

Violence and mortality in the Northern Rakhine State of Myanmar, 2017: results of a quantitative survey of surviving community leaders in Bangladesh



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Summary

Background In August, 2017, Myanmar security forces initiated a widespread response against the Rohingya ethnic minority in Northern Rakhine State, displacing thousands of people to Bangladesh. This attack was purportedly in response to attacks committed by the Arakan Rohingya Salvation Army, a non-state insurgent group, on Myanmar police, Border Guard Police, and military posts, killing 12 security personnel on Aug 25, 2017. This study aimed to capture the experiences of the population from all Rohingya hamlets in the Northern Rakhine State who have been displaced to Bangladesh.

Methods A quantitative survey was done among Rohingya leaders displaced to refugee camps in Bangladesh. Community leaders from 590 Rohingya hamlets and eight urban wards provided hamlet-level data on the extent, nature, and perpetrators of the violence in Northern Rakhine State in August, 2017, and the resulting morbidity and mortality.

Results From May 28 to July 25, 2018, 462 (77%) of 604 hamlet leaders reported that the primary reason they and their community members fled was because of violence in their hamlet or in a neighbouring hamlet. 568 (94%) respondents reported that they had experienced destruction in their hamlets, including burning or destruction of fields or farms, homes, and mosques; 531 (89%) of 599 respondents reported violence in their hamlets before flight and 373 (64%) of 586 reported violence against civilians in flight. The main perpetrators of violence included but were not limited to Border Guard Police, Myanmar military, and Rakhine extremists. Of the 531 respondents who reported violence in their hamlets, 408 (77%) reported that military forces used helicopters, 372 (70%) reported military vehicles, and 113 (21%) reported tanks in these assaults on civilian communities. We estimate that 7803 Rohingya died from violent and non-violent causes associated with the August, 2017, attacks and subsequent displacement.

Interpretation In 2017, the Rohingya ethnic minority population of Northern Rakhine State were the targets of a campaign of widespread and systematic violence, including violence by state forces.

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Introduction

The Rohingya are a Muslim minority population who trace their roots in the Rakhine state, western Myanmar, to the 8th century CE.¹ Successive regimes in Myanmar have argued, however, that Rohingya are foreigners who have only recently arrived in the region. The Rohingya do not have recognition as an official ethnic minority in Myanmar after the 1982 Citizenship Law, which effectively revoked citizenship rights and rendered them de facto stateless and susceptible to persecution.^{2,3}

On Aug 25, 2017, the Arakan Rohingya Salvation Army (ARSA), a non-state armed group, claimed responsibility for attacks on 30 Myanmar police, Border Guard Police, and military posts in the Rakhine state, killing 12 Myanmar security personnel.⁴ Subsequently, as supported by satellite imagery and reports from refugees,⁵ Myanmar security forces launched a widespread

military campaign in the Maungdaw, Buthidaung, and Rathedaung townships. Military operations reportedly included the burning of villages, destruction of property, and violence against civilians. Hundreds of thousands of Rohingya civilians fled to Bangladesh in the weeks after Aug 25, 2017, joining 300 000 Rohingya refugees who had fled attacks in previous years and were now residing in Bangladesh.^{6–9}

In the past year, investigations of the August, 2017, attacks have provided reports on the exodus of the Rohingya and outcomes of the military response. Mortality estimates have been calculated with the use of several methods, including a retrospective refugee household survey done in refugee camps in Bangladesh by Médecins Sans Frontières (MSF),⁸ which estimated 6700 deaths due to excess violence during the period of Aug 25–Sept 24, 2017. Results of a survey done by the Public International Law and Policy Group for the

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*The members of the study group have chosen to remain anonymous to protect their ongoing work in the region; the names and addresses of the anonymous authors have been supplied to the journal

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Research in context

Evidence before this study

Many journalists, human rights advocates, and humanitarian organisations have reported on the attacks against the Rohingya ethnic minority in the Northern Rakhine State in August, 2017. Most of these reports provide narrative accounts of attacks on hamlets, including beatings and attacks using guns and military assets, such as helicopters and tanks, resulting in mass killings and mass rape across a wide geographical area. Systematically gathered mortality data and information on perpetrators are missing from these reports. Médecins Sans Frontières (MSF) did a retrospective refugee household survey in refugee camps in Bangladesh that estimated 6700 deaths from excess violence in the period of Aug 25–Sept 24, 2017. A survey by the Public International Law and Policy Group for the US Department of State released in late September, 2018, which corroborated widespread killing, rape, and destruction of property, without quantifying mortality. These reports did not provide data on families or hamlet populations who might have been killed in their entirety before arrival, nor did they gather information on the extent and nature of violence encountered, perpetrators, or presence of military assets.

