Health Survey in Kutupalong and Balukhali Refugee Settlements, Cox's Bazar, Bangladesh

December 2017

SURVEY REPORT

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Table of Contents

List of abbreviations

≥50MR	50 and above mortality rate
95% CI	95% confidence interval
ACF	Action Contre La Faim
BMS	Balukhali Makeshift Settlement
CMR	Crude mortality rate
ERB	Ethical Review Board
EPI	Expanded Programme of Immunisation
GAM	Global Acute Malnutrition
GIS	Geographic information system
GPS	Global positioning system
IOM	International Organisation for Migration
ISCG	Inter-Sector Coordination Group
KMS	Kutupalong Makeshift Settlement
MAM	Moderate acute malnutrition
MenACWY	Meningococcal conjugate vaccine
MoHFW	Ministry of Health and Family Welfare
MSF	Médecins sans Frontières
MSF-OCA	Médecins sans Frontières – Operational Centre Amsterdam
MUAC	Mid Upper Arm Circumference
OCV	Oral cholera vaccine
PCV	Pneumococcal conjugate vaccine
PFA	Psychological first aid
SAM	Severe Acute Malnutrition
U5MR	Under-5 mortality rate (mortality rate in children under 5 years of age)
UNHCR	United Nations High Commissioner for Refugees
WHO	World Health Organization

Executive summary

Introduction

Violence in Rakhine State which began on 25th August 2017 has driven an estimated 626,000 Rohingya across the border into Cox's Bazar, Bangladesh.[1] Together with previously displaced people this took the total number of Rohingya in Bangladesh to over 800,000. The majority of these people are now living in pre-existing camps and settlements, settlement extensions (additions to pre-existing settlements), spontaneous settlements (newly-formed settlements) and amongst the host community in Cox's Bazar District. There was a need to understand the scale and severity of the emergency in the settlements.

Methods

Four health surveys were performed in Kutupalong Makeshift Settlment (KMS), Balukhali Makeshift Settlement (BMS), Kutupalong Makeshift Settlement Extension (KMS Extension) and Balukhali Makeshift Settlement Extension (BMS Extension). These sites were chosen to ensure that the health status and conditions were measured in both the new settlements and the pre-existing settlements. The surveys measured current and retrospective mortality, the main morbidities affecting the population, global and severe acute malnutrition rates, vaccination coverage rates for key antigens and health-seeking behaviour. Simple random sampling was used with a recall period from 25th February 2017 until the date of interview (30th October to 12th November): approximately 260 days.

Results

The overall crude mortality rate (CMR) was 0.93 per 10,000 per day (95% CI: 0.77-1.13) for the period 25th February 2017 to 12th November 2017, with an under 5 mortality rate (U5MR) of 0.74 per 10,000 per day (95% CI: 0.43-1.27). However, these rates mask the variation over time. Among those displaced since 25th August 2017, almost two thirds of deaths (64.9%) occurred between 25th August and 24th September 2017. This corresponds to a CMR during the month following the crisis of 6.31 (95% CI: 4.93-8.08)[2]. This is nearly 15 times higher than the CMR in the same population prior to this period (0.42 [95% CI: 0.28-0.62] between 25th February and 24th August 2017) and more than 9 times higher than the CMR in the same population afterwards (0.67 [95% CI: 0.35-1.29] between 25th September 2017 and the end of the recall period).

When the 25th August-24th September 2017 mortality was stratified by age group the highest mortality was among those aged above 50 years with a mortality rate of 17.28 per 10,000 per day (95% CI: 10.58-28.20) but mortality was also high in those aged between 5 and 49 at 5.32 (95% 3.90-7.25) per 10,000 per day and in <5 year olds at 4.56 (95% CI: 2.18-9.57) per 10,000 per day.

For the recently displaced, the main cause of death was violence, responsible for 66.7% of deaths between 25th August and 24th September 2017. The most common form of violence resulting in death was shooting (69.0%) followed by "other" causes (16.7%, all but one of which was recorded as "killed by military") and burnt to death in home (11.9%).

Between 25th August and 24th September 21.5% (95% CI: 20.1-22.9) of the recently displaced population reported experiencing at least one violent event, nearly 8 times higher than in the same population prior to this period, between 25th February and 24th August (2.8% [95% CI: 2.2-3.4]) and 20.5 times higher than in the same population between 25 September and the end of the recall period

[1] Inter Sector Coordination Group. Situation Report: Rohingya Refugee Crisis, 19 November 2017. Available at URL: https://reliefweb.int/sites/reliefweb.int/files/resources/171119_weekly_iscg_sitrep_final_0.pdf

[2] CMR for the period 25th August to 24th September 2017

(1.1% [95% CI: 0.7-1.4]). These events included shooting, physical violence, the burning of homes and detentions / kidnapping. Sexual violence was also reported by 3.3% of all women amongst the recently displaced population during this period.

One third of respondents self-reported ill health in the two weeks prior to the survey. The most common reported illnesses were fever (66%), respiratory diseases (35%) and diarrhoea (15%). Overall, 49% of those who were ill sought healthcare from a clinic with a higher proportion of the pre-existing residents (67%) seeking healthcare in comparison to the new arrivals (46%). Reasons not to utilise healthcare services included lack of money (42%), geographical barriers (26%) and a lack of time (20%).

Measles vaccination coverage in the settlements was low (23.2% [95% CI: 19.9-26.5]), with less than one quarter of children under 5 years vaccinated. A mass oral cholera vaccination (OCV) campaign conducted by the Government in October has resulted in vaccination coverage of 68.3% (95% CI: 66.9-69.8) of the population. However, coverage varies by site with coverage ranging from 55.8% in the KMS Extension to 74.0% in the BMS Extension, 77.0% in BMS and 79.1% in KMS.

Based on the mid-upper arm circumference (MUAC) assessment, the global acute malnutrition (GAM) in the settlements is just below 10% and the severe acute malnutrition (SAM) rate 3%, above the MSF emergency threshold. However, doubts about the suitability of the MUAC methodology have been raised in a recent SMART survey performed by Action Contre la Faim (ACF) in Kutupalong refugee camp. Discordancy between anthropometric assessment and MUAC in the same individuals was observed, with GAM rates up to four times higher when using weight-for-height compared with MUAC.

Conclusions

The results of these surveys reveal extremely high mortality, even in children, and exposure to violence, in the initial weeks following the crisis in Rakhine. This analysis demonstrates the widespread and indiscriminate nature of the attacks, forcing the Rohingya to flee en masse. In contrast, mortality in the pre-existing refugee population in the settlements in Bangladesh has remained stable over this period, with no obvious detrimental effect on the health of this population with the arrival of the recently displaced refugees.

Assessment and monitoring of malnutrition in the settlements remains challenging, with discussions regarding the most appropriate methods for rapid, community-level malnutrition screening ongoing and it may be necessary to repeat nutritional screening if the MUAC methodology used in this survey is deemed inaccurate.

Vaccination coverage was found to be low among the refugee population. As of November 2017, a large-scale measles outbreak occurred in the settlements to which the Government has responded with a catch-up vaccination campaign. Despite this, it is recommended that efforts to scale up expanded programme of immunisation (EPI) activities continue.

Acknowledgments

We would like to thank Prof. Abul Kalam Azad, Director General, the Directorate General of Health Service Ministry of Health and Family Welfare (MoHFW) in Bangladesh and Dr. Md. Abdus Salam Civil Surgeon, Cox's Bazar Civil Surgeon Office, Ministry of Health and Family Welfare, for the permission to undertake this survey and the population of Balukhali and Kutupalong settlements for their participation, assistance and cooperation during this survey.

1. Introduction

1.1. Context

In the early hours of 25 August 2017, violence broke out in Rakhine State, Myanmar, when the Myanmar military commenced a counter-offensive following attacks by Rohingya militants on Border Guard Police. This resulted in the displacement of an estimated 621,000 people from Rakhine state into Bangladesh.[3] Together with previously displaced people this took the total number of Rohingya in Bangladesh to over 800,000.

The majority of the refugees are now resident in Cox's Bazar district in pre-existing camps and settlements, settlement extensions (additions to pre-existing settlements), spontaneous settlements (newly-formed settlements with little support) and amongst the host community. Two of the main settlement locations are Kutupalong and Balukhali.

The Kutupalong refugee camp has traditionally contained a population of approximately 32,000 and is one of only two camps containing registered refugees. The camp closed registration in 1992, and the Rohingya refugees who continued to arrive over the following years populated areas around the official camp, forming the Kutupulong Makeshift Settlement (KMS). Together, the Kutupalong Registered Camp and the KMS comprise of the largest settlement of Rohingya refugees in Bangladesh.

In October 2016, another large influx of Rohingya took place with the majority settling in KMS and in the Balukhali Makeshift Settlement (BMS), several kilometres farther south. The Balukhali Makeshift Settlement had an estimated population of 20,000 in July 2017.[4]

Since August 2017, an estimated 439,600 refugees have reportedly arrived in the Kutupalong and Balukhali Makeshift Settlements. This led to rapid and massive extensions to the pre-existing Makeshift Settlements and eventually resulted in the merger of the two Makeshift Settlements into one extensive Expansion Site. The living conditions in the Extensions are visibly worse than those in the Makeshift Settlements as there was no pre-existing infrastructure in place prior to the refugees arrival. Efforts to put this infrastructure in place have been hampered by complicated access due to a lack of roads and difficult terrain.

The remaining 182,000 newly arrived refugees have settled in other spontaneously formed Makeshift Settlements south of Balukhali, in and around the pre-existing Settlements of Leda and Shamlapur, in Nayapara Refugee Camp or in the host community.[3]

1.2. MSF presence in Bangladesh

Médecins sans Frontières – Operational Centre Amsterdam (MSF-OCA) has had a presence in Bangladesh since 1992. Currently three projects are operational – Kamrangirchar project, based in Dhaka, which focuses on adolescent sexual and reproductive health, sexual and intimate partner violence and occupational and environmental health, and the Kutupalong and Balukhali Emergency Health Intervention Projects in Cox's Bazar.

[3] Inter Sector Coordination Group. Situation Report: Rohingya Refugee Crisis, 19 November 2017. Available at URL: https://reliefweb.int/sites/reliefweb.int/files/resources/171119_weekly_iscg_sitrep_final_0.pdf

[4] International Organisation for Migration. Bangladesh: Needs and Population Monitoring. July 2017. Available at URL: https://cxbcoordination.org/wp-content/uploads/2017/08/170814_NPM_RIV_Final.pdf

In Cox's Bazar the MSF-OCA response to the current emergency is focusing on increasing access to services and the provision of primary and secondary healthcare while retaining the capacity to respond to emergency situations as they arise. To date, MSF-OCA has opened six new health posts since 25 August and increased its in-patient capacity from 50 beds in the Kutupalong Health Facility to 120 beds across two facilities in Kutupalong and Balukhali (Figure 1).

As of 21 November, MSF has treated over 67,000 patients since the influx of 25 August including more than 1,500 admissions to health facilities for secondary healthcare. Among those in-patients MSF has treated close to 400 patients for violence related injuries including gunshot wounds, burns and blast injuries and 94 sexual violence survivors.

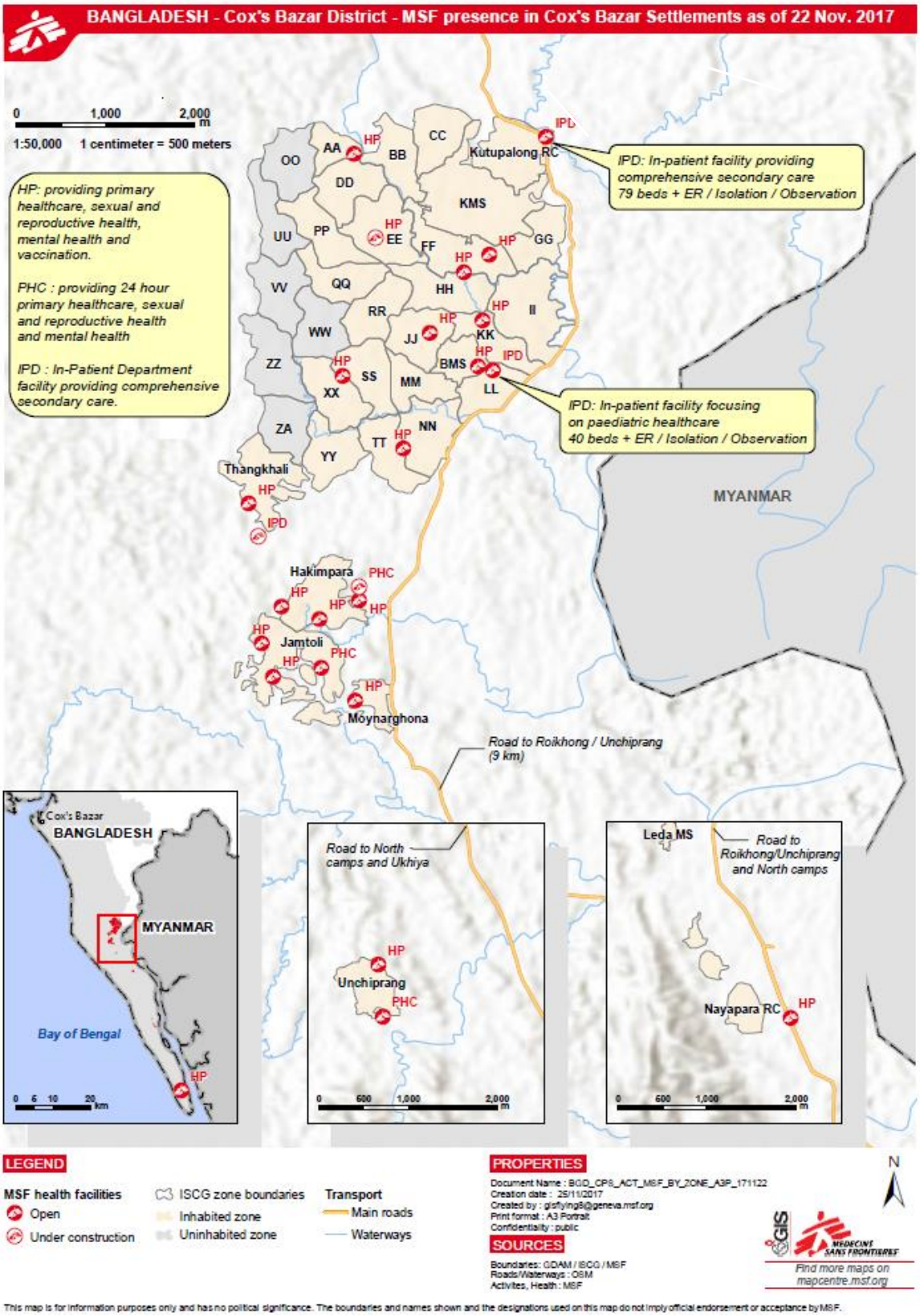


Figure 1. Map of Balukhali & Kutupalong settlements, Cox's Bazar District, Bangladesh

1.3. Background

Due to the vast hilly terrain, and the dynamic nature of the emergency, the scale and severity of the emergency and the health needs in the settlements are difficult to assess. A retrospective mortality and health survey was proposed in order to understand the needs of the population in order to better target medical programmes, and to provide relevant information to partner agencies working in the settlements. This survey will serve as a baseline for similar surveys to be performed in the future and will facilitate monitoring of health changes in the population over time as well as allowing for evaluating the impact of MSF interventions.

