudan.org/en/all-news/article/20-dead-23-injured-in-khartoum-air-raid> archived at <https://perma.cc/R526-4FN5>
2. <https://www.doctorswithoutborders.org/latest/sudan-deadliest-days-khartoum-conflict-began> archived at <https://perma.cc/S77S-TNDD>
3. <https://www.state.gov/on-civilian-casualties-in-sudan/> archived at <https://perma.cc/VQU3-FFAU>
4. https://twitter.com/sudan_post/status/1701643147812421841, archived at <https://perma.cc/3DNX-JK5H>
5. <https://www.dabangasudan.org/en/all-news/article/100-dead-as-indiscriminate-shelling-ravages-sudan-capital> archived at <https://perma.cc/B4Q3-5JUK>
6. <https://www.dabangasudan.org/en/all-news/article/100-dead-as-indiscriminate-shelling-ravages-sudan-capital> archived at <https://perma.cc/B4Q3-5JUK>

Restrictions on Civilian Movement

Over half the estimated population of Khartoum has fled, and the civilian population that remains in Khartoum is likely unable to leave due to travel risks, the cost of leaving, or physical limitations including disability and age. Exiting Khartoum is prohibitively expensive; civilians are often robbed or forced to pay bribes to pass through security checkpoints. News media reports that housing costs and rent have also increased significantly in the areas of the city where there is less fighting, which creates further socioeconomic barriers to civilian safety in Khartoum.⁷

Beyond these impediments to movement, SAF, RSF, and aligned militias have imposed restrictions on civilians' free movement within and outside the cities of Khartoum, Omdurman and Bahri. Open source data indicates that RSF are allegedly enforcing the use of permits, which can include bribes, on civilians who wish to exit and return to RSF-controlled areas in Khartoum.⁸ SAF closed the Khartoum-Bara highway, one of the key highways to exit Khartoum on 24 July 2023 and warned that any vehicle travelling on this highway would be considered a military target. SAF issued this policy based on a claim that RSF smuggles goods and forces to and from Darfur via the highway.⁹ Around 17 August 2023, RSF and allied militias reportedly besieged Omdurman's neighborhoods of Abbasia, Abu Kadok, Al Doubat, Al Doha, and Al-Fitahab while also prohibiting entry of food supplies to trapped civilians. Eyewitness accounts reported that RSF prevented entry of life-saving medicines and essential food supplies to both Abu Kadok and Al-Fitahab areas.¹⁰

7. <https://www.theguardian.com/world/2023/aug/24/sudan-war-atrocities-civilians-targeted-khartoum-poor-elderly-trapped>, archived at <https://perma.cc/K45W-6QCU>
8. SITREP_04_003
9. <https://sudantribune.com/article275417/> archived at <https://perma.cc/W5LT-J77N>
10. <https://www.altaghyeer.info/en/2023/08/17/sudan-rsf-blocks-food-and-life-saving-medicines-reaching-omdurman/>, archived at <https://perma.cc/XB9B-NYEP>

Humanitarian Impact of Fighting and Bombardment across Khartoum State

Damage and Destruction of Civilian Sites

Critical Infrastructure

The Resistance Committee in Al-Fitahab reported that, around 26 August 2023, RSF fired mortar shells into civilian homes and on the Abu Sied Pediatric Hospital.¹¹ The violence in Khartoum State has resulted in substantial damage and destruction to civilian infrastructure including healthcare facilities, markets, schools, power and telecommunications infrastructure, and water supplies.¹² The destruction of critical infrastructure from the start of the conflict limits civilian access to essential items, such as food and water.¹³ The destruction to markets in Khartoum has led to an increased shortage of essential food items across Khartoum State, which aggravates the fragile food security situation.¹⁴ Damage from aerial bombardment and explosive ordinance has damaged and destroyed water pipes and water treatment plants in residential areas across Khartoum State.¹⁵ In Khartoum State, the damage to water treatment plants and constant power outages continues to affect the operations of the water stations in Bahri and El Shajara.¹⁶