Added value of this study

Our study provides evidence of coordinated, widespread, and systematic attacks against the Rohingya population from a

survey of 604 surviving Rohingya leaders from hamlets displaced to the refugee camps in Bangladesh. These leaders represent 590 of 591 Rohingya hamlets in Northern Rakhine State and eight of 12 urban wards. The evidence from this research shows that Myanmar military and Border Guard Police participated in attacks that resulted in an estimated 7803 deaths. Respondents reported mass rape, killings, beatings, and use of military assets, including helicopters and military tanks, across a widespread area within a short time frame, suggesting a centrally controlled attack targeting the Rohingya population. These attacks continued during the flight to Bangladesh.

Implications of all the available evidence

These data corroborate the determination by the UN Fact Finding Mission that these attacks were widespread and systematic and done “with intent to destroy, in whole or in part, a national, ethnical, racial or religious group,” which is consistent with the definition of genocide under the Rome Statute. These findings are consistent with findings of the MSF study and findings of the US Department of State survey, all of which give evidence to support the prosecution of the Government of Myanmar for crimes against humanity with genocidal intent.

US Department of State¹⁰ were released in late September, 2018, which corroborated widespread killing, rape, and destruction of property, without quantifying mortality. Other reports^{11–13} have focused on testimonies of survivors and forensic documentation of injuries of survivors. Despite these investigations, data remains scarce on the perpetrators and quantitative assessments of the extent of the violence against the Rohingya have not been documented. These data are crucial to bring justice for victims and to provide evidence of crimes that can be tried in the International Criminal Court. This study aimed to address these gaps with a quantitative survey of all available and consenting surviving hamlet leaders who are living in Rohingya camps in Bangladesh.

Methods

Study participants

The primary aim of the cross-sectional survey was to capture the experiences of the population from all Rohingya hamlets in the Northern Rakhine State who had been displaced to Bangladesh. The term hamlet is equivalent to village. Multiple hamlets comprise a larger administrative unit called a village tract. Multiple village tracts make up a township, of which there are three in the Northern Rakhine State: Maungdaw, Buthidaung, and Rathedaung.¹⁴ The Northern Rakhine State is the portion of Rakhine State where most Rohingya reside and was the primary location of the August, 2017, attacks.^{10,15}

The Myanmar Government requires that Rohingya hamlet leaders regularly report population data for each hamlet to facilitate policies to restrict the Rohingya population; thus, we assumed leaders had accurate hamlet-level population estimates preflight. By having these estimates, we feel it makes hamlet leader reports more accurate than they might be in other non-Rohingya contexts, based on the knowledge of their role in Myanmar and community reports.^{16,17} Rohingya hamlets slowly reconnected in the refugee camps, and surviving leaders continue to represent and have knowledge of the population of their displaced hamlets. Based on community consultation and the reports of camp leadership, Rohingya surveyors, and others, we thought leaders were likely to be able to report on what happened to surviving villagers before, during, and after flight to Bangladesh.¹⁸

Physicians for Human Rights (PHR) compiled a comprehensive list of Rohingya hamlets using lists constructed by aid agencies working in Northern Rakhine State and the Myanmar Information Management Unit, a data and mapping unit under the UN humanitarian coordinator in Myanmar. Rohingya community leaders from each township then vetted this compiled list to ensure that every Rohingya village tract in Northern Rakhine State was represented.¹⁴ PHR identified 591 Rohingya hamlets across the three townships of Northern Rakhine State and 12 urban wards (subdivisions of cities) in Maungdaw and Buthidaung towns. PHR staff

	Number of respondents*
Township	
Maungdaw	346 (57%)
Buthidaung	229 (38%)
Rathedaung	29 (5%)
Total hamlets surveyed	598 (99%)
Affected households	91 434
Affected individuals	
Rohingya	898 499 (99%)
Rakhine	3563 (0.4%)
Mro	121 (0.01%)
Hindu	2556 (0.3%)
Main religion practiced in hamlet	
Islam	599 (99%)
Buddhism	4 (1%)
Hinduism	1 (<1%)
Rohingya households per hamlet	174 (104–290)
Rohingya individuals per hamlet	1156 (660–1930)
Data are number of respondents or affected individuals (%) or median (IQR). *604 respondents representing 598 hamlets and urban wards; leaders from six wards (subdivisions) provided unique ward-level data for two hamlets.	

Table 1: Hamlet characteristics

identified the most senior Rohingya official for each village tract or urban ward who was present in the Bangladeshi camps, and with their assistance the data collection team identified an appropriate leader from each hamlet or ward to interview for the survey.