1.4. Objectives

The primary objective of the four surveys was to estimate the crude mortality rate (CMR) and the mortality rate in children under five years of age (U5MR) for each settlement area (KMS, BMS, KMS Extension and BMS Extension) and for the total population.

The secondary objectives were:

- To describe the population in terms of age, sex and household composition;
- To determine the coverage of measles, polio, MenACWY, DPT-Hib-HepB (Pentavalent) and pneumococcal (PCV) vaccination in 6-59 month olds, and oral cholera vaccine (OCV) coverage for the whole population;
- To determine the prevalence of severe and global acute malnutrition in 6-59 month olds;
- To identify the most prevalent morbidities in the population in the two weeks preceding the survey;
- To describe health seeking behaviour in terms of access to primary and secondary care;
- To estimate the crude mortality rate for the total population and for children under five years of age for the recently displaced population before and after the crisis in Myanmar and for the pre-existing population in the Bangladeshi settlements;
- To identify major causes of death, by age group and sex;
- To gain knowledge of violence-related events;

2. Methods

2.1. Study Design

The health survey was a retrospective survey using simple random sampling, a method by which households are selected by chance (random GPS coordinates within the area of interest).

2.2. Study Area

The study area was the entire catchment area of the MSF-OCA project in Kutupalong and Balukhali settlement camps and extension areas. Four surveys were conducted in total, in the BMS, BMS Extension, KMS and KMS Extension.

2.3. Study Period and Population

The recall period was 25th February 2017 until the day before the date of interview (30 October 2017 – 12 November 2017): 247-260 days. The 25th February 2017 date was chosen as the starting point for the recall period as it allowed for comparison between the situation in Myanmar before the crisis and the situation after 25th August among those displaced as a result of the crisis. It also allowed for comparison of the situation before and after the crisis began for the pre-existing displaced population in the settlements.

The study population consisted of all people living in Balukhali and Kutupalong settlements, which are situated in Cox's Bazar District, Bangladesh. Population data was taken from an exhaustive population count conducted by MSF community volunteers in the BMS, BMS Extension and KMS Extension between 23rd and 29th October 2017. Inter-Sector Coordination Group (ISCG) population estimates were used for KMS.[5] Combining these two data sources shows a current total population estimate for both areas of 472,128. These population data were used to generate sample weights for each area in order to calculate appropriately weighted results for the total population (Table 1).

Table 1. Population estimates by area, sample population and sample weights used in analysis

	Population estimate		Sample population		Sample weight
	N	%	N	%	
BMS	54,118	11%	1,060	23%	0.50
BMS Ext	95,117	20%	1,193	26%	0.78
KMS*	129,865	28%	1,161	25%	1.10
KMS Ext	193,028	41%	1,228	26%	1.55
Total	472,128		4,642		

*Population estimate from Inter-Sector Coordination Group estimates. All other population data from MSF exhaustive population count.

[5] Inter-Sector Coordination Group. Location of Rohingya Refugees in Cox's Bazar, 15th November 2017. Available from URL: https://data.humdata.org/dataset/site-location-of-rohingya-refugees-in-cox-s-bazar

2.4. Definitions

2.4.1. Definition of household

A household was defined as a group of people who slept under the same roof the previous night. Information on the whole household was included, no matter the age of the household member or the relation with the other members.

2.4.2. Definition of head of household

The head of household was defined as follows:

- Adult household member aged ≥18 years, *and*
- Could give accurate information on all demographic and mortality questions regarding others in his/her household (could describe with reasonable accuracy the events that occurred during the recall period), *and*
- Was present at the time of the survey

A household was excluded from the study if none of the household members fulfilled all these criteria. Individuals were included in the study if they were living in the randomly selected household, or had lived in the household during the recall period, and if verbal informed consent was given by the head of the household. Conversely, individuals were excluded if they refused to participate in the study or if they could not be located after two attempts.

2.5. Sample size and sampling frame

2.5.1. Sample size

Sample size was calculated with the help of "ENA for SMART 2011" software.[6] Although surveys are usually powered on the primary objective, in order to be able to achieve the secondary objective of detecting significant malnutrition, the sample size for this study was instead powered on detecting a global acute malnutrition (GAM) rate above the emergency threshold of 15% (i.e. with the lower 95% CI above 15%).[7] Therefore, a minimum of 212 households were included per survey, with one survey conducted in each area (BMS, BMS Ext, KMS, KMS Ext, Table 2).

[6] http://www.nutrisurvey.de/ena2011/main.htm

[7] World Health Organization, United Nations High Commissioner for Refugees, International Federation of Red Cross, World Food Programme. The Management of Nutrition in Major Emergencies, 2000. Available from URL: http://www.who.int/nutrition/publications/emergencies/9241545208/en/

Table 2. Criteria for the calculation of survey sample size

Criteria	GAM
Population	472,128
Global acute malnutrition rate (GAM, %)	16
Precision (%)	5
Design effect	1
Recall period (days)	-
No. Children aged <5 years to be sampled	207
Proportion of the population <5 years (%)	20
Average household size[8]	6
Proportion non-response households (%)	10
Number of households to be surveyed (assuming average household size of six persons)	212

2.5.2. Sampling frame

Simple random sampling of households was conducted by using randomly-generated GPS coordinates. The perimeters of each area were mapped by the MSF geographic information systems (GIS) officer. Random points were generated, using ArcGIS software[9], within the perimeter of each area and corresponding to the sample size. Survey teams using android phones with GPS localisation functionality visited the households that were identified to be physically closest to these randomly generated GPS points, and interviews were then conducted. This could potentially create a bias as households in areas with large distances between households are more likely to be selected than households in densely populated areas. However, in this setting where the population density is high and the distances between households are similar, the bias becomes negligible.

There were some instances of the survey teams not being able to visit the nearest household. This was due to the households being outside the perimeter of each area, being currently unoccupied or all residents at home at the time of visitation being under 18 years of age. For the latter two reasons, a second visit was made to the household. After two visits, the household was considered non-respondent.

2.6. Data collection

One survey team consisting of 12 pairs of data collectors (1 male and 1 female in each pair) and 1 supervisor performed the entire survey. The teams were trained for 2 days prior to the commencement of data collection, which included pilot testing of the questionnaire (Appendix 1).

Where possible the community pre-approved the visit of the survey team through community leaders (Mazees) or were informed through the Mazees on the day of interview. In the households randomly selected according to the above methodology, the purpose of the survey was explained to the head of the household in the Rohingya language and verbal consent obtained to conduct the interview. If participation was declined, this was recorded and reported to the supervisor.

[8] Estimated household size source: IRC, Relief International. October 2017 Assessment Report. Undocumented Myanmar Nationals Influx to Cox's Bazar, Bangladesh. Available from URL: https://reliefweb.int/report/bangladesh/october-2017-assessment-report-undocumented-myanmar-nationals-influx-cox-s-bazar

[9] ESRI 2011. ArcGIS Desktop: Release 10. Redlands, CA: Environmental Systems Research Institute.

2.7. Data entry and analysis

Data were collected using smartphones and the Dharma electronic survey platform. All data were anonymous (names and other identifying information were not collected) and electronic files stored and password-protected by MSF. The electronic database will be stored for 5 years after survey completion. Access to the electronic version of the survey will be restricted to the study investigators and MoHFW on request.

Data checks were undertaken at multiple stages of the survey to identify any inconsistencies in data entry and responses. At the field level, the study investigator joined survey teams daily to ensure that consent and interviews were being conducted correctly and to supervise data collection. Electronic forms collected by each team were also checked by the study investigator at the end of each day. Entered data were cleaned prior to analysis, which was conducted using Excel and STATA 13 (StataCorp, College Station, TX, USA).

Key indicators were calculated as proportions with 95% confidence intervals (95% CIs) for each area, with weighted averages used for results for the total population. Weights for each area were calculated using population estimates. Logistic regression models were used to assess the key contributors to differences between groups for some indicators.

The end of the recall period was calculated individually for each member of the household present at the start of the recall period, or born within the recall period. The recall period was considered to end either with the day of the study, the day of death of the household member or with the day of departure for household members who had left. For all mortality rate calculations, the denominator was the total number of person-days contributed during the recall period, with people still alive in the household on the day of the interview contributing person-time up to that day. Mortality rates were calculated as the number of deaths per 10,000 person-days with appropriate 95% CIs.

2.8. Ethical issues

The study was conducted in accordance with the Council for International Organisations of Medical Sciences International Ethical Guidelines, 2016 and the World Medical Assembly Declaration of Helsinki - Ethical Principles for Medical Research Involving Human Subjects, 2013.[10] The study protocol was approved by the MSF Ethics Review Board (ERB) on 19 October 2017 and by the Director General of the Ministry of Health and Family Welfare in Bangladesh.

Informed verbal consent, recorded by survey teams, was obtained from all participants in the study. All participants had the study explained to them in a language with which they were familiar. Each household was offered the opportunity to decline participation in the study at any time without penalty. Participation was voluntary and it was made clear that no incentives or inducements would be provided to respondents.

All data remained anonymous throughout the data entry and analysis process. Identifiable data was not collected, and, thus, will not appear in any report or publication.

[10] http://www.wma.net/en/30publications/10policies/b3/

The survey did not cause any physical harm to participants. All study teams were trained on psychological first aid (PFA) in order to provide immediate response to mitigate any possible event of acute distress displayed by a respondent. The MSF medical team leader for each project provided guidance to the study team on appropriate referral practices for physically ill people (for both life-threatening cases and non-emergency cases) as well as procedures for referrals regarding psychosocial issues or victims of violence.

Participant privacy was respected during the interviewing process and staff were trained in how to assess for appropriate conditions to help maintain confidentiality during the interview process, including choosing the optimal location when a setting makes privacy difficult (e.g. single room dwelling).

3. Results

3.1. Study sample

The four health surveys were conducted in Balukhali and Kutupalong settlements from 30 October 2017 to 12 November 2017. The survey teams visited a total of 956 GPS points across the four surveys. Out of these, 51 households were not included (5.3% non-response rate) because they did not provide consent (2.7%), because no household was identified at the GPS point (e.g. the GPS point was some distance outside the settlement perimeter, 1.2%), because the house was empty (after two visits) (1.0%), or because the head of household was aged <18 years (0.4%) (Table 4). This resulted in a total of 905 household interviews (BMS (n=220), BMS Extension (n=235), KMS (n=215), KMS Extension (n=235)).

3.2. Demography

The demographics in each area were broadly similar (Table 3), although the average household size was slightly greater in the KMS (5.3 persons/household) than other areas. A higher proportion of women were currently pregnant in the BMS extension (8.5%), although this was not statistically significant. There was no statistically significant difference in the household composition of the recently arrived population and the pre-existing population. Throughout this report we refer to Rohingya who were living in the settlements in Bangladesh prior to the crisis on 25 August 2017 as pre-existing refugees or previously arrived refugees, and those who arrived in Bangladesh following the crisis as recently arrived or newly arrived refugees.