Between 16 and 17 September 2023, critical facilities and government institutions in Khartoum were set ablaze during intense fighting between SAF and RSF.¹⁷ Yale HRL has confirmed damage, including smoke emanations visible in satellite imagery, to both the Greater Nile Petroleum Operating Company Tower and the Ministry of Justice building after multimedia online circulated showing both on fire (slides: Ministry of Justice and GNPOC Tower).¹⁸ Both parties released statements accusing the opposing side of being responsible for intentional damage caused to these various facilities.¹⁹ Yale HRL has not made assessments as to which actor(s) are responsible for the attacks at this time. Clashes have also reportedly intensified as RSF attacked the SAF General Command in Khartoum on 16 and 17 September 2023.²⁰

11. <https://alintibaha.net/online/166610/%20archived%20at%20https://alintibaha.net/online/166610/%20;%20https://reliefweb.int/report/sudan/attacks-health-care-sudan-23-august-05-september-2023,%20archived%20at%20https://perma.cc/YZ5V-34XD>
12. <https://www.ipcinfo.org/ipc-country-analysis/details-map/en/c/1156504/?iso3=SDN>, archived at <https://perma.cc/H48E-GJQ5>
13. <https://reliefweb.int/report/sudan/acaps-thematic-report-sudan-impact-current-conflict-wash-needs-11-september-2023>, archived at <https://perma.cc/9KVY-JZTV>
14. <https://www.ipcinfo.org/ipc-country-analysis/details-map/en/c/1156504/?iso3=SDN>, archived at <https://perma.cc/H48E-GJQ5>
15. <https://reliefweb.int/report/sudan/acaps-thematic-report-sudan-impact-current-conflict-wash-needs-11-september-2023>, archived at <https://perma.cc/9KVY-JZTV>
16. <https://reliefweb.int/report/sudan/acaps-thematic-report-sudan-impact-current-conflict-wash-needs-11-september-2023>, archived at <https://perma.cc/9KVY-JZTV>

17. <https://www.bbc.com/news/world-africa-66837026> archived at <https://perma.cc/5Z6K-PYMB>
18. <https://twitter.com/sudanwarmonitor/status/1703318560632614939> archived at <https://perma.cc/ZU6N-R397>; SITREP_04_004
19. <https://twitter.com/RSFSudan/status/1703489770242879690> archived at <https://perma.cc/L2GG-2G5L>; <https://www.sudanakhbar.com/1430978>, archived at <https://perma.cc/4PMW-EN25>
20. <https://www.theguardian.com/world/2023/sep/18/sudan-fighting-conflict-landmarks-destroyed-battles> archived at <https://perma.cc/WVG5-GLK7>

Humanitarian Impact of Fighting and Bombardment across Khartoum State

Attacks on Healthcare Facilities and Medical Personnel

The Sudanese Ministry of Health has stated great concern for vulnerable people across Sudan due to medical shortages.²¹ Armed troops are forcibly evacuating and seizing medical facilities, exacerbating the significant medical supply shortages across Sudan.²²

Using satellite imagery, Yale HRL has corroborated the 1 August 2023 attack which resulted in a partial collapse of the upper floors of the Doctors' Hospital in Khartoum, likely rendering the building uninhabitable (slide: Doctors' Hospital).²³ RSF has alleged that SAF bombed this hospital.²⁴

As humanitarian and healthcare conditions in Khartoum State continue to deteriorate, healthcare personnel from neighboring states travel long distances to Khartoum State to assist with healthcare emergencies. On 2 September 2023, Sharg El Nil Emergency Room accused RSF of detaining three doctors who traveled from El Gedaref to volunteer at El Ban Jedid Hospital, Sharg El Nil in Khartoum.²⁵ MSF further alleged that RSF extrajudicially detained three doctors as they arrived near a RSF base near Teiba Camp in Jebel Aulia.²⁶

MSF provided critical care across the city despite warning that they may limit or cease operations in Khartoum following attacks on their workers on 20 July 2023.²⁷ MSF manages some of the only medical facilities currently open in Khartoum State, including the Turkish Hospital and Bashair Teaching Hospital in Khartoum and Al Nao in Omdurman.²⁸ MSF treated the casualties and survivors of the alleged SAF 10 September 2023 airstrike on Khartoum's Quoro Market, which reportedly killed 43 people and injured over 60.²⁹ The Bashair Teaching Hospital and other medical facilities have operated in dangerous conditions throughout the conflict, with limited medical supplies, access issues, the inability to replenish staff, and continuous shelling in proximity to their facilities.³⁰