Data collection

PHR obtained the name of the leading Rohingya official for each village tract and contact information (phone number and camp location) via community contacts residing in the refugee camps. PHR then contacted these leaders to find one surviving leader from each hamlet who was living in the refugee camps in Bangladesh. The most senior leaders (or their designees) from each hamlet who were displaced because of the 2017 attacks, were present in the Bangladeshi refugee camps, and who consented were interviewed, including hamlet council chairmen, clerks, secretaries, and village elders. PHR interviewed this member of hamlet leadership about events that people from that hamlet experienced, including morbidity and mortality from violence. In the rare case that a leader could not be found to represent the displaced hamlet, a village tract administrator or other person in a related position was asked to complete a questionnaire about the selected hamlet within their village tract, if they deemed they had sufficient information to do so. The research team developed interview order lists using a random number start system to randomise the order in which hamlet leaders were interviewed and thus minimise reporting

	Number of respondents*
Primary reason community members in hamlet left Rakhine State per hamlet leader report (select most appropriate response)	
Fighting or violence occurred in our hamlet	253/604 (42%)
Fighting or violence occurred in hamlet(s) near ours	209/604 (35%)
We did not feel safe remaining in our hamlet	44/604 (7%)
People were being arrested	36/604 (6%)
We were being extorted	17/604 (3%)
We were warned during meetings with officials that we should leave	10/604 (2%)
Other people fled to our hamlet and we decided to leave	7/604 (1%)
Accused of being ARSA	2/604 (<1%)
Other	26/604 (4%)
Other reasons people fled (select all)	
No other reason	37/604 (6%)
We were being extorted	452/604 (75%)
People were being arrested	431/604 (71%)
Fighting or violence occurred in hamlet(s) near ours	377/604 (62%)
We were warned during meetings with officials that we should leave	329/604 (55%)
Fighting or violence occurred in our village	266/604 (44%)
Health reasons	227/604 (37%)
Other people fled to our hamlet and we decided to leave	190/604 (32%)
Accused of being ARSA	187/604 (31%)
Lack of food	177/604 (29%)
Economic reasons	173/604 (29%)
Worried about now being a minority population in the hamlet	134/604 (22%)
Other	51/604 (8%)
One or more meetings held with the Rohingya in the hamlet after the end of Ramadan	555/604 (92%)
Content of meeting (among those where meetings were held)	
Asked about national verification cards	518/555 (93%)
Told about restricted mobility and access in or out of other hamlets	424/555 (76%)
Told about violence that occurred in other hamlets	411/555 (74%)
Threatened with violence	385/555 (69%)
Asked about ARSA	280/555 (51%)
Perceived intent of these meetings	
A threat to force you to move	452/555 (81%)
A warning so that you could prepare or escape	78/555 (14%)
Refused	3/555 (1%)
Other	22/555 (4%)

(Table 2 continues on next page)

bias by hamlet leaders. Only one individual was interviewed per hamlet.

The questionnaire included domains on respondent and hamlet characteristics, including location, population, ethnicity(ies), and religion(s) of inhabitants; reasons for flight from the Rakhine State; meetings and arrests leading up to the events of the August, 2017, attacks (specifically, after the end of Ramadan [June 24, 2017]—chosen to provide a common and easily remembered event); the types of destruction that

Number of respondents*

(Continued from previous page)

Who held the meeting (select all)

Border Guard Police	494/555 (89%)
Military or Tatmadaw	467/555 (84%)
Civil Government	312/555 (56%)
Rakhine extremists	129/555 (23%)
33rd Battalion	126/555 (23%)
Regiment 552	122/555 (22%)
Border Guard Police Sector 9	108/555 (20%)
Rakhine State Militias	75/555 (14%)
Regiment 564	72/555 (13%)
Regiment 353	28/555 (5%)
Hindu extremists	19/555 (3%)
Sakma extremists	18/555 (3%)
Other	104/555 (19%)

Any Rohingya people from the hamlet who were arrested after Ramadan 446/602 (74%)

Total number arrested after Ramadan (median per hamlet, [range]) 4605 (5 [0–220])

Reason for arrest (select all; among those reporting arrest)

Suspected of being ARSA	109/445 (25%)
No reason was given	417/445 (94%)
Other	21/445 (5%)

Outcomes for those arrested (select all; among those reporting arrest)

They were released	301/445 (68%)
They were killed	43/445 (10%)
They remain under arrest	222/445 (50%)

Data are n/N (%), unless otherwise specified. *604 respondents representing 598 hamlets and urban wards.
ARSA=Arakan Rohingya Salvation Army.