Table 3. Demographics of the sample population by area, Balukhali and Kutupalong settlements

	BMS	BMS Ext	KMS	KMS Ext
Households interviewed	220	235	215	235
Total number of people living in households	1,059	1,190	1,159	1,219
Average number of people per household (males, females)	4.8 (2.4, 2.4)	5.0 (2.5, 2.6)	5.3 (2.8, 2.7)	5.1 (2.5, 2.7)
Male/female sex ratio	1.0	0.9	1.0	0.9
Total number of pregnant women (% total women in sample)	34 (6.4%)	52 (8.5%)	28 (4.8%)	43 (6.7%)
Total number of people aged <5 years living in households	155 (14.6%)	209 (17.6%)	184 (15.9%)	191 (15.7%)
Mean age	20.8	20.3	20.0	21.5
Median age	17.0	16.0	16.0	16.0
Average number of children aged <5 years per household	1.5	1.6	1.5	1.5
Recently arrived refugees	567 (53.5%)	1,180 (99.2%)	478 (41.2%)	1,206 (98.9%)
Pre-existing refugees	492 (46.5%)	10 (0.8%)	681 (58.8%)	13 (1.1%)

Comparing the geographical distribution of recently arrived refugees and pre-existing refugees in the settlements showed that 46.5% of the population of the BMS and 58.8% of the KMS population were already living in the settlement before the August influx (Figure 2). Almost all the people living in both extension areas were recent arrivals (BMS Ext=99.2%, KMS Ext=99.0%). The recently arrived refugee population accounted for 77.9% of the total sampled population (n=3,431).

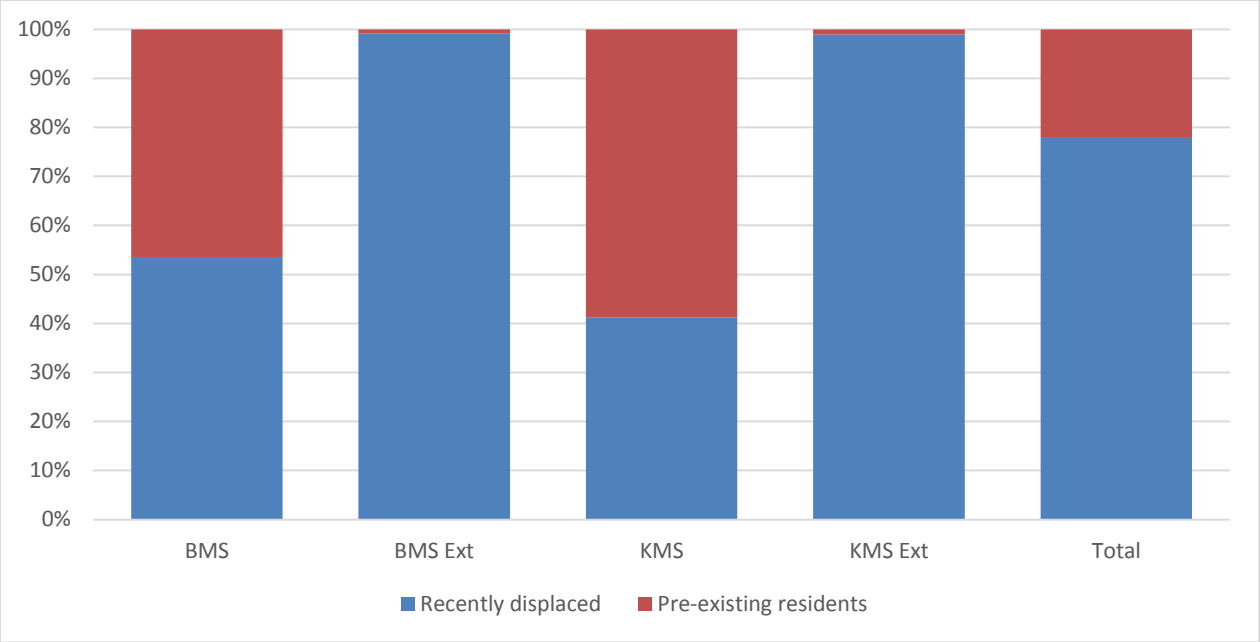


Figure 2. Proportion of the population of each area who were newly arrived refugees or pre-existing refugees

Across all areas there were 4,627 people living in the 905 households interviewed, of which 739 (16.0%) were children aged <5 years (Table 4). The average number of people living in each household was 5.1, with on average of 1.5 children aged <5 years in each household. Approximately 6.6% of all females sampled, or 14.2% of women of reproductive age (15-44 years), were pregnant[11]. The reported age range of pregnant women was 12-60 years, with a mean of 26 years (95% CI: 25.0-27.6); 94.3% of pregnant women were aged between 15 and 44 years.

The reported age range of the sampled population was 1 day to 120 years[12], with a mean of 20.8 years and a median of 16 years (Figure 3). Notable was the indent in the population pyramid in the 20-24 years age group, for both genders. Without comparable population data for the Rohingya in Rakhine prior to the crisis this is difficult to interpret. Children aged <15 years represented nearly half the sample population (46.0%). The male and female populations had similar age distributions, with 58.4% of males under 20 years compared with 56.7% of females: the mean age in males was 20.9 years and in females 20.4 years. Over three quarters (77.9%) of the sampled population comprised people who arrived in Bangladesh following the recent crisis in Rakhine State.

[11] It is unclear how this figure compares to other populations because it is rarely reported: number of live births is a more pertinent indicator.

[12] Age recording among the very old can be quite approximate. It is quite possible that those recorded as over 100 years are in fact younger.

Table 4. Demographic characteristics of sample population in Balukhali and Kutupalong settlements and non-response from the survey (weighted analysis)

	Number (%)
Total number of households visited (including non-respondents)	956
Non-response households	*51 (5.3%)*
Not home	*10 (1.0%)*
Aged <18 years	*4 (0.4%)*
Refused to participate	*26 (2.7%)*
No household identified at location	*11 (1.2%)*
Total number of households interviewed	905
Total number of people living in households interviewed	4,627
Average number of people per household (males, females)	5.1 (2.6, 2.6)
Total number of pregnant women (% total women in sample)	157 (6.6%)
Total number of people aged <5 years living in households interviewed	739 (16.0%)
Mean age	20.8 years
Median age	16.0 years
Average number of children aged <5 years per household	1.5
Recently arrived refugees	3,431 (77.9%)
Pre-existing population in the Bangladeshi settlements	1,196 (22.1%)

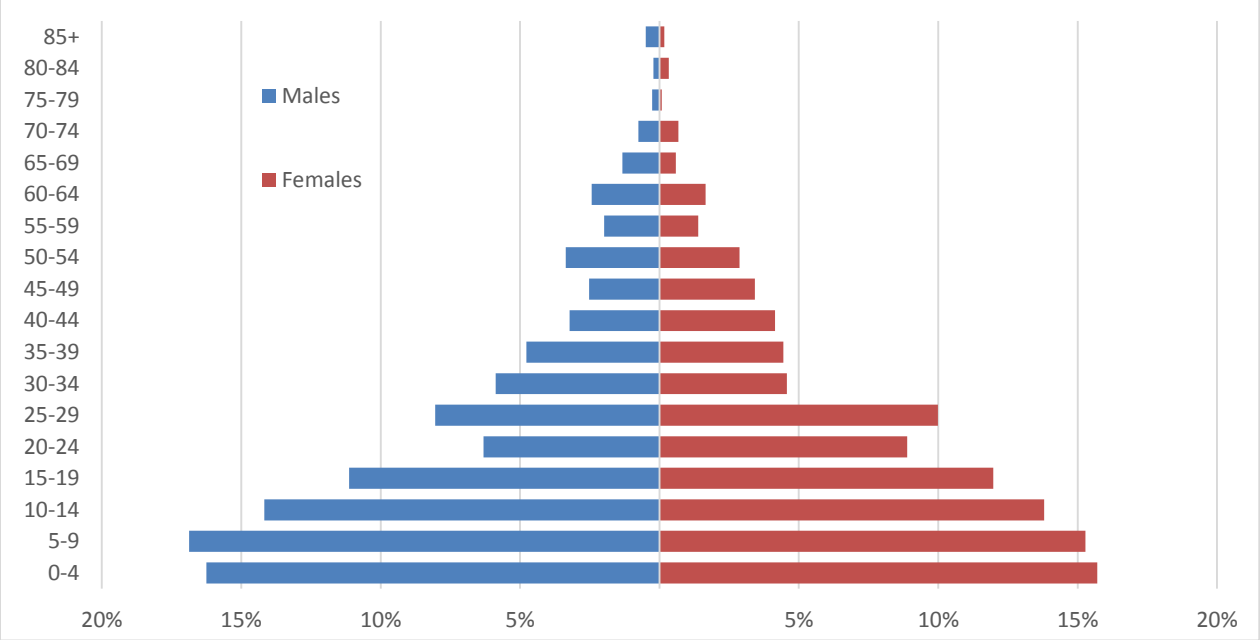


Figure 3. Population pyramid of the sample population in Kutupalong and Balukhali settlements

The male female sex ratio for the total population was 0.96, with no significant difference observed between areas. There are however differences between age groups, with the male female sex ratio low in the 20-24 (0.68), 25-29 (0.77), 40-44 (0.74) and 45-49 (0.70) age groups (Figure 4). There were, however, more males over 55 years of age, with a sex ratio of 1.36 in the 55-59 age group and 1.49 among those aged over 60 years.

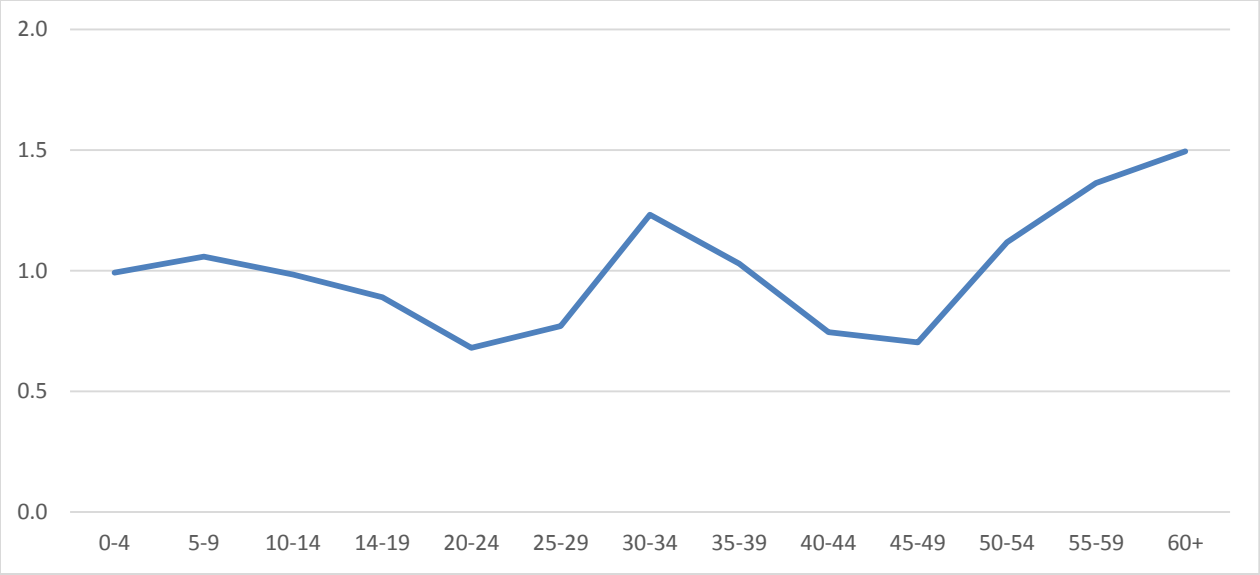


Figure 4. Male-female sex ratio for the total sample population, by age group

3.3. Mortality

The recall period, from 25 February 2017 to 12 November 2017 (last day of data collection), was 260 days; approximately 8.5 months. After accounting for arrivals and departures, births and deaths, the mean number of person days per individual, and therefore the denominator for mortality rate calculations, was 247.3 days (95% CI: 246.5–248.0), the median was 254.6 days.

3.3.1. CMR and U5MR for each survey – total recall period

The CMR for the entire recall period significantly exceeded the emergency threshold of 1 per 10,000 per day[13] in the BMS Extension area, with a CMR of 1.41 per 10,000 per day (95% CI: 1.04-1.92), but not in the KMS Extension (1.17 [95% CI: 0.84-1.64]) (Table 5). The CMR in the KMS (0.60 [95% CI: 0.37-0.96]) and in the BMS (0.50 [95% CI: 0.29-0.86]) was lower than the emergency threshold. No significant difference was observed in the sex-specific mortality rate between sex by area, nor in any of the age groups by area.

[13] Sphere. The Sphere Handbook: Humanitarian Charter and Minimum Standards in Humanitarian Response. Switzerland: Sphere; 2011 [online]. Available from: http://www.sphereproject.org/handbook/

Table 5. Mortality rates in the sample population for the whole recall period, by area

	BMS		BMS Ext		KMS		KMS Ext	
	N	**Rate (95% CI)***	**N**	**Rate (95% CI)***	**N**	**Rate (95% CI)***	**N**	**Rate (95% CI)***
Crude mortality	13	0.50 (0.29-0.86)	41	1.41 (1.04-1.92)	17	0.60 (0.37-0.96)	34	1.17 (0.84-1.64)
Sex-specific:								
Male	8	0.61 (0.31-1.23)	23	1.63 (1.08-2.45)	11	0.77 (0.43-1.40)	18	1.31 (0.83-2.08)
Female	5	0.38 (0.16-0.92)	18	1.20 (0.76-1.91)	6	0.42 (0.19-0.94)	16	1.05 (0.64-1.72)
Age-specific:								
<5 years	2	0.54 (0.13-2.14)	5	1.00 (0.42-2.40)	1	0.23 (0.03-1.60)	5	1.13 (0.47-2.71)
5-49 years	7	0.35 (0.17-0.74)	27	1.25 (0.86-1.82)	9	0.41 (0.21-0.79)	21	0.98 (0.64-1.50)
≥50 years	4	1.61 (0.61-4.31)	9	3.69 (1.92-7.10)	7	3.11 (1.48-6.51)	8	2.57 (1.28-5.11)

*Deaths per 10,000 people per day

3.3.2. CMR and U5MR – pooled analysis, total recall period

After pooling results from the 4 surveys, during the recall period a total of 105 deaths were reported in the sample population, giving a pooled CMR of 0.93 deaths per 10,000 per day (95% CI: 0.77-1.13) (Table 6).