21. <https://www.dabangasudan.org/ar/all-news/article/%d9%88%d8%b2%d9%8a%d8%b1-%d8%a7%d9%84%d8%b5%d8%ad%d8%a9-%d8%aa%d9%88%d9%82%d9%81-100-%d9%85%d8%b3%d8%aa%d8%b4%d9%81%d9%89-%d8%a8%d8%a7%d9%84%d8%ae%d8%b1%d8%b7%d9%88%d9%85-%d8%a8%d8%b3%d8%a8%d8%a8>, archived at <https://perma.cc/ZT27-GYCK>

22. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC10444969/>, archived at <https://perma.cc/28NL-9NNJ>

23. https://twitter.com/Sudan_tweet/status/1686437855801868288 archived at <https://perma.cc/P34V-7CNS> ; <https://www.dabangasudan.org/en/all-news/article/sudan-armed-forces-deny-imminent-cessfire-as-shelling-ravages-khartoum-hospital>, archived at <https://perma.cc/SXA4-KX7E>

24. <https://twitter.com/RSFSudan/status/1686473453015052288>, archived at <https://perma.cc/974R-U5QX>

25. SITREP_04_010

26. <https://www.doctorswithoutborders.org/latest/sudan-crisis-update-august-2023>, archived at <https://perma.cc/2P5M-BQBH>

27. <https://www.doctorswithoutborders.org/latest/sudan-hospital-omdurman-threatened-escalating-violence>, archived at <https://perma.cc/UA29-SAKH>; <https://www.doctorswithoutborders.org/latest/situation-very-dangerous-msf-doctor-reports-khartoum>, archived at <https://perma.cc/LG33-7HX7>

28. <https://www.aljazeera.com/news/2023/7/21/msf-says-armed-men-attacked-aid-workers-in-sudan>, archived at <https://perma.cc/ZXH5-F5EQ>, also reported previously in Howarth, Caitlin N., Kaveh Khoshnood, Andrew Marx, Nathaniel A. Raymond, et al. "Impact of 100 days of Fighting across Civilian Areas in Khartoum" Report 007 28 July 2023, Sudan Conflict Observatory: Washington, DC. Available at <https://sudan.conflictobservatory.org>.

29. <https://www.doctorswithoutborders.org/latest/sudan-deadliest-days-khartoum-conflict-began>, archived at <https://perma.cc/S77S-TNDD>

30. <https://www.doctorswithoutborders.org/latest/sudan-hospital-omdurman-threatened-escalating-violence>, archived at <https://perma.cc/UA29-SAKH>; <https://www.doctorswithoutborders.org/latest/situation-very-dangerous-msf-doctor-reports-khartoum>, archived at <https://perma.cc/LG33-7HX7>

Humanitarian Impact of Fighting and Bombardment across Khartoum State

Humanitarian Situation and Access

As of 13 September 2023, UNOCHA reports that humanitarian access remains limited across Sudan, including in Khartoum, with 921 access incidents since 15 April 2023.³¹ Humanitarian access incidents are defined as anything impeding or stopping humanitarian aid from being delivered. Khartoum State accounts for 37% (280) of these reported access incidents, which is the highest number of access incidents out of any state in Sudan since the start of the conflict.³² UNOCHA has noted bureaucratic impediments for aid leaving Port Sudan, such as denial of travel visas, arbitrary payments, and stop-and-search activities that serve to actively limit aid to Khartoum.³³ On 17 August 2023, it was reported that RSF and aligned forces were specifically preventing the delivery of humanitarian aid in RSF-besieged areas of Omdurman, under the justification that the aid was reportedly going to SAF.³⁴

Food aid remains a critical need in Khartoum.³⁵ On 1 September 2023, MSF reported an increase in children with malnutrition being admitted to the Turkish Hospital.³⁶ The World Food Programme (WFP) assesses that only three humanitarian organizations are providing food assistance throughout Khartoum State, with WFP providing the majority of that aid.³⁷

UNICEF has coordinated delivery of water treatment chemicals to seven different facilities to reduce the risk of cholera throughout Khartoum State, which may provide one month of clean water supply.³⁸

Significant Forced Displacement of Khartoum's Civilians

On 14 September 2023, UNOCHA reported that there are 7.7 million internally displaced people (IDPs) in Sudan- the largest number of IDPs in the world.³⁹ An unknown proportion of recent IDPs from Khartoum are IDPs from previous conflicts, resulting in a scenario where some families are subjected to a second displacement.⁴⁰ Khartoum State remains the largest origin of recently displaced civilians across Sudan with at least 2,875,125 people displaced.⁴¹ Even though a large proportion of civilians have left the state, there are still over 49,000 recently displaced civilians staying around Khartoum.⁴² The majority of IDPs who remain in Khartoum (62.8%) are in various host communities, with about a third living in rented accommodations.⁴³