Table 2: Reasons for flight and events leading to flight

occurred in the hamlet, if any; and whether or not violence occurred in their hamlet or during flight. The questionnaire asked respondents to report the initial number of people in their hamlet, how many arrived to the refugee camp, and the number of people who were killed, missing, or remained in Myanmar. In hamlets where violence occurred, the questionnaire asked respondents to describe the types of violence perpetrated during these attacks, including total number of people injured, the number of people known to have been killed, the perpetrators, and the presence of military assets, such as helicopters, tanks, and other vehicles used during the attacks. The same series of questions was asked for leaders who reported attacks during flight. Hamlet leaders verified the list of all hamlets in their village tract to ensure the comprehensiveness of the initial hamlet list and provided information on events in neighbouring hamlets, including whether or not all of the residents of neighbouring hamlets were killed.

The research team selected a team of 11 refugee Rohingya surveyors, each with previous survey experience. They had 6 days of training in methodology,

research ethics, and consent procedures. Surveyors administered the questionnaire using Samsung Tab A tablets (Samsung, Seoul, South Korea) with a secure data entry platform developed using the SurveyCTO SurveyCollect application version 2.0, which the research team programmed with a Rohingya transliterated version of the questionnaire. All interviews took place in the Rohingya refugee camps located in Ukhiya and Teknaf upazilas of Cox's Bazar District, Bangladesh.

Surveyors met with prospective respondents to explain the questionnaire and, after obtaining consent, left with them a summary of the information being sought. An interview appointment was set for 2–5 days later, to give the respondent enough time to gather relevant information. The interview was held at a private location and the surveyor recorded responses on the study tablet.

Statistical analysis

We did data cleaning and validation regularly to ensure completeness and accuracy of data. We used descriptive statistics to calculate proportions describing results for categorical and binary variables. We estimated the total numbers of affected residents, displaced people, deaths, and injuries by a summation of the numbers reported for each hamlet.

We did not calculate 95% CIs given that these are used to describe uncertainty associated with the sampling process; this data collection was not a sample of hamlet leaders but a survey of all available Rohingya hamlet leaders in refugee camps who were displaced by the August, 2017, attacks. We acknowledge that there might be recall errors present in the data; however, imprecision associated with recall errors would not be addressed through the use of confidence intervals, which reflect imprecision in sampling rather than imperfect reporting. Instead, we have highlighted this limitation throughout this paper and present the datapoints as they are for the reader to interpret.

We estimated the crude mortality ratio (CMR) as the number of fatalities reported divided by the number of Rohingya residents as of Aug 25, 2017 (excluding those displaced or who remained inside Myanmar), in the time period defined for this study per 1000 people. As outlined in the results, many individuals were not displaced to Bangladesh and might have either remained in Myanmar or gone elsewhere. Given that the outcomes for people who were displaced or remained in the Rakhine State were unknown, we assumed a constant ratio of mortality after the event among this group and applied the CMR to extrapolate the number of probable deaths in that group. We summed this estimate with the total number of reported deaths from violent or non-violent causes in the hamlet, during flight, and after arrival to Bangladesh to estimate the total mortality among the Rohingya population affected during and after the August, 2017 attacks. Non-violent deaths included those due to fatal

events during flight for reasons such as drowning, no access to health care, and other causes not directly resulting from the attacks themselves. We analysed the results using Stata version 15 (StataCorp, College Station, TX, USA).

Protection of participants

All study participants underwent an informed consent process in Rohingya language before participating in this study. The PHR Ethics Review Board provided ethical approval for this study. Given the absence of a formal Rohingya body that could serve as a review board, PHR held a community consultation with Rohingya leadership before administration of the qualitative and quantitative components of this work, to obtain their input, feedback, and approval.

Government authors have targeted individuals reporting human rights violations in the Rakhine State. Thus, the research team implemented several strategies to ensure the confidentiality of the data collection team and respondents.^{19,20} PHR did not record any identifying information beyond hamlet and leadership role of respondent. To preserve anonymity, this Article excludes names of hamlets and specific mention of leadership roles of respondents. Surveyors entered data on password-protected tablets and transferred data for storage on secure password-protected and encrypted servers. The research team discussed risks of this survey with the Rohingya data collection team and with Rohingya leadership during community consultations. Both groups felt PHR's plans to mitigate these risks were adequate, and both endorsed the study.

Role of the funding source

The funder of the study had no role in study design, data collection, data analysis, data interpretation, or writing of the report. The corresponding author had full access to all the data in the study and shared with coauthors final responsibility for the decision to submit for publication.

Results

All results below are based on reports of senior hamlet representatives and are presented as proportion of the total population.

