

## Background

➤United Nations Relief and Works Agency for Palestine Refugees in the Near East (UNRWA) is a United Nations agency performing health, education, social service, protection, infrastructure maintenance of refugee camps and environment improvement. It has provided humanitarian aids to maintain life of 5.4 million Palestine refugees forced to live as refugees since 1948.<sup>1)</sup>

➤Regarding the effect of Israel– Hamas War 2023 on health of Palestine refugees, a dearth of water and worse hygiene become severe due to long refugee lives. As a result, Palestine refugees with diarrhea extremely increased 33 times in children and 99 times in adults because they were forced to drink water with bad hygiene.<sup>2)</sup> This becomes a serious problem for public health.

➤From start of the war to early January, UNRWA reported that consultations at UNRWA health centers in the Gaza Strip totally chronologically increased, and especially, consultations per day per governorate in UNRWA health centers in the Gaza Strip chronologically changed.<sup>2)</sup> It can be interpreted that this chronological change corresponds to the chronological move of Palestine refugees displaced by Israeli attacks in Gaza.

➤On the other hand, the number of consultations at health points in UNRWA shelters in the Gaza Strip were stable in all area regardless of course of the war.<sup>2)</sup> This shows UNRWA’s superior providing ability of quick stable medical service in disaster including this war.

➤To contribute to health of Palestine refugees displaced by the Israel– Hamas War of 2023, we examined changes in shipment of relief supplies for the Palestine refugees displaced by the war donated by UNRWA during the war.

1. Blanchet K, et. alLancet 2018; 392: 1009-10.

2. Al-Jadba G, et. al: Lancet 2024; 403: 723-26.

## Research design & Methods

➤We used data on “the number of trucks conveying relief supplies into Gaza” (nTrucks) in the UNRWA’s online logistics platform.

Endpoint

➤Comparison of the weekly changes in nTrucks donated by UNRWA (nT–UNRWA) and those donated by the others (nT–the–others) during the 196 days from October 21, 2023, to May 18, 2024.

➤Comparison of the weekly changes in nTrucks passing the Rafah Crossing (nT–Rafah–Crossing) and those passing the Kerem Shalom Crossing (nT–Kerem–Shalom–Crossing) for the same period.

➤The daily correlations between  $\frac{\text{nT–UNRWA}}{\text{nT–UNRWA} + \text{nTrucks donated by Egyptian Red Crescent (nT–ERC)}}$  (P–UNRWA [P: proportion]) and  $\frac{\text{nT–Kerem–Shalom–Crossing}}{\text{nT–Kerem–Shalom–Crossing} + \text{nT–Rafah–Crossing}}$  (P–Kerem–Shalom–Crossing) for the same period


➤Cochran-Armitage test and Pearson product-moment correlation coefficients were used for statistical analysis.

## Results

Comparison of the weekly changes in nTrucks																													
Week from October 21, 2023	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	p
nT–UNRWA	2	41	79	133	230	75	212	94	135	49	59	88	155	138	146	199	71	168	361	330	243	163	207	406	282	253	405	149	p<0.001
nT–the–others	131	303	377	329	935	609	497	810	558	862	928	996	997	760	795	323	411	694	889	768	833	969	1050	868	988	1120	1241	338	
nT–Kerem–Shalom–Crossing	0	0	0	0	0	0	0	142	136	356	542	645	666	413	579	465	366	680	970	946	821	774	864	977	989	1168	1266	407	p<0.001
nT–Rafah–Crossing	133	344	456	462	1165	684	709	762	557	555	445	439	486	485	362	57	116	182	280	152	255	358	393	297	281	205	380	80	

	nTrucks		p: Cochran-Armitage test
UNRWA (weekly)	174.0 ± 109.1	nT–UNRWA significantly increased over time compared to nT–the–others.	
nT–the–others (weekly)	727.8 ± 291.6		
nT–Rafah–Crossing (weekly)	506.1 ± 403.0		
nT–Kerem–Shalom–Crossing (weekly)	395.7 ± 239.7	nT–Kerem–Shalom–Crossing significantly increased over time compared to the nT–Rafah–Crossing.	
nT–UNRWA (daily)	24.9 ± 23.7		
nT–ERC (daily)	30.3 ± 25.7		
nT–Rafah–Crossing (daily)	72.3 ± 71.0	P–UNRWA was positively correlated with P–Kerem–Shalom–Crossing (r = 0.48, p < 0.001).	
nT–Kerem–Shalom–Crossing (daily)	56.5 ± 42.1		