Of the 105 deaths, 13 were aged <5 years, resulting in an U5MR of 0.74 deaths per 10,000 people per day (95% CI: 0.43-1.27). Among those aged 50 years or above the mortality rate was 2.73 per 10,000 per day (95% CI: 1.88-3.95). This was higher among males (3.25 [95% CI: 2.05-5.09]) than females (2.03 [95% CI: 1.06-3.90]), although this difference was not statistically significant.

Males had the highest number of deaths, accounting for 57.1% of all reported deaths in the recall period. The sex-specific mortality rate was 1.09 per 10,000 per day for males (95% CI: 0.85-1.40), higher, but not statistically significantly, than for females (0.78 per 10,000 per day [95% CI: 0.58-1.05]).

Table 6. Retrospective mortality among sample population during entire recall period, Balukhali and Kutupalong settlements

	Number of deaths	Rate*	95% CI
Crude mortality	105	0.93	0.77-1.13
Sex-specific			
All males	60	1.09	0.84-1.40
All females	45	0.78	0.58-1.05
Age-specific:			
<5 years	13	0.74	0.43-1.27
5-49 years	64	0.76	0.59-0.97
≥50 years	28	2.73	1.88-3.95

*Deaths per 10,000 people per day

Cause of death by week, recently displaced refugees

The number of reported deaths was far higher in the weeks following 25 August 2017 (end of epi week 34). Almost two thirds of deaths (64.9%) in the recently displaced sample population occurred in the 31 days following 25th August. 43.8% of the total reported deaths occurred in just 10 days following 25 August 2017 (Figure 5).

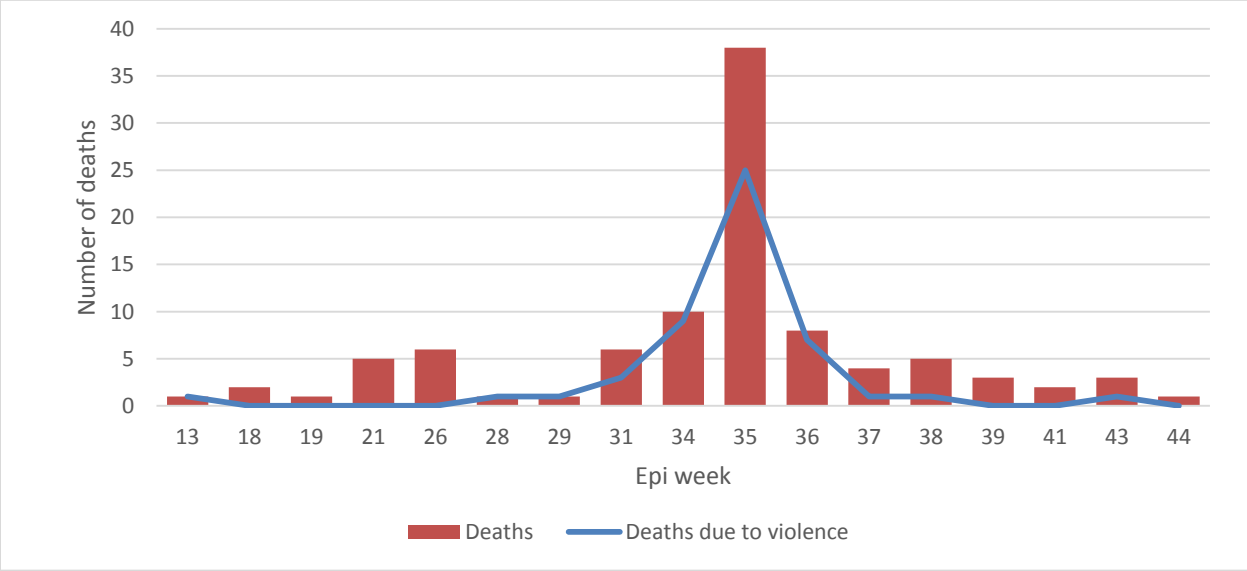


Figure 5. Distribution of mortality among recently displaced refugees in the sample population by reported cause of death and epi week of the recall period

3.3.3. Pooled mortality analysis – newly arrived refugees and pre-existing refugees

In order to consider the different experiences of people who were displaced during the recent crisis and those who were already present in Cox's Bazar, mortality rates were estimated separately for each sample population. The survey included information on the date of arrival in the settlements: this information was used to assess whether each respondent was displaced following the crisis on 25 August 2017 or was already living in the settlements / arrived earlier in the year. The recall period was divided into three periods – before the crisis in Rakhine (25 February – 24 August), the month following the commencement of the crisis (25 August – 24 September) and the period from 25 September until the end of the recall period. Recently displaced refugees comprised 77.9% of the sample population, although this did vary significantly by area (Table 3).

Recently displaced refugees (arrived on or after 25 August 2017)

97 deaths were reported from the 3,431 people who recently arrived in Cox's Bazar, corresponding to a CMR of 1.17 per 10,000 per day (95% CI: 0.96-1.43) for the whole recall period (Table 7). The majority of deaths occurred between 25 August and 24 September (n=63, 64.9%). The mortality rates between 25 August and 24 September were significantly different to the periods before and after: the CMR was 6.31 (95% CI: 4.93-8.08), between 25 August and 24 September and nearly 15 times higher than the period 25th February to 24th August before the crisis [0.42 (95% CI: 0.28-0.62)] and more than 9 times higher than the period 25 September to the end of the recall period, after the initial 31 days of the crisis [0.67 (95% CI: 0.35-1.29)].

The U5MR for the entire recall period was 1.05 (95% CI: 0.61-1.80). For the period 25 February – 24 August the U5MR was 0.23 (95% CI: 0.06-0.91), however for the period from 25 August to 24 September the U5MR was over 20 times higher, at 4.56 (95% CI: 2.18-9.57). This was not significantly different to the period from 25 September until the end of the recall period (1.91 [95% CI: 0.72-5.10]).

The age-specific MR for people aged 5-49 years was 5.32 (95% CI: 3.90-7.25) between 25 August and 24 September and the ≥50MR was 17.28 per 10,000 per day (95% CI: 10.58-28.20]).

Table 7. Mortality rates amongst newly arrived refugees in the sample population, by time period, age and sex

	Number of deaths	Rate	95% CI
All new arrivals	97	1.17	0.96-1.43
25 February – 24 August	25	0.42	0.28-0.62
25 August – 24 September	63	6.31	4.93-8.08
25 September – End of recall period	9	0.67	0.35-1.29
Sex-specific			
All males	56	1.39	1.07-1.80
25 February – 24 August	17	0.59	0.36-0.94
25 August – 24 September	36	7.44	5.36-10.31
25 September – End of recall period	3	0.46	0.15-1.43
All females	41	0.97	0.71-1.32
25 February – 24 August	8	0.26	0.13-0.53
25 August – 24 September	27	5.25	3.60-7.66
25 September – End of recall period	6	0.86	0.39-1.92
Age-specific			
<5 years	13	1.05	0.61-1.80
25 February – 24 August	2	0.23	0.06-0.91
25 August – 24 September	7	4.56	2.18-9.57
25 September – End of recall period	4	1.91	0.72-5.10
5-49 years	59	0.95	0.73-1.22
25 February – 24 August	16	0.36	0.22-0.58
25 August – 24 September	40	5.32	3.90-7.25
25 September – End of recall period	3	0.30	0.10-0.92
≥50 years	25	3.14	2.12-4.64
25 February – 24 August	7	1.20	0.57-2.53
25 August – 24 September	16	17.28	10.58-28.20
25 September – End of recall period	2	1.65	0.41-6.60

Cause of death by time period, recently displaced refugees

The primary cause of death amongst the recently displaced population, before the crisis in Rakhine, was "other" causes of death (44.0%, n=11), which consisted of heart attacks (n=8) and neonatal deaths (n=3) (This range of causes of death contrasts starkly with the causes of death between 25 August and 24 September (end of epi week 34), when 42 deaths were reported due to violence (66.7%), by far the primary cause of death, with 9 deaths (14.3%) also reported from trauma / accidents (Table 9). There was no statistically significant difference between age groups or by sex in the profile of causes of death, with violence being the main cause of death in all age groups.

Among 9 deaths recorded from 25 September until the end of the recall period, 2 (22.2%) were from trauma/accident and 2 (22.2%) were unknown cause (Table 10).

Table 8). Even prior to the crisis, deaths were reported from violence (n=7, 28.0%). The cause was unknown for 6 deaths (24.0%) and 1 person died from trauma / accidents (4.0%).

This range of causes of death contrasts starkly with the causes of death between 25 August and 24 September (end of epi week 34), when 42 deaths were reported due to violence (66.7%), by far the primary cause of death, with 9 deaths (14.3%) also reported from trauma / accidents (Table 9). There was no statistically significant difference between age groups or by sex in the profile of causes of death, with violence being the main cause of death in all age groups.

Among 9 deaths recorded from 25 September until the end of the recall period, 2 (22.2%) were from trauma/accident and 2 (22.2%) were unknown cause (Table 10).

Table 8. Causes of death, recently displaced refugees in sample population, February 25th to August 24th

	<5 years		5-49 years		≥50 years		Males		Females		Total	
	N	%	N	%	N	%	N	%	N	%	N	%
Other*	1	50.0%	7	43.8%	3	42.9%	6	35.3%	5	62.5%	11	44.0%
Violence	0	0.0%	6	37.5%	1	14.3%	5	29.4%	2	25.0%	7	28.0%
Unknown	1	50.0%	2	12.5%	3	42.8%	5	29.4%	1	12.5%	6	24.0%
Trauma / accident	0	0.0%	1	6.2%	0	0.0%	1	5.9%	0	0.0%	1	4.0%
Total	2		16		7		17		8		25	

* Other causes of death before August 25th included heart attack (N=8) and neonatal deaths (N=3)

Table 9. Causes of death, recently displaced refugees in sample population, 25 August to 24 September

	<5 years		5-49 years		≥50 years		Males		Females		Total	
	N	%	N	%	N	%	N	%	N	%	N	%
Violence	5	71.4%	24	60.0%	13	81.3%	27	75.0%	15	55.6%	42	66.7%
Trauma / accident	1	14.3%	6	15.0%	2	12.5%	2	5.6%	7	25.9%	9	14.3%
Fever	0	0.0%	5	12.5%	1	6.2%	2	5.6%	4	14.8%	6	9.5%
Unknown	1	14.30%	4	10.0%	0	0.0%	4	11.1%	1	3.7%	5	7.9%
Other*	0	0.0%	1	2.5%	0	0.0%	1	2.7%	0	0.0%	1	1.6%
Total	7		40		16		36		27		63	

* No information was provided for the one death recorded as “other”

Table 10. Causes of death, recently displaced refugees in sample population, 25 September to the end of the recall period

	<5 years		5-49 years		≥50 years		Males		Females		Total	
	N	%	N	%	N	%	N		N	%	N	%
Other*	0	0.0%	1	33.4%	0	0.0%	0	0.0%	1	16.7%	1	11.3 %
Violence	0	0.0%	1	33.3%	0	0.0%	0	0.0%	1	16.7%	1	11.1%
Trauma / accident	0	0.0%	1	33.3%	1	50.0%	0	0.0%	2	33.3%	2	22.2%
Unknown	2	50.0%	0	0.0%	0	0.0%	1	33.4%	1	16.7%	2	22.2%
Diarrhoea	1	25.0%	0	0.0%	0	0.0%	1	33.3%	0	0.0%	1	11.1%

Respiratory	1	25.0%	0	0.0%	0	0.0%	1	33.3%	0	0.0%	1	11.1%
Fever	0	0.0%	0	0.0%	1	50.0%	0	0.0%	1	16.6%	1	11.1%
Total	4		3		2		3		6		9	

* Other causes of death between September 25th and the end of the recall period were old age (N=4)

Cause of death specific to violence following the crisis, recently displaced refugees

For the recently displaced population in the 31 days following the crisis in Rakhine the most common cause of death related to violence was shooting (n=29, 69.0%), "other" (n=7, 16.7%) and being burned to death in the home (n=5, 11.9%) (Table 11). "Other" responses were predominantly 'killed by military' (n=6, 85.7% of "other" responses).

Table 11. Types of violence leading to death, recently displaced sample population, 25th August – 24th September

	<5 years		≥5 years		Males		Females		Total	
	N	%	N	%	N	%	N	%	N	%
Shot	3	60.0%	26	70.3%	21	77.8%	8	53.3%	29	69.0%
Burned to death in home	1	20.0%	4	10.8%	3	11.1%	2	13.3%	5	11.9%
Sexual	0	0.0%	1	2.7%	0	0.0%	1	6.7%	1	2.4%
Other	1	20.0%	6	16.2%	3	11.1%	4	26.7%	7	16.7%
Total	5		37		27		15		42	

Place of death, recently displaced refugees

Prior to the crisis in Rakhine, the most common reported place of death was at home (n=20, 80.0%) (Table 12). However, during the period of the crisis deaths reported during the journey to the settlements in Bangladesh were as common (n=26, 41.3%) as those reported at home (n=25, 39.7%). Four (6.4%) deaths recorded in 'other' locations. The location of death was unknown for 7 reported deaths (11.1%). Deaths occurring from 25 September until the end of the recall period were predominantly either in locations in the camp or at home.