Rohingya leaders, including hamlet headmen (194 [32%]), hamlet council chairs (134 [22%]), village tract administrators (87 [14%]), village tract clerks (76 [13%]), and other leaders (113 [19%]), were based in Bangladeshi refugee camps and informal settlements. 604 surveys were done, representing eight (67%) of 12 urban wards and 590 (>99%) of 591 Rohingya hamlets in the Maungdaw, Buthidaung, and Rathedaung townships. Two of the 590 hamlets are large and so are administratively split into four subdivisions each, with one representative from each subdivision being interviewed to give 604 respondents in total. The surveyed hamlets included a reported 91434 Rohingya households

and 898499 Rohingya people (table 1). They were also home to an estimated 6240 ethnic Mro, Hindu, and Rakhine people. Collectively, respondents estimated that 233826 Rohingya people were displaced within or had

	Number of respondents*
Types of destruction observed before flight	
None	36/604 (6%)
Fields or farms were burned	479/568 (84%)
Homes were torn down or destroyed	454/568 (80%)
Mosques were destroyed or burned	394/568 (69%)
Homes were set on fire	304/568 (54%)
Other	144/568 (25%)
Violence occurred in hamlet after the end of Ramadan until flight to Bangladesh	531/599 (89%)
How did you know this violence occurred?	
Witnessed it occur	271/531 (51%)
Heard that it occurred	28/531 (5%)
Both witnessed and heard that it occurred	230/531 (43%)
Perpetrators of violence in the hamlet	
Border Guard Police	481/531 (90%)
Military or Tatmadaw	463/531 (87%)
Rakhine extremists	355/531 (67%)
Civil government	245/531 (46%)
33rd Battalion	148/531 (28%)
Rakhine State militias	144/531 (27%)
Regiment 552	136/531 (26%)
Border Guard Police Sector 9	120/531 (23%)
Regiment 564	88/531 (17%)
Sakma extremists	77/531 (15%)
Hindu extremists	66/531 (12%)
Regiment 353	43/531 (8%)
Other	96/531 (18%)
Military assets observed during violence in hamlet (select all)	
No vehicle	17/531 (3%)
Motorbike	452/531 (85%)
Helicopters	408/531 (77%)
Special military trucks	372/531 (70%)
Local boat	149/531 (28%)
Speedboats	114/531 (22%)
Tanks	113/531 (21%)
Other	37/531 (7%)
Other hamlets in the village tract experienced violence?	480/596 (81%)
Any violence occurred to the Rohingya people of your hamlet after leaving for Bangladesh	373/586 (64%)
How did you know this violence occurred?	
Witnessed it occur	116/373 (31%)
Heard that it occurred	82/373 (22%)
Both witnessed and heard that it occurred	175/373 (47%)

(Table 3 continues on next page)

Number of respondents*

(Continued from previous page)

Perpetrators of violence during flight (select all)

Border Guard Police (BGP)	331/373 (89%)
Military or Tatmadaw	331/373 (89%)
Rakhine extremists	289/373 (78%)
Civil government	189/373 (51%)
Rakhine State Militias	147/373 (39%)
Sakma extremists	116/373 (31%)
Regiment 552	102/373 (27%)
33rd Battalion	98/373 (26%)
Border Guard Police Sector 9	88/373 (24%)
Regiment 564	50/373 (13%)
Hindu extremists	38/373 (10%)
Regiment 353	23/373 (6%)
Other	80/373 (21%)

Military assets observed during violence while in flight (select all)

No vehicle	25/373 (7%)
Motorbike	289/373 (78%)
Helicopters	288/373 (77%)
Special military trucks	216/373 (58%)
Local boat	113/373 (30%)
Speedboats	98/373 (26%)
Tanks	94/373 (25%)
Other	20/373 (5%)

Was mass grave observed? (select all)

No	488/604 (81%)
Yes, in the hamlet	40/604 (7%)
Yes, en route to Bangladesh	53/604 (9%)

Data are n/N (%), unless otherwise specified. *604 respondents representing 598 hamlets and urban wards.

Table 3: Types of destruction, perpetrators, and military assets in hamlets before flight and during flight

chosen to stay within Rakhine State while another 665 101 fled to Bangladesh.

462 (77%) of 604 respondents reported that the primary reason that their hamlet fled was violence in their hamlet or in a neighbouring hamlet (table 2). 555 (92%) reported meetings convened by Border Guard Police, military, and civil Government representatives, which were held within their hamlet between the end of Ramadan (June 24, 2017) and before flight; 281 (47%) participants reported that five or more meetings were held. According to respondents, these meetings included threats of violence against the Rohingya (385 [69%] of 555) or focused on discussion of national verification cards (518 [93%]), which provide temporary legal status without conferring citizenship, or sometimes both.²¹ Meetings also discussed restricted mobility (424 [76%]) and violence that occurred in other hamlets (411 [74%]). Most of the respondents who reported these meetings said that they were perceived as

a threat to force the hamlet population to move (452 [81%]; table 2).