31. <https://reports.unocha.org/en/country/sudan/>, archived at <https://perma.cc/7WTG-HS88>
32. <https://reports.unocha.org/en/country/sudan/>, archived at <https://perma.cc/7WTG-HS88>
33. <https://reliefweb.int/report/sudan/sudan-humanitarian-update-14-september-2023>, archived at <https://perma.cc/Q3X2-D2MY>
34. <https://reliefweb.int/report/sudan/attacks-health-care-sudan-23-august-05-september-2023>, archived at <https://perma.cc/5SQ5-FPUU>
35. <https://reports.unocha.org/en/country/sudan/>, archived at <https://perma.cc/7WTG-HS88>
36. <https://www.doctorswithoutborders.org/latest/situation-very-dangerous-msf-doctor-reports-khartoum>, archived at <https://perma.cc/LG33-7HX7>
37. <https://app.powerbi.com/view?r=eyJrIjoieWVhbnRlY0YjZTBJMTkNYsImMiOjF9>, archived at <https://perma.cc/KU3N-GRB3>

38. <https://reports.unocha.org/en/country/sudan/>, archived at <https://perma.cc/7WTG-HS88>; <https://www.doctorswithoutborders.org/latest/situation-very-dangerous-msf-doctor-reports-khartoum>, archived at <https://perma.cc/LG33-7HX7>
39. <https://reliefweb.int/report/sudan/sudan-humanitarian-update-14-september-2023>, archived at <https://perma.cc/Q3X2-D2MY>
40. <https://reports.unocha.org/en/country/sudan/card/WxtL7XevrB/> archived at <https://perma.cc/7WTG-HS88>; <https://mixedmigration.org/articles/mixed-migration-consequences-sudan-conflict/>, archived at <https://perma.cc/VM72-CCB8>
41. <https://dtm.iom.int/reports/dtm-sudan-weekly-displacement-snapshot-3?close=true>, archived at <https://perma.cc/BS7Z-DJJS>
42. <https://dtm.iom.int/reports/dtm-sudan-weekly-displacement-snapshot-3?close=true>, archived at <https://perma.cc/BS7Z-DJJS>
43. <https://dtm.iom.int/reports/dtm-sudan-weekly-displacement-snapshot-3?close=true>, archived at <https://perma.cc/BS7Z-DJJS>