Table 12. Reported location of death for the recently displaced population by time period

Location	N	%
25 February – 24 August		
Home	20	80.0%
During journey	4	16.0%
Unknown	1	4.0%
25 August – 24 September		
Home	25	39.7%
During journey	26	41.3%
Other*	4	6.4%
Unknown	7	11.1%
Work	1	1.5%
25 September – End of recall period		
Home	4	44.5%
Other**	3	33.3%
During journey	2	22.%

* Deaths coded as other occurred in the Border Guard Police Camp (N=1), "Myanmar Zamboenna village tract" (N=1), "a shop" (N=1), and in the camp (N=1)

** Deaths coded as other included in the camps (N=2) and "A3 No 10 mountain" (N=1)

Previously arrived refugees (before 25 August 2017)

Eight deaths were reported amongst people already resident in the settlements in Cox's Bazar, corresponding to a CMR of 0.27 per 10,000 per day (95% CI: 0.13-0.54) for the entire recall period (Table 13). There was no significant difference in the CMR before, during and after the crisis in Rakhine state, with 7 deaths recorded before 25 August and 1 death recorded after. There was also no significant difference in mortality rates between males and females, or age groups.

Table 13. Mortality rates amongst the pre-existing refugee population, by age, sex and time period

	Number of deaths	Rate	95% CI
All existing residents	8	0.27	0.13-0.54
25 February – 24 August	7	0.34	0.16-0.70
25 August – 24 September	0	-	-
25 September – End of recall period	1	0.19	0.03-1.32
Sex-specific			
All males	4	0.27	0.10-0.73
All females	4	0.26	0.10-0.70
Age-specific			
<5 years	0	-	-
5-49 years	5	0.22	0.09-0.54
≥50 years	3	1.30	0.42-4.02

Cause of death, pre-existing refugee population

The primary causes of death amongst the pre-existing population were "other" causes, all of which involved elephant attacks in the KMS on 20 August 2017 (n=4) (Table 14).

Table 14. Causes of death amongst the pre-existing population in the settlements, whole recall period

	<5 years		≥5 years		Males		Females		Total	
	N	%	N	%	N	%	N	%	N	%
Diarrhoea	0	0.0%	1	12.5%	0	0.0%	1	25.0%	1	12.5%
Other*	0	0.0%	4	50.0%	2	50.0%	2	50.0%	4	50.0%
Violence	0	0.0%	1	12.5%	1	25.0%	0	0.0%	1	12.5%
Unknown	0	0.0%	2	25.0%	1	25.0%	1	25.0%	2	25.0%
Total	0		8		4		4		8	

* Note: "Other" causes of death were all caused by elephants

All reported deaths occurred within the camp, either at home (n=2, 25.0%) or at "other locations" (n=6, 75.0%) (Table 15).

Table 15. Location of deaths amongst pre-existing residents, whole recall period

	<5 years		≥5 years		Males		Females		Total	
	N	%	N	%	N	%	N	%	N	%
Home	0	0.0%	2	25.0%	1	25.0%	1	25.0%	2	25.0%
Other*	0	0.0%	6	75.0%	3	75.0%	3	75.0%	6	75.0%
Total	0		8		4		4		8	

* Other places of death were all locations within the settlements

3.4. Violence

3.4.1. Overall

Here, we refer to both interpersonal violence and collective (social and political) violence[14, 15, 16]. Interpersonal violence comprises family/intimate partner and community violence. For the purposes of this survey, we focused on community and collective violence associated with the displacement from Rakhine State and domestic violence resulting from familial, partner or community issues that may have occurred within the settlements. The World Health Organization (WHO) classifies violence as: physical, sexual, psychological and deprivation/neglect (see Appendix 2).

Overall, 922 people reported experiencing a violent event during the recall period, corresponding to a weighted average across the settlements of 20.6% (95% CI: 19.3-21.8) of the total sampled population (Table 17); of those, 5.9% (95% CI: 4.3-7.6, n=51) died because of the most recent violent events. There was no significant difference in the proportion of males (7.3% [95% CI: 4.8-9.8]) and females (4.4% [95% CI: 2.3-6.5]) who died because of the most recent violent event. The number of reported violent episodes during the recall period ranged from 1 to 9 per person, with an average of 3.7 (95% CI: 3.5-3.9). This was significantly higher amongst the recently displaced population (3.9 [95% CI: 3.7-4.1]) than the pre-existing population (3.0 [95% CI: 2.4-3.6]).

The vast majority of violent events were reported by the recently arrived population, 25.8% of whom experienced violence (95% CI: 24.3-27.3, n=885), with a low proportion of pre-existing residents reporting a violent event (3.1% [95% CI: 2.1-4.1], n=37). The same applies to deaths related to violence: 50 of the 51 deaths from violence occurred in the recently displaced population.

Among the recently displaced refugees, males (28.4% [95% CI: 26.2-30.5]) were significantly more likely to have experienced violence than females (23.3% [95% CI: 21.3-25.3]).

[14] Interpersonal violence involves family/partner violence and community violence. Community interpersonal violence is defined as: violence between individuals who are unrelated, and who may or may not know each other, generally taking place outside the home. This includes youth violence, random acts of violence, rape or sexual assault by strangers, and violence in institutional settings such as schools, workplaces, prisons and nursing homes.

[15] Collective violence refers to violence committed by larger groups of individuals or by states. Collective violence that is committed to advance a particular social agenda includes, for example, crimes of hate committed by organized groups, terrorist acts and mob violence. Political violence includes war and related violent conflicts, state violence and similar acts carried out by larger groups. Economic violence includes attacks by larger groups motivated by economic gain – such as attacks carried out with the purpose of disrupting economic activity, denying access to essential services, or creating economic division and fragmentation. Clearly, acts committed by larger groups can have multiple motives.

[16] Krug EG et al. (eds). World report on violence and health. Geneva, World Health Organization, 2002.

Table 16. Experience of violence and average number of violent events reported by sample population for the total recall period

	<5 years		≥5 years		Males		Females		Total	
	N	%	N	%	N	%	N	%	N	%
Recently arrived refugees										
Experienced violence	93	17.6%	792	27.3%	476	28.4%	409	23.3%	885	25.8%
Average number of events	2.7		4.0		3.9		3.9		3.9	
Pre-existing refugees										
Experienced violence	5	2.4%	32	3.3%	20	3.4%	17	2.8%	37	3.1%
Average number of events	3.0		3.0		2.6		3.4		3.0	
Total sample population										
Experienced violence	98	13.0%	824	22.0%	496	22.6%	426	18.7%	922	20.6%
Average number of events	2.5		3.9		3.8		3.7		3.7	

3.4.2. By time period

The majority of recently displaced population experienced violent events between 25 August and 25 September (N=738, 84.8% of all recently displaced population that experienced violent events), with 21.5% (95% CI: 20.1-22.9) of recently arrived refugees in the sample population experiencing violence during this period (Table 17). This was 7.7 times higher than in the same population between 25 February and 24 August (2.8% [95% CI: 2.2-3.4]) and 20.5 times higher than in the same population between 25 September and the end of the recall period (1.1% [95% CI: 0.7-1.4]). During this 31-day period of peak violence, males (23.0%) were significantly more likely than females (20.1%) to have experienced a violent event.

Violent events were reported in children to a lesser extent than in adults, however 81 (15.3%) children under 5 years experienced violent events between 25 August and 24 September. Those aged ≥5 years were significantly more likely to have experienced violence (22.6% [95% CI: 21.1-24.2]) than those under 5 years (15.3 [95% CI: 12.2-18.4]). The proportion of each age group experiencing at least one violent event can be seen in Figure 6.

Due to only 5 individuals in the pre-existing population sample reporting experiencing violence events between 25th August and 24th September, stratification by time period provides limited insight. This corresponds to 0.4% (95% CI: 0.1-0.8) of the sample population experiencing violence, much lower than among the recently displaced sample population.

Table 17. Violent events experienced during the recall period by age, sex, time period and arrival date of the sample population

	<5 years		≥5 years		Males		Females		Total	
	N	%	N	%	N	%	N	%	N	%
25 February – 24 August										
Recently arrived refugees	8	1.5%	88	3.0%	64	3.8%	32	1.8%	96	2.8%
Pre-existing refugees	0	0.0%	6	0.6%	4	0.7%	2	0.3%	6	0.5%
25 August – 24 September										
Recently arrived refugees	81	15.3%	657	22.6%	385	23.0%	353	20.1%	738	21.5%
Pre-existing refugees	1	0.5%	4	0.4%	3	0.5%	2	0.3%	5	0.4%
25 September - End of recall period										
Recently arrived refugees	4	0.8%	32	1.1%	17	1.0%	19	1.1%	36	1.1%
Pre-existing refugees	2	1.0%	5	0.5%	3	0.5%	4	0.7%	7	0.6%
Total										
Recently arrived refugees	93	17.6%	777	26.8%	466	27.8%	404	23.0%	870	25.4%
Pre-existing refugees	3	1.4%	15	1.5%	10	1.7%	8	1.3%	18	1.5%

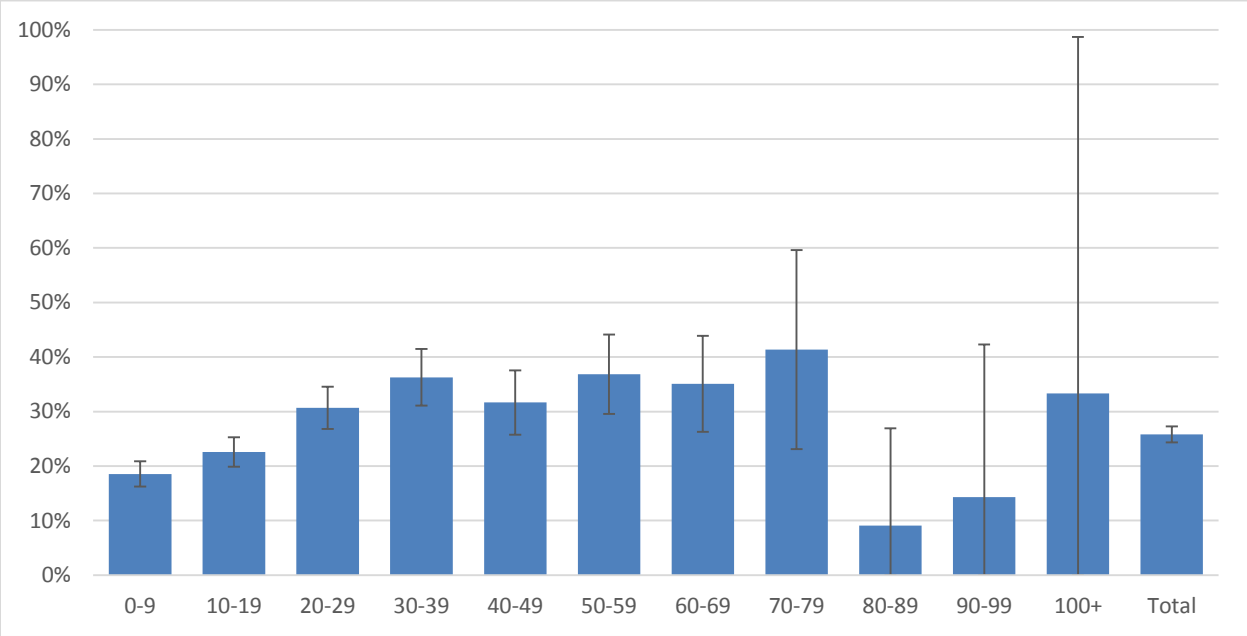


Figure 6. Proportion of people experiencing violence during the recall period, by age group, recently displaced refugees

The type of violence experienced by the recently displaced population between 25 August and 24 September was similar for both sexes (Table 18), except for sexual violence which was more likely to be experienced by females (16.4% of all violence experienced [95% CI: 12.6-20.3]) than males (9.1% [95% CI: 6.2-12.0]). In total, 58 women among the sampled population who were recently displaced reported experiencing sexual violence during this period, and 35 men. This corresponds to 3.3% (95% CI: 2.5-4.1) of all females in the recently displaced sample population and 2.1% (95% CI: 1.4-2.8) of all males. Sexual violence amongst women occurred almost exclusively before arrival in Kutupalong and Balukhali, with 56 of 58 (96.6%) incidents reported prior to arrival in the settlements in Bangladesh.

Shooting (76.2% [95% CI: 73.1-79.2]) and beating (60.0% [95% CI: 56.5-63.6]) were the most common types of violence experienced by both genders in the recently displaced sample population. The majority of people experiencing an "other" type of violence (n=207, 28.1%) reported having their house burned (8.5% of all violent events), witnessing other people being shot (2.2%), having their money taken / being extorted (1.4%) and various other types of violence including witnessing beatings or detentions. The "other" types of violence experienced were unclear for 17.8% of those responding "other". A full list of "other" types of violence can be found in Appendix 3.