446 (74%) Rohingya leaders reported that Rohingya individuals in their hamlets had been arrested in the period between Ramadan and their flight. Among those who reported arrests in their hamlets, 417 (94%) reported that no reason was given for some or all of the arrests. 109 (25%) reported that some Rohingya individuals in their hamlets had been arrested under suspicion of collaborating with ARSA militants (table 2).

Respondents described destruction and violence that occurred within their hamlet and during flight to Bangladesh. 568 (94%) of 604 respondents reported that their hamlets experienced destruction, including burning or destruction of fields or farms (479 [84%]), homes (454 [80%]), and mosques (394 [69%]; table 3). 531 (89%) of 599 respondents reported that violence had been directly perpetrated against people in their hamlet during the period before flight (only 599 respondents provided data on violence from the end of Ramadan before flight). Respondents reported a range of different types of violence in their hamlets, including villagers being shot, beaten, or otherwise injured, and religious leaders targeted in most hamlets. (figure 1).

Multiple groups were implicated by 531 respondents in the attacks of hamlets (table 3). The most commonly reported perpetrators included Border Guard Police (481 [90%]), military (or Tatmadaw; 463 [87%]), or Rakhine (ethnic group) extremists (355 [67%]; table 3). Respondents reported violence perpetrated by specific military regiments, including regiments 552, 564, and 353, and Border Guard Police Sector 9. Of note, respondents stated that extremists from Sakma and Hindu ethnic minority groups also perpetrated violence (table 3). Participants who reported violence described the involvement of military assets, including helicopters (408 [77%]), military trucks (372 [70%]), and tanks (113 [21%]). When these 531 respondents were asked about when the violence occurred in their hamlets, over two-thirds of (363 [67%]) indicated that it occurred within the 10 days before and after Aug 25, 2017, including 125 (24%) who reported that violence occurred directly on Aug 25, 2017 (figure 2). 480 (81%) of 596 respondents reported that violence was also perpetrated against neighbouring hamlets in their village tract (table 3).

Almost two-thirds (373 [64%] of 586) of respondents reported that violence was perpetrated against members of their hamlets while they fled to Bangladesh. Types of violence experienced during flight were similar to types of violence experienced during attacks on hamlets. However, gunshots, landmines, and attacks with mortars, rocket-propelled grenades, or grenades were more commonly experienced during flight than during attacks on hamlets (figure 1). Perpetrators of violence during flight were similar to those who perpetrated violence inside hamlets. Respondents reported seeing similar

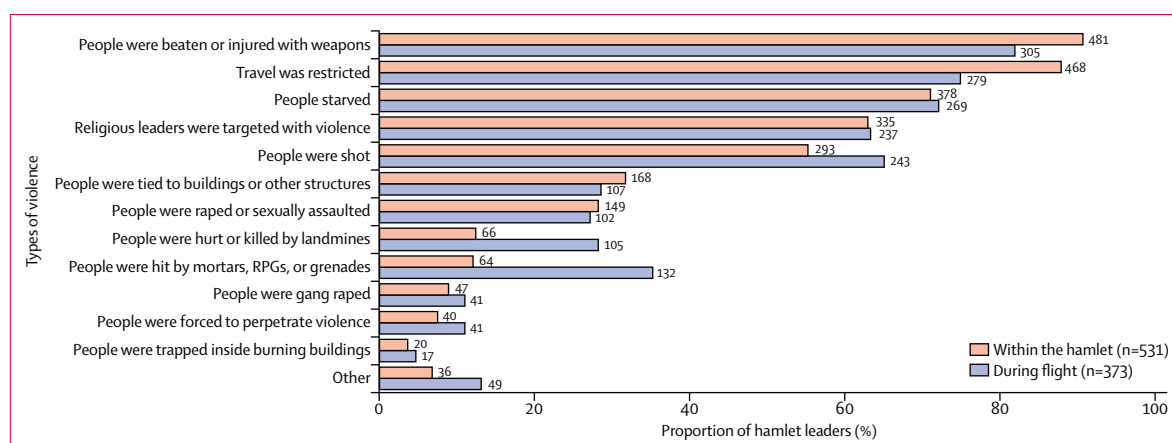


Figure 1: Proportions of hamlet leaders who reported each type of violence within the hamlet or while the community was in flight*

Data labels provide number of respondents. *Reports are per hamlet and might, therefore, represent a variable proportion of people (table 1). RPGs=rocket-propelled grenades.

military assets (eg, helicopters, tanks) during attacks on villages and attacks during flight. 15% of participants (93 of 604) reported observing a mass grave in their hamlet or while en route to Bangladesh.