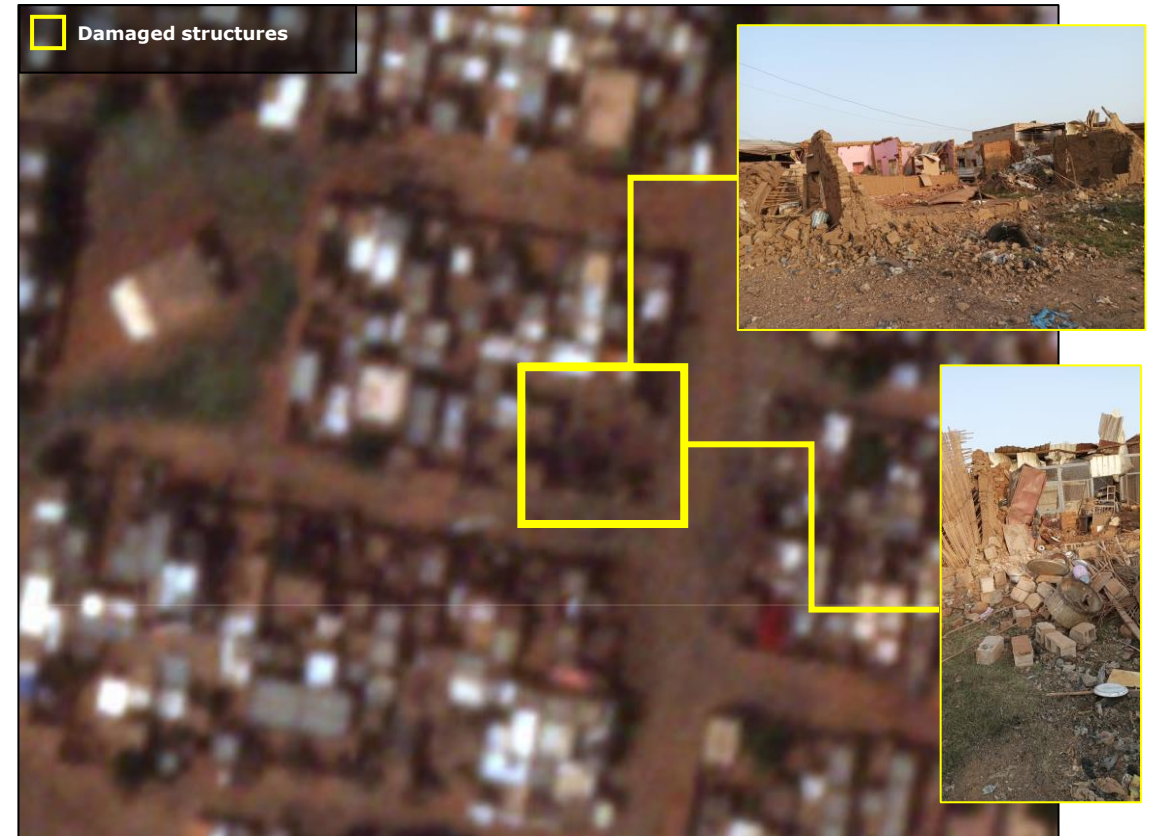
El Haj Yousef al-Wahda, East Nile

16 AUGUST - 14 SEPTEMBER 2023



16 August 2023 ©2023 Maxar

Analysis of satellite imagery identifies likely damage to multiple buildings, likely civilian homes, between 16 August 2023 and 14 September 2023. This corroborates open source reporting of an airstrike on 9 September 2023 that hit a residential neighborhood in El Haj Yousef al-Wahda.



14 September 2023 ©2023 Planet Labs PBC

Mayu Neighborhood

QUORO MARKET AREA

16 AUGUST - 17 SEPTEMBER 2023

An airstrike on 10 September 2023 hit Quoro market, resulting in 43 civilian deaths. News outlets have reported that residents said a military aircraft bombarded the market.

Yale HRL has observed that between 16 August 2023 and 17 September 2023, several buildings at the market experienced severe structural collapse. Imagery analysts identified the presence of new thermal scarring visible in satellite imagery on 17 September 2023. It appears likely that Quoro market is proximate to these buildings. Yale HRL has not been able to directly correlate the damage assessed below with potential damage caused by the alleged airstrike at this time.



16 August 2023 ©2023 Maxar



17 September 2023 ©2023 Planet Labs PBC

SOURCE | <https://www.doctorswithoutborders.org/latest/sudan-deadliest-days-khartoum-conflict-began> archived at <https://perma.cc/S77S-TNDD> ;

<https://www.bbc.com/news/world-africa-66745734> archived at <https://perma.cc/S44M-SM8P>

Doctors' Hospital, Khartoum

28 JULY - 16 AUGUST 2023

Between 28 July 2023 and 16 August 2023, the Doctors' Hospital, a private hospital in Khartoum, was attacked and sustained substantial structural damage.

Open source reporting corroborates visual damage to the hospital building. On 1 August 2023, RSF released a statement that alleges SAF bombed the hospital.



28 July 2023 ©2023 Maxar



16 August 2023 ©2023 Maxar

Ministry of Justice, Khartoum

16 SEPTEMBER 2023



6 September 2023 ©2023 Planet Labs PBC

Smoke emanations from the Sudanese Ministry of Justice building in Khartoum are visible in satellite imagery collected on 16 September 2023. This corroborates news reporting that the building was set ablaze during the exchange of rocket and artillery fire between the SAF and RSF on 16 September and 17 September 2023.



16 September 2023 ©2023 Maxar

GNPOC Tower, Khartoum

14 - 19 SEPTEMBER 2023

Satellite imagery shows probable thermal scarring, discoloration, and debris at the base of the GNPOC (Greater Nile Petroleum Operating Company) in Khartoum between 14 September and 19 September 2023. Multimedia circulating online indicates that the tower was burning on 17 September 2023. Yale HRL cannot assess responsibility for this attack using available data.



14 September 2023 ©2023 Maxar



19 September 2023 ©2023 Planet Labs PBC

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