Table 18. Type of violence experienced among recently displaced sampled population who experienced violence between August 25 and September 24, by age and sex, Balukhali and Kutupalong settlements

	<5 years		≥5 years		Males		Females		Total	
	N	%	N	%	N	%	N	%	N	%
Beaten	24	29.6%	419	63.8%	235	61.0%	208	58.9%	443	60.0%
Sexual violence	2	2.5%	91	13.9%	35	9.0%	58	16.4%	93	12.6%
Shooting	71	87.7%	491	74.7%	289	75.0%	273	77.3%	562	76.2%
Detained/kidnapped	6	7.4%	243	37.0%	126	32.7%	123	34.8%	249	33.7%
Unknown	0	0.0%	3	0.5%	3	0.8%	0	0.0%	3	0.4%
Other	7	8.6%	200	30.4%	104	27.0%	103	29.2%	207	28.1%

Note: participants could list multiple types of violence experienced during the recall period therefore the proportions in each column sum to greater than 1.

Violent events experienced by the recently displaced sample population between 25 August and 24 September generally occurred at home (68.7% [95% CI: 65.3-72.1]) or on the journey (62.8% [95% CI: 59.2-66.3]), with some violence occurring at work (18.1% [95% CI: 15.3-20.9]) or in an "other" location (2.5% [95% CI: 1.3-3.6]) (Table 19).[17] The "other" places of violence reported were: "Border Guard Police camp"[18] (n=4), at the shop / market / bazaar (n=4), in the village (n=2) and in school (n=1). The location of violence was unclear for 20 respondents.

Table 19. Location of violence experienced by the recently displaced sampled population, August 25th – September 24th

	<5 years		≥5 years		Males		Females		Total	
	N	%	N	%	N	%	N	%	N	%
Home	34	43.6%	464	71.7%	250	66.3%	248	71.3%	498	68.7%
Work	2	2.6%	129	19.9%	110	29.2%	21	6.0%	131	18.1%
During journey	61	78.2%	394	60.9%	243	64.5%	212	60.9%	455	62.8%
Unknown	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Other	0	0.0%	18	2.8%	14	3.7%	4	1.2%	18	2.5%
Missing	3	3.7%	10	1.5%	8	2.1%	5	1.4%	13	1.8%

Note: participants could list multiple locations of violence events during the recall period therefore the proportions in each column sum to greater than 1.

[17] Proportions sum to over 100% as respondents could provide multiple locations of violence

[18] It is not clear where these camps are as no further geographical information was provided

3.5. Morbidity and access to healthcare

3.5.1. General morbidity

Morbidity was assessed by asking participants if they had any illnesses in the previous two weeks. Across the four surveys, 33.2% (n=1,490) of the sampled population for whom information was provided[19] reported experiencing illness in the two weeks preceding data collection[20]. A slightly greater proportion of females (35.1% [95% CI: 33.0-37.2]) reported being ill in the previous weeks compared to males (31.3% [95% CI: 29.2-33.3] (Table 20).

Among participants aged ≥50 years 52.4% reported being ill in the previous two weeks, and 36.6% of children aged <5 years reported recent illness. There were differences between areas, with residents of the BMS Extension (37.0%) and KMS Extension (35.3%) more likely to have been ill recently than residents of other areas (Figure 7), although this was only significant for the BMS Extension. Children under 5 years were significantly more likely to have been ill in the BMS Extension (40.9%) than in any other area.

The difference in recent morbidity between the recently displaced population (34.2% [95% CI: 32.5-36.0] ill in the last two weeks) and the pre-existing population in the settlements (29.8% [95% CI: 27.0-32.5]) was on the borderline of statistical significance.

Table 20. Residents ill in the previous two weeks by age, sex and area

	BMS	BMS Ext	KMS	KMS Ext	Recently displaced	Pre-existing residents	Total
Male	28.5%	33.7%	26.9%	34.0%	32.5%	27.1%	31.3%
<5	29.6%	41.2%	37.9%	36.9%	37.9%	35.5%	37.3%
5-49	25.9%	29.4%	22.3%	31.2%	29.1%	22.4%	27.6%
50+	43.9%	51.8%	47.7%	45.8%	46.7%	48.9%	47.1%
Female	31.5%	40.1%	30.7%	36.5%	35.9%	32.3%	35.1%
<5	26.8%	40.6%	31.8%	38.2%	36.9%	33.0%	36.0%
5-49	29.5%	39.0%	28.4%	32.6%	33.0%	30.3%	32.4%
50+	61.5%	51.2%	49.0%	68.6%	60.9%	52.0%	59.1%
Total	30.0%	**37.0%**	28.8%	**35.3%**	**34.2%**	**29.8%**	33.2%
<5	28.3%	**40.9%**	35.0%	37.6%	37.4%	34.3%	36.6%
5-49	27.8%	34.5%	25.4%	32.0%	31.2%	26.5%	30.1%
50+	51.0%	51.5%	48.4%	55.3%	52.9%	50.3%	52.4%

[19] Information was not available for 98 respondents, who had either left the household or died

[20] It should be noted that this figure may be overinflated because people might think that if they report illness, MSF will increase services in that area.

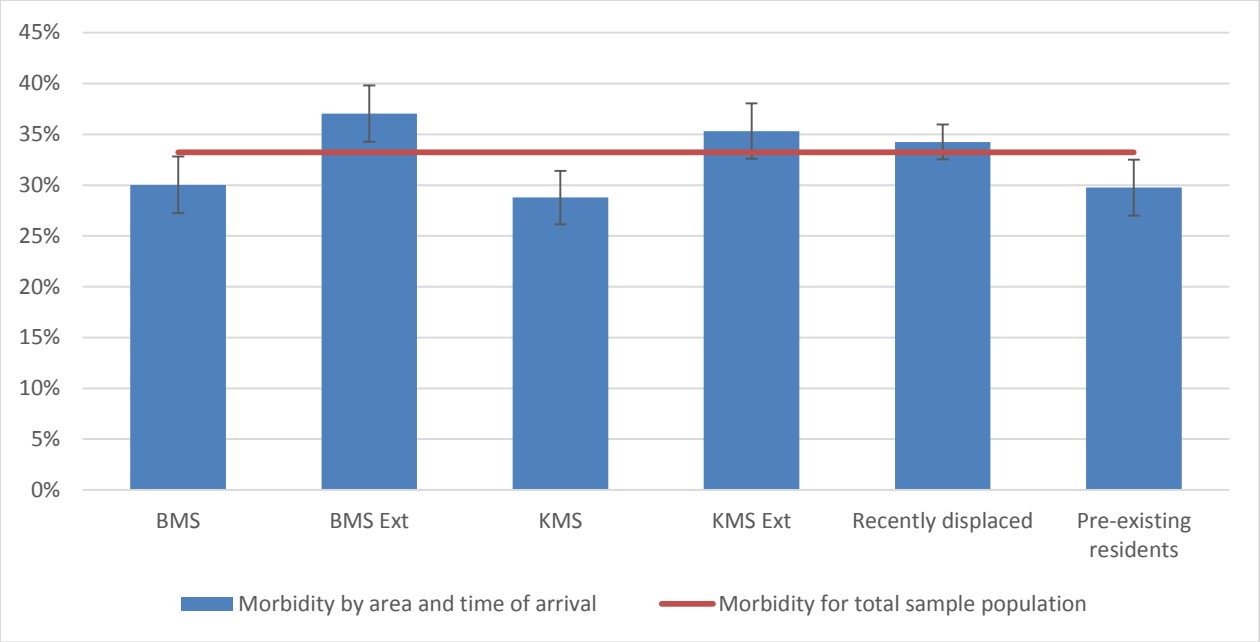


Figure 7. Proportion of residents ill in the last two weeks, by area and time of arrival in Bangladesh

Among residents who have been ill most people self-reported one illness or symptom in the last 2 weeks (57.2%), with 35.6% reporting 2 symptoms and 7.2% reporting 3 or more symptoms. The most common primary illnesses/symptoms reported were fever (66.4%), respiratory complaints (36.0%), ''other'' illnesses not included in the list in the questionnaire (24.9%) and diarrhoea (14.8%). "Other" illnesses predominantly consisted of musculoskeletal complaints (2.9%)[21], stomach problems (2.8%), high blood pressure / hypertension (1.1%), skin disease / rashes (0.9% and eye problems (0.7%), and a range of unclassified conditions (5.2%) (see Appendix 4). Children under 5 years of age were significantly more likely to have symptoms of fever (73.2%), respiratory (45.1%), diarrhoea (19.8%) and malnutrition (14.8%) than those aged 5 years or above (Figure 8).

[21] Proportion of all those who reported illness in the previous 2 weeks

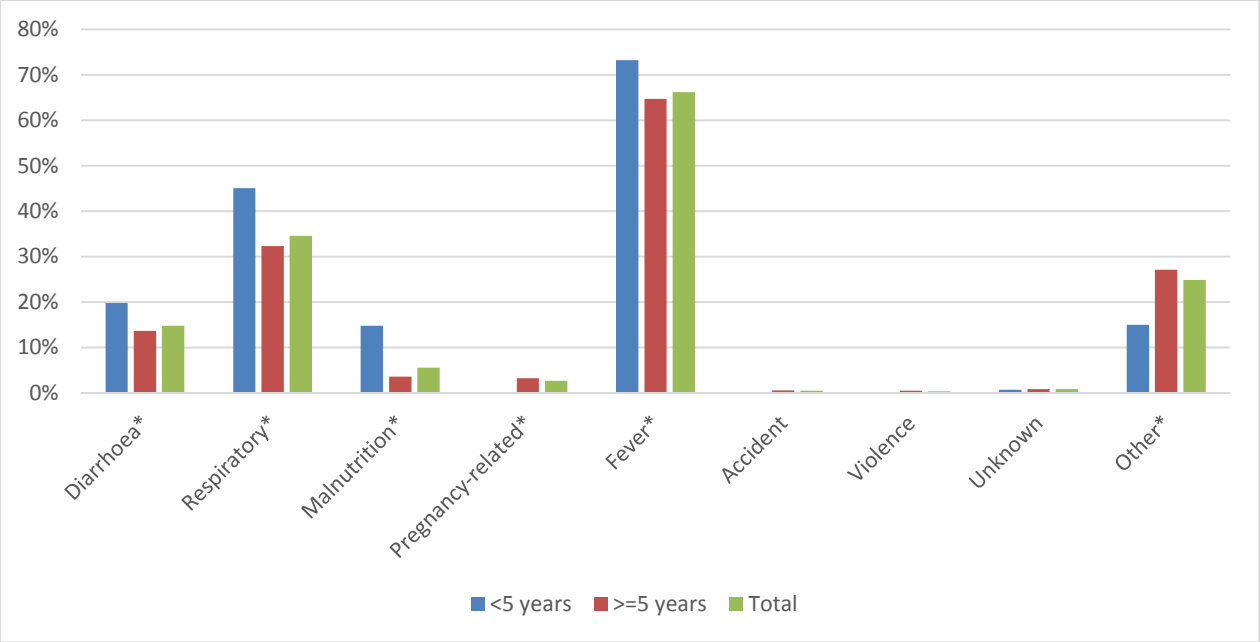


Figure 8. Proportion (weighted) reporting types of illness, by age group
* Significant difference between age groups

A simple logistic regression model was used to assess the contribution of different demographic variables on the chance of being ill in the previous two weeks (Table 21). Adjustment for sex, age, area of residence and time of arrival in Bangladesh in the model made little difference to the final odds ratios (OR), with females, children under 5 and adults over 50 years more likely to have been ill. In contrast to the proportions described above, the logistic regression model did show that recently arrived refugees were more likely to have been ill than the pre-existing inhabitants of the settlements (OR=1.28 [95% CI: 1.09-1.48]).

Table 21. Logistic regression model for chance of being ill in the last 2 weeks

	Unadjusted OR	95% CI	Adjusted OR including area	95% CI	Adjusted OR including arrival time	95% CI
Male	1		1		1	
Female	1.19	(1.04-1.36)	1.15	(1.01-1.31)	1.15	(1.01-1.32)
5-49	1		1		1	
<5	1.34	(1.12-1.61)	1.30	(1.08-1.55)	1.31	(1.09-1.56)
50+	2.55	(2.04-3.19)	2.63	(2.11-3.27)	2.63	(2.12-3.28)
BMS	1		1			
BMS Ext	1.37	(1.15-1.64)	1.35	(1.13-1.61)	-	
KMS	0.94	(0.78-1.13)	0.93	(0.78-1.12)	-	
KMS Ext	1.27	(1.06-1.52)	1.30	(1.09-1.56)	-	
Pre-existing residents	1		1.30		1	
Recently displaced	1.23	(1.06-1.43)	-		1.27	(1.09-1.48)

Note: Two adjusted models were generated to include either the area or the time of arrival due to interaction between these two variables – they are broadly a proxy for each other

3.5.2. Access to Healthcare

Across the four surveys 49.0% (n=757) of people who reported being sick in the previous two weeks visited a health care facility, while 37.1% (n=528) self-medicated, 9.2% (n=130) accessed no health care, 3.6% (n=55) visited a traditional healer and 0.7% (n=7) accessed an "other" form of health care, predominantly receiving medication from public drug distributions.

Residents of the BMS were more likely to seek care from a clinic (63.8% [95% CI: 58.4-69.1]) and the least likely to self-medicate (21.8% [95% CI: 17.2-26.4]) (Figure 9). Pre-existing residents of the settlements were more likely to seek healthcare from a clinic (66.7% [95% CI: 61.8-71.6]) than recent arrivals (45.7% [95% CI: 42.8-48.6]). The greater utilisation of clinics in the BMS is not surprising, however the fact that residents of the KMS were no more likely to utilise healthcare services than the residents of both extension areas was unexpected due to the close proximity of clinics in the area.