An estimated 898 499 Rohingya lived in the hamlets before the attacks. Respondents estimated that 233 826 (26%) were internally displaced or remained within the Northern Rakhine State. After the attacks, which also affected an estimated 129 people of other ethnicities, an estimated 665 101 Rohingya people arrived and were living in Bangladesh. Some 644 Rohingya people were estimated to be missing as a result of the August 2017 attacks. Notably, estimates of those who fled, were killed, or displaced internally might differ from the estimation of total Rohingya population in affected areas. A total of 5772 Rohingya people were estimated to have died from violent and non-violent injuries during attack, flight, and arrival. These occurred while in their hamlet (n=1866), during flight (n=515), from non-violent causes during flight (n=969), or after arrival to Bangladesh (n=2422). These figures give an estimated CMR of 8.7 per 1000 people during the period of this study from Ramadan up to arrival to camps. We applied this CMR to the 233 826 people who remained in Northern Rakhine State who experienced the same levels of mortality, and we estimate that an additional 2031 Rohingya might have died from violent and non-violent causes. Thus, the total estimated deaths among the Rohingya population between the dates of the attacks and their arrival to Bangladesh are 7803.

Discussion

We have documented the widespread and systematic attacks by Myanmar state actors against the Rohingya population that resulted in most of that population fleeing to another country. We also documented threats against that same population from state actors leading up to the attacks, and the coordinated use of military

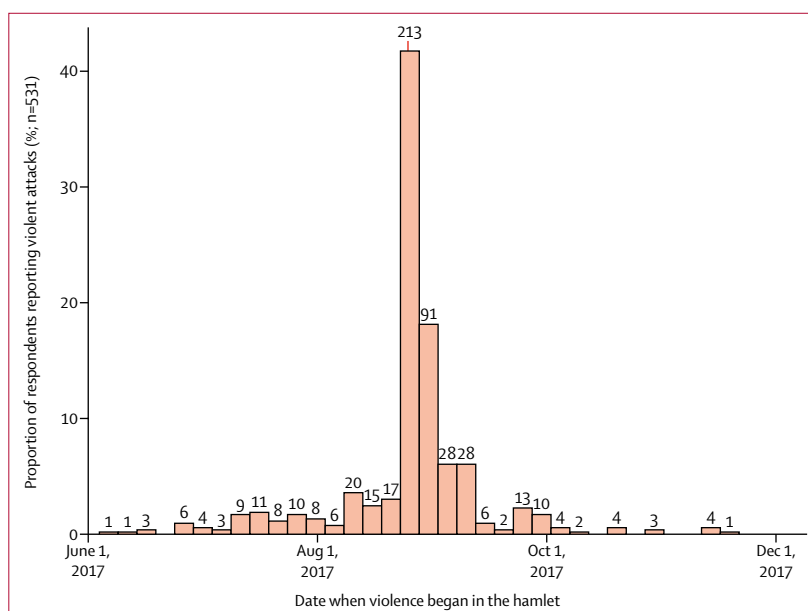


Figure 2: Dates when violence against the hamlets began in the Northern Rakhine State, June-Dec, 2017

Data labels provide number of respondents. Bars represent 5-day blocks. Red reference line shows Aug 25, 2017.

assets against them both during the attacks and during flight. These findings are consistent with the Rome Statute definitions of genocide: “committed with intent to destroy, in whole or in part, a national, ethnic, racial or religious group”.²²

These attacks were framed by Myanmar authorities as operations designed to target insurgents responsible for the deaths of 12 security personnel on Aug 25, 2017.²³ Our findings contradict this narrative. Hamlet leaders reported that attacks against Rohingya civilians in 2017 came after multiple meetings held by Myanmar security officials, including Border Guard Police and Tatmadaw, before Aug 25, 2017, in which Rohingya communities were reportedly threatened with violence and urged to

leave their lands. In most of these meetings, hamlet leaders reported that people were either directly threatened with violence or perceived the intent of these meetings as a threat of violence against the Rohingya hamlets. The use of helicopters, tanks, and military trucks across a geographically widespread region within a narrow time frame also supports respondent reports that these assets were moved into the region in advance of this military campaign.^{24,25} Furthermore, almost half the attacks occurred on Aug 25, 2017, with over two-thirds occurring within the ten days that followed.