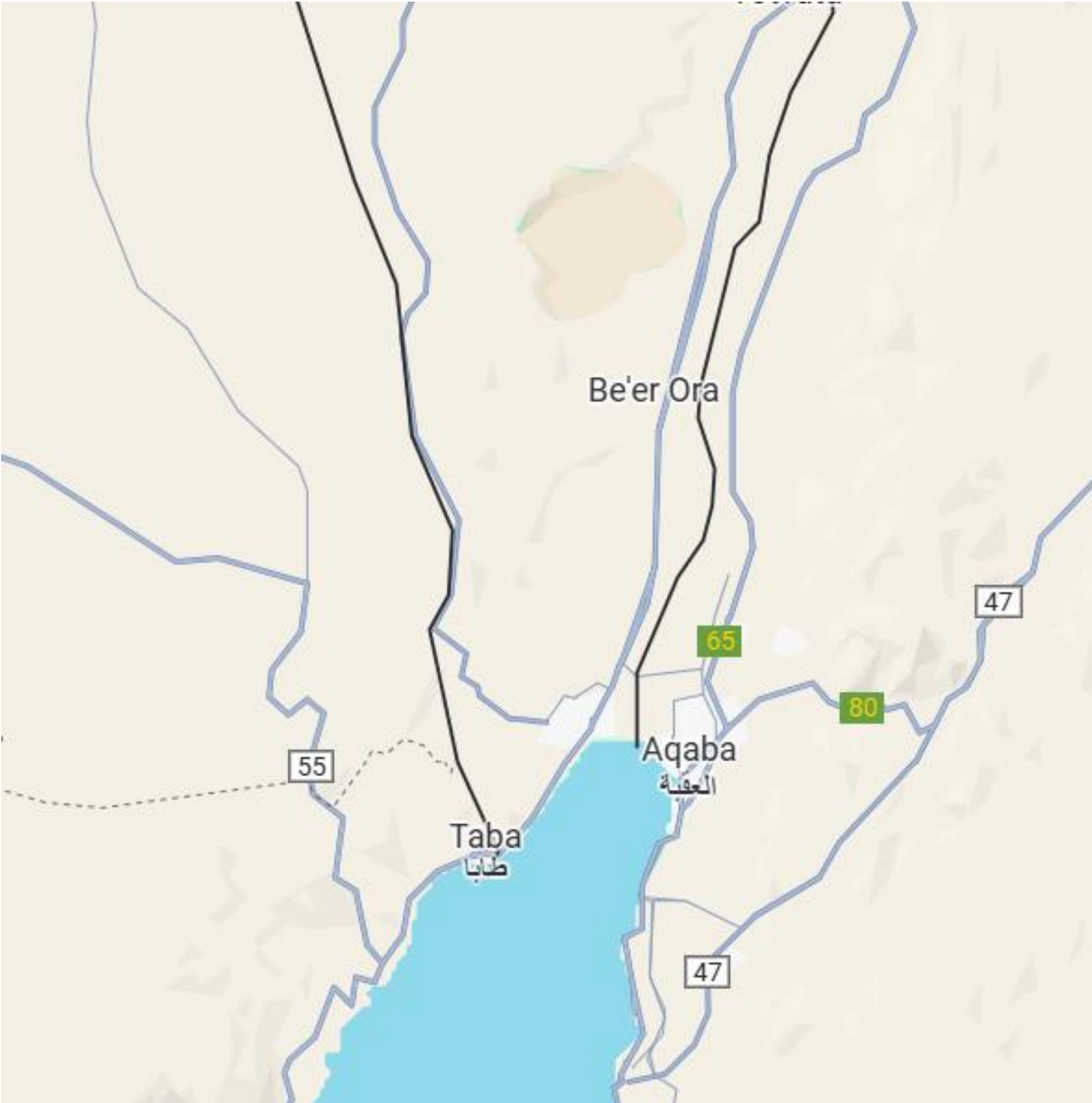
## Discussion



The Rafah Crossing lies on the Egypt–Gaza border.  
The Kerem Shalom Crossing lies on the Israel–Gaza border.

Geographical factors might have influenced the results of this study.

- When the Israel– Hamas War of 2023 started, the main crossing was the Rafah Crossing but has gradually shifted to the Kerem Shalom Crossing.
- Because the Rafah Crossing lies on the Egypt–Gaza border, whereas the Kerem Shalom Crossing lies on the Israel–Gaza border, trucks conveying relief supplies from Jordan, where the main office of UNRWA is located, to the Rafah Crossing must cross both the Jordan–Israel and Israel–Egypt borders. This hinders trucks from entering Gaza, resulting in a decrease in nTrucks.
- In contrast, trucks from Jordan must only cross the Jordan–Israel border to reach the Kerem Shalom Crossing.
- These factors might have spurred the increase in nT–UNRWA over time.
- In addition, to reach the Rafah Crossing, trucks conveying relief supplies from Egypt, where the main office of the Egyptian Red Crescent (ERC) is located, do not need to cross any borders, whereas to reach the Kerem Shalom Crossing, they must cross the Israel–Egypt border.
- These factors might have increased the correlation between P–UNRWA and P–Kerem–Shalom–Crossing.



Trucks from Jordan cannot go to Egypt directly by land and must pass through Israel.

Contact information

Conclusion

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To utilize UNRWA aid more effectively, it might be better to develop transportation routes using the Kerem Shalom Crossing.