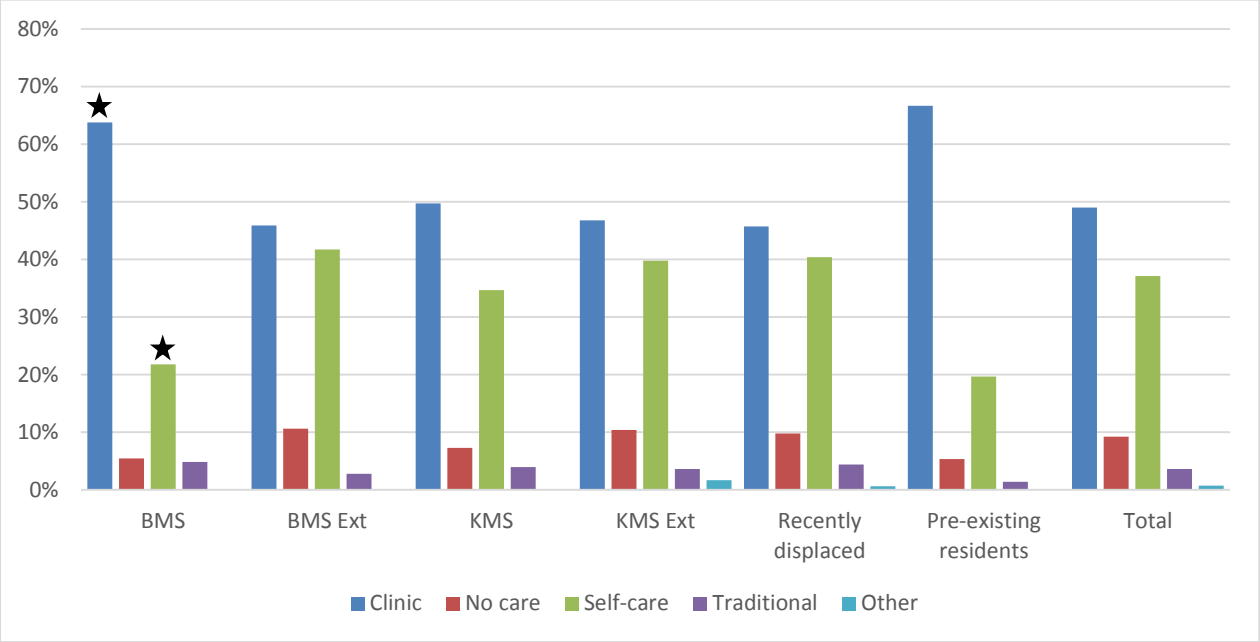


Figure 9. Health-seeking among those ill in the last 2 weeks, Balukhali and Kutupalong settlements
* Significant difference between areas

When looking at care-seeking behaviour by reported morbidity type, there was little difference between conditions, although people who reported diarrhoea or fever were statistically significantly less likely to visit a health facility than those who reported respiratory conditions, malnutrition or pregnancy-related conditions (Figure 10). The proportion of people who reported seeking no care did not vary significantly between different morbidity types.

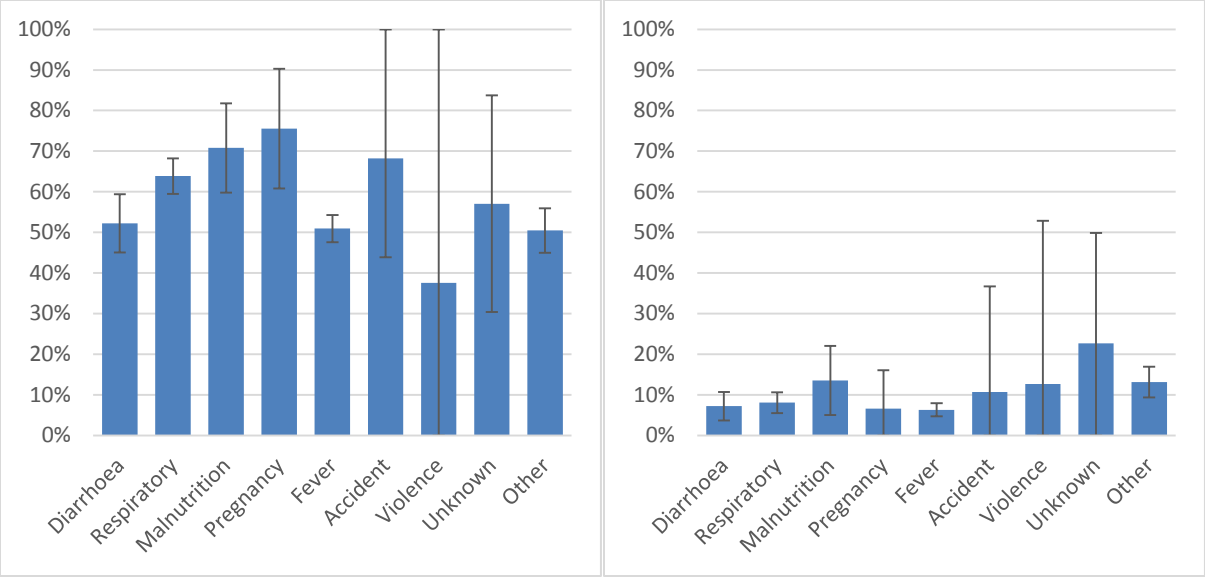


Figure 10. Proportion of residents with different conditions seeking care from a clinic (left) or seeking no care (right)

The main reason given for not attending a health facility was that the respondent did not have enough cash funds (41.8%); this was statistically significantly higher in the KMS (66.7%) than other areas. Other commonly reported reasons were that the clinic is too far away (25.6%), particularly in the BMS (37.0%) and KMS (27.9%) extensions, and that there was no time (20.3%) (Table 22). Given the rapid expansion of the extension areas, and the large number of people residing there, the distances between clinics can be large and the existence of geographical barriers is to be expected.

Table 22. Reasons for not seeking care, by area and time of arrival

	BMS		**BMS Ext**		**KMS**		**KMS Ext**		**Recently displaced**		**Pre-existing residents**		**Total**
	n	%	n	%	n	%	n	%	n	%	n	%	
No money*	2	11.8%	16	34.8%	**16**	**66.7%**	**17**	**39.5%**	**42**	**37.8%**	**9**	**47.4%**	**41.8%**
Too ill	0	0.0%	2	4.4%	3	12.5%	2	4.7%	5	4.5%	2	10.5%	5.8%
Not ill enough	2	11.8%	5	10.9%	1	4.2%	2	4.7%	9	8.1%	1	5.3%	6.6%
Clinic too far away*	0	0.0%	**17**	**37.0%**	3	12.5%	**12**	**27.9%**	**32**	**28.8%**	0	0.0%	**25.6%**
No time*	**11**	**64.7%**	6	13.0%	2	8.3%	10	23.3%	**23**	**20.7%**	**6**	**31.6%**	**20.3%**
No trust in clinic	1	5.9%	1	2.2%	0	0.0%	1	2.3%	3	2.7%	0	0.0%	2.1%
Security concerns	*0*	*0.0%*	*0*	*0.0%*	*0*	*0.0%*	*0*	*0.0%*	*0*	*0.0%*	*0*	*0.0%*	*0.0%*
Care refused at the clinic	*0*	*0.0%*	*0*	*0.0%*	*0*	*0.0%*	*0*	*0.0%*	*0*	*0.0%*	*0*	*0.0%*	*0.0%*
Other	1	5.9%	1	2.2%	2	8.3%	3	7.0%	6	5.4%	1	5.3%	5.9%

*Significant difference between areas

Overall, of those who visited a clinic, 62.7% visited an MSF facility and 37.3% visited a clinic recorded as "other". "Other" clinics included "free medical camp"[22] (11.1% of all those seeking care from a clinic), public drug distribution points (5.1%), BRAC (3.6%), IOM (3.3%) and other facilities for which the name could not be recalled (3.6%). A full list of "other" clinics reported can be found in Appendix 5.

Utilisation of MSF clinics varied by area, with residents of the BMS (75.4%) and KMS (79.7%) statistically significantly more likely to have visited an MSF clinic than those living in the BMS Extension (55.3%) and KMS Extension (52.2%) (Figure 11.). MSF health facilities in the BMS and KMS areas predate the recent influx and are more established compared with recently-opened health posts in the extensions, which may partially explain the higher proportions.

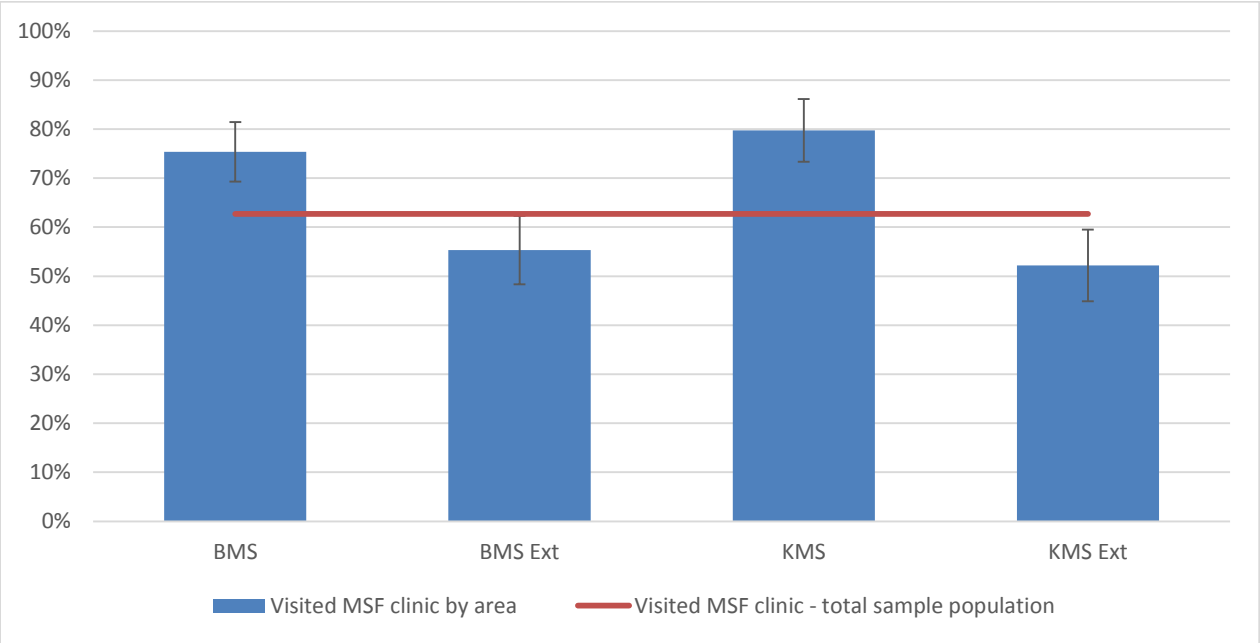


Figure 11. Proportion of residents of each area reporting utilisation of MSF clinics

3.6. Vaccination coverage

Oral cholera vaccine (OCV) vaccination status was assessed for a recent mass vaccination campaign in all respondents over one year of age, and measles, polio, meningitis (MenACWY), DPT-Hib-HepB (Pentavalent) and PCV vaccination status was assessed since birth in children aged 6-59 months.

3.6.1. Cholera vaccination coverage

Overall, 68.3% (95% CI: 66.9-69.8) of the sampled population reported that they had received OCV. The proportion of respondents reporting they had received the vaccine was significantly lower in the KMS Extension (55.8% [95% CI: 53.0-58.7]) than in the BMS (77.0% [95% CI: 74.4-79.6]), BMS Ext (74.0% [95 CI: 71.4-76.5]) and KMS (79.1% [95% CI: 76.7-81.5]). This was due in part to the large numbers of newly

[22] Run by the Pari foundation - this initiative provides free medical services, medications and food to Rohingya refugees in the Kutupalong settlement

arrived refugees in the KMS Extension – amongst recently arrived refugees the proportion who had received the vaccine was significantly lower (65.3% [95% CI: 63.6-67.1]) than amongst the pre-existing population (78.7% [95% CI: 76.3-81.2]) (Figure 12).

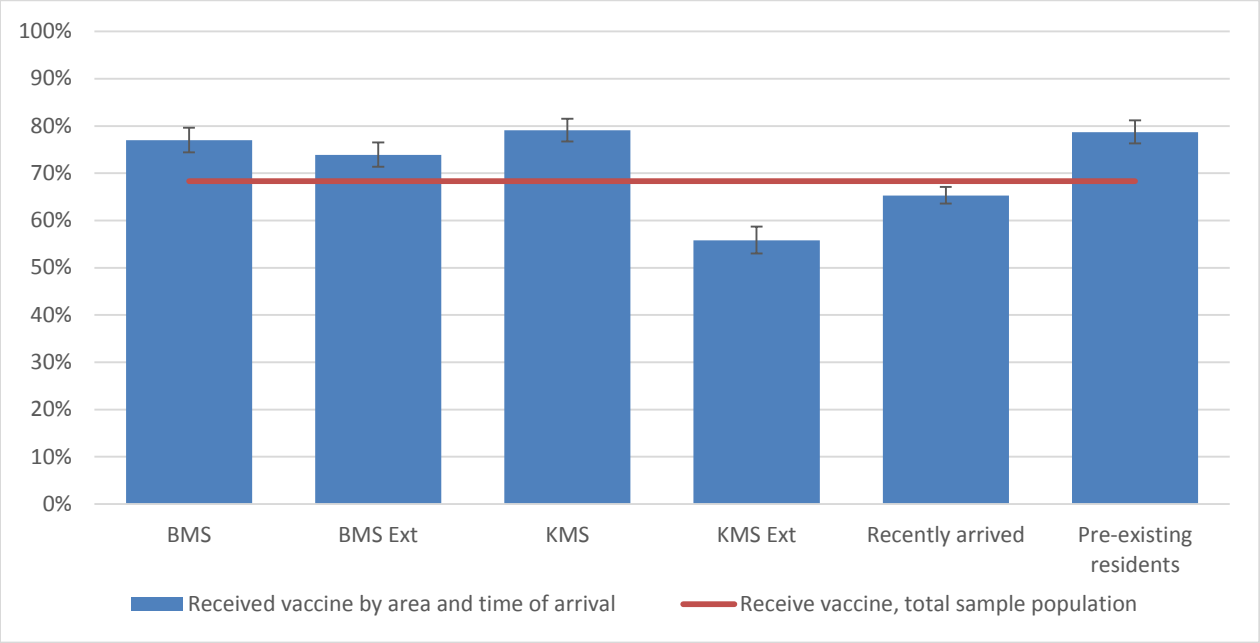


Figure 12. Proportion of residents who reported receiving the cholera vaccine, by area and arrival time

There was no statistically significant difference between genders in the proportion who reported receiving the vaccine (68.1% among males, 66.7% among females). There was also no significant difference between age groups in vaccination coverage (Figure 13).