Most of the attacks were attributed to the Border Guard Police and the Tatmadaw (ie, the Myanmar military), with several specific regiments named. These results are consistent with the findings of many other organisations and journalists.^{10,26–29} Reports of violence by civilian actors, including Rakhine, Sakma, and Hindu individuals, also warrant investigation by authorities.

The attacks beginning on Aug 25, 2017, against the Rohingya people were carried out in strikingly similar manner, regardless of location. This finding has been corroborated in the UN Fact Finding Mission report.³⁰ We estimated that the total number of deaths due to the violence or in the aftermath (drowning, or death due to having no access to medications or health systems during flight) was approximately 7803 Rohingya people, with a CMR of 8.7 deaths per 1000 people. This projection assumes a constant rate, similar to the mortality estimates produced by others.⁸ Our estimate of the number of deaths is similar to the estimate reported by MSF, which suggested that 9400 people lost their lives in Myanmar between Aug 25 and Sept 24, 2017, of whom at least 6700 died due to violence.⁸ Given that MSF's estimate was based on a CMR for people who arrived in Bangladesh in November, 2017, it is likely to have captured populations who experienced higher rates of violence and who fled earlier, accounting for their higher estimate.

The findings reported here should be viewed in light of several limitations. The biggest limitation of this study is that one leader reported on events that transpired in their hamlet (although typically in consultation with other leaders, this process was not formalised). The size of hamlets varied from a few hundred to 8675 individuals. In other settings, reports of village leadership on mortality have proven unreliable.^{31,32} However, these previously studied settings did not involve leadership who were explicitly tasked with tracking and controlling populations in their villages in the same way Rohingya leaders do. For this reason, we feel morbidity and mortality estimates in these villages are likely to be stronger than those found in previous studies, though few objective means are able to confirm this assumption. Mortality findings are also consistent with findings of other reports, including the events of Chut Pyin, Inn Dinn, and others.¹²

All interviews were done in Bangladesh because of continued restricted access to the Northern Rakhine

State; thus the experiences of individuals displaced inside Myanmar still remain largely unknown. All individuals interviewed were men, given the cultural norms that largely exclude women from formal leadership positions; thus the experiences of women in these attacks and during flight are reflected through the lens of male leadership. We decided to interview hamlet leaders because of the ethical concerns around interviewing women survivors of sexual violence in a resource-limited context. Similarly, hamlet leaders might not have been present or aware of some deaths or other specific incidents of violence, so the survey results might represent an underestimate of hamlet-level mortality. However, this study is probably an accurate representation of each hamlet's overall experience with violence given the sampling strategy used. Rohingya leadership might be perceived to benefit from overestimating levels of violence and mortality in their villages, leading to a source of bias. However, given that our findings are in line with other estimates using differing methods and given that many leaders provided minimal or no reports of deaths or human rights violations, we have no reason to believe these reports have been inflated.

Notably, we have attempted to independently verify incidents reported by hamlet leadership with satellite imagery; however, much of the affected area was under cloud cover during the height of these attacks. Satellite corroboration of these attacks, thus, cannot be done during the period when most of the attacks were carried out (Marx A, Spatial Sciences Institute, University of Southern California, personal communication). Additionally, we were unable to corroborate reports with other individuals from each hamlet because of time and resource constraints.

Finally, the CMR estimated for populations remaining inside Myanmar and displaced to other locations was assumed to be similar to the CMR for populations who fled to Bangladesh. Mortality might have been higher for those who did not flee for reasons such as continued exposure to perpetrators, lack of food, shelter, and clean water because entire villages were destroyed. Thus, we feel that the estimate we present is conservative.

These data corroborate the determination by the UN Fact Finding Mission that these attacks were widespread and systematic and conducted “with intent to destroy, in whole or in part, a national, ethnical, racial or religious group,” which is consistent with the definition of genocide under the Rome Statute.^{22,30} These findings are consistent with findings of the MSF study and US Department of State survey, all of which provide evidence to support the prosecution of the Government of Myanmar for genocide, crimes against humanity, and war crimes, as recommended by the UN Fact Finding Mission.^{8,10,33}

Contributors

PKP was primarily responsible for writing the manuscript and co-coordinated study design, data collection, data analysis, data

interpretation. JL coordinated field data collection, and contributed to study design, data analysis, interpretation, and writing. HV contributed to writing the manuscript, study design, data collection, data analysis, data interpretation. The names and addresses of the authors who wish to remain anonymous have been supplied to the journal; their contributions included leading the data analysis and data interpretation, as well as co-coordinating study design, data collection, and writing; providing senior guidance on writing the manuscript, and co-coordinating study design, data collection, data analysis, data interpretation; and contributing to writing the manuscript, study design, data collection, data analysis, data interpretation.

Declaration of interests

We declare no competing interests.

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