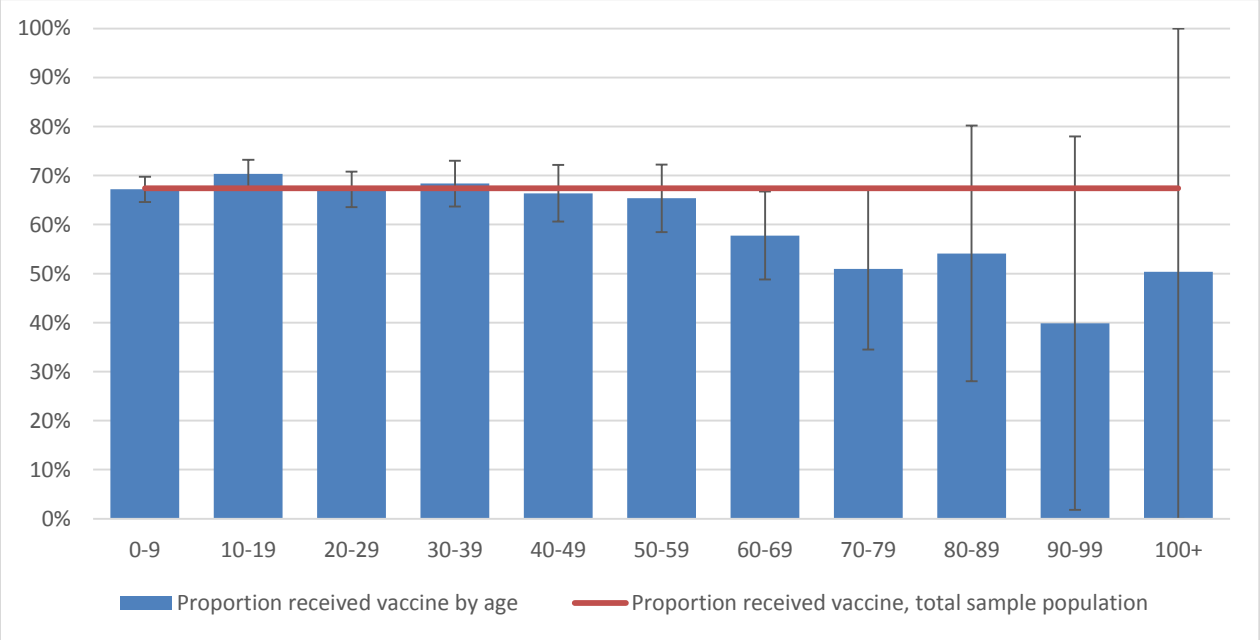


Figure 13. Proportion of residents who reported receiving the cholera vaccine, by age

3.6.2. Under 5 vaccination coverage

Measles

Overall, 23.2% (95% CI: 19.9-26.5, n=171) of children under 5 years had received the measles vaccine. Of all children under 5 years, 4.1% (95% CI: 0.7-2.7) confirmed this with a vaccination card; the vaccination was confirmed verbally by 19.1% (95% CI: 16.0-22.2). There was no statistically significant variation by area, or between recent arrivals and the pre-existing population (Figure 14).

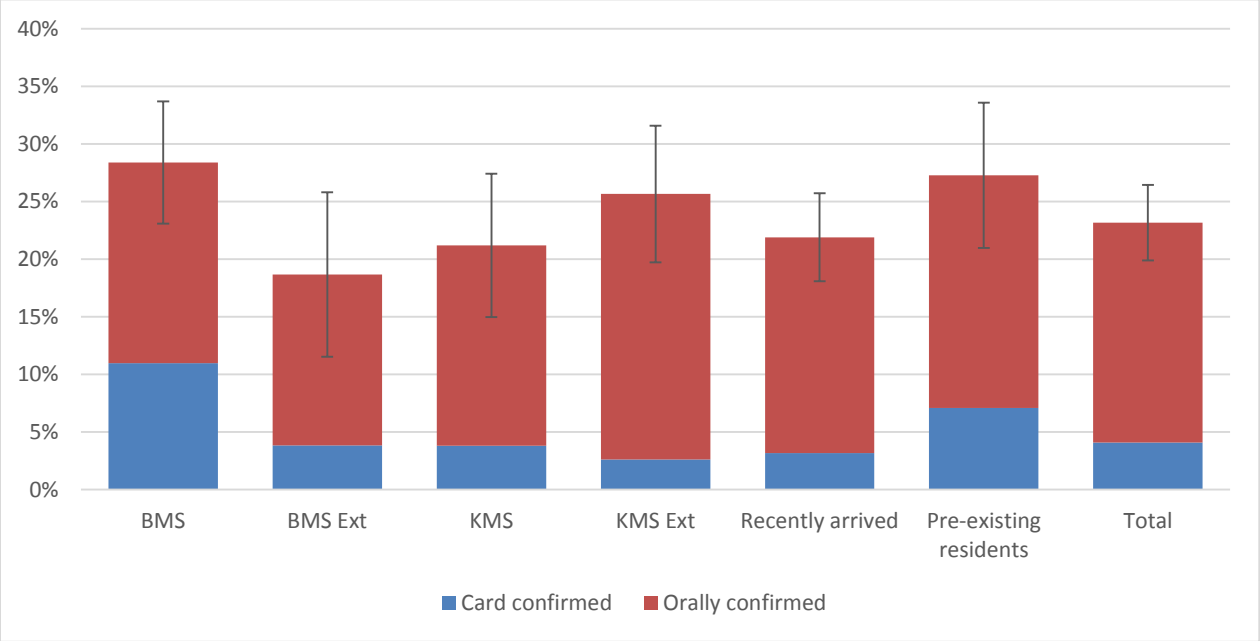


Figure 14. Measles vaccination coverage, by method of confirmation, area and time of arrival
Note: Error bars show the confidence interval for the proportion of children who received the vaccine, regardless of method of confirmation

Polio

Overall, 49.9% (95% CI: 46.1-53.8) of children under 5 years had received the polio vaccine (Figure 15). Of all children, 9.7% (95% CI: 7.6-11.8) confirmed by vaccination card; 40.2% (95% CI: 36.4-44.0) confirmed verbally. Children living in the BMS (64.5% [95% CI: 56.9-72.1]) and KMS (51.6% [95% CI: 44.4-58.9]) were more likely to have received the vaccine than those living in the BMS extension (47.8% [95% CI: 41.0-56.4]) or KMS extension (46.1% [95% CI: 39.0-53.1]), however this was only statistically significant for children living in the BMS compared with other areas. The recently arrived population (47.0% [95% CI: 42.5-51.6]) were statistically significantly less likely to have been vaccinated for polio than those living in the settlements before the influx (59.2% [95% CI: 52.1-66.3]). A combined OCV/OPV vaccination campaign of all <5 year olds was being performed at the time of data collection and coverage was not captured in this survey.

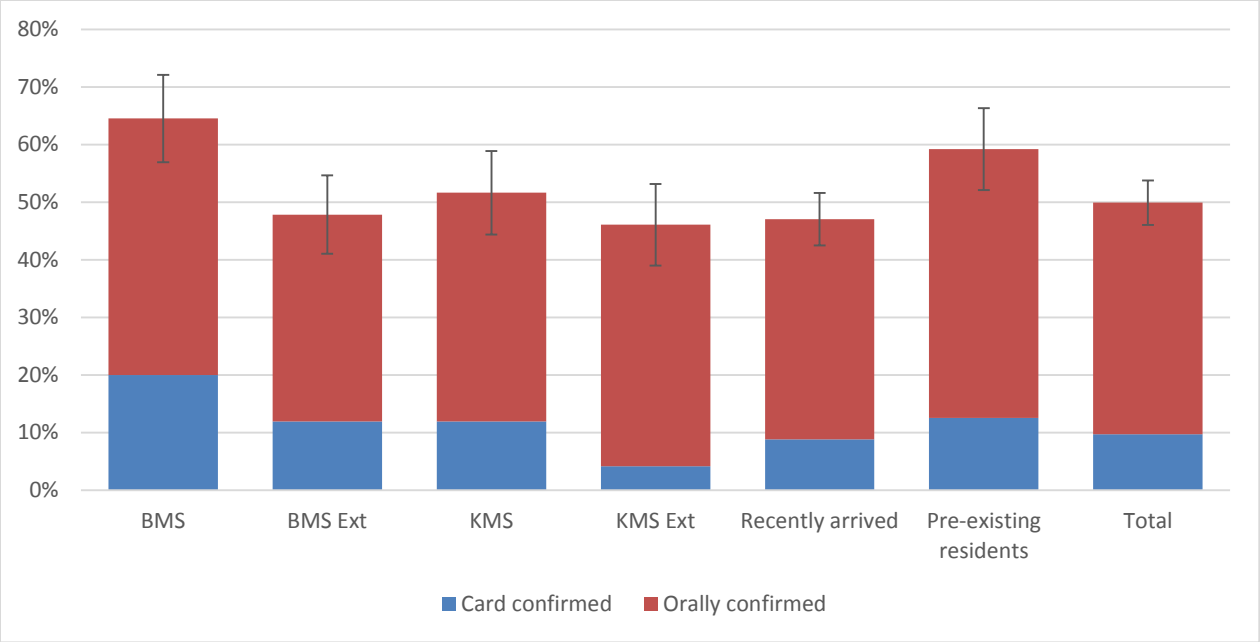


Figure 15. Polio vaccination coverage, by method of confirmation, area and time of arrival
Note: Error bars show the confidence interval for the proportion of children who received the vaccine, regardless of method of confirmation

Meningitis, pentavalent and PCV

Vaccination coverage for meningitis appears to be low or non-existent, with no children under 5 years reportedly having been vaccinated. The same applies for the pentavalent vaccine. Coverage for the PCV vaccine also appears to be low, with 2.3% (95% CI: 1.2-3.5) of all children under 5 years having received the vaccination, with no statistically significant difference seen between areas.

Overall, 30.8% (95% CI: 27.2-34.4) of children under 5 years had received no vaccinations, with no statistically significant difference observed between areas. There was also no significant difference in the proportion of children who had received no vaccinations between new arrivals (30.8% [95% CI: 26.9-34.8]) and the pre-existing population in the settlements (25.2% [95% CI: 19.3-31.1]).

3.7. Malnutrition

Among children aged 6-59 months, 10.3% (n=71) were not at home at the time of the interview so could not be assessed for malnutrition, leaving 617 children to be assessed using mid-upper arm circumference (MUAC) measurement.

The overall GAM for Balukhali and Kutupalong was 9.9% (95% CI: 7.5-12.2), close to the accepted emergency threshold. The moderate acute malnutrition (MAM) rate was 6.8% (95% CI: 4.8-8.8) and the severe acute malnutrition (SAM) rate 3.0% (95% CI: 1.7-4.4, includes bilateral oedema, n=4 cases identified).

The results for the separate surveys show a significantly lower GAM in the BMS (3.3%) than the rest of the settlements, with a slightly higher GAM amongst recently displaced people compared with the pre-existing population, although this difference was not significant (Table 23).

Whilst not directly comparable due to assessment of a population in an area not covered by this survey, a recent SMART survey conducted by ACF in the registered Kutupalong Refugee Camp showed a GAM rate of 5.9% (95% CI: 3.7-9.4) when assessed using MUAC, but a GAM rate of 24.3% (95% CI: 19.5-29.7) in the same population when assessed using anthropometric measurement, suggesting that malnutrition assessments using MUAC only may not be appropriate in this population.

Table 23. Acute malnutrition in children aged 6-59 months

	MAM	95% CI	SAM	95% CI	GAM	95% CI
BMS	2.7%	0.1-5.3	0.7%	0.0-2.0	3.3%	0.4-6.2
BMS Ext	5.8%	2.6-9.0	**3.9%**	**1.2-6.5**	9.7%	5.6-13.8
KMS	8.2%	4.2-12.3	2.2%	0.1-4.3	10.4%	6.0-14.9
KMS Ext	7.5%	3.7-11.3	**3.7%**	**1.0-6.5**	11.2%	6.7-15.8
Recently displaced	5.6%	3.6-7.6	**3.5%**	**1.9-5.0**	9.1%	6.6-11.5
Pre-existing residents	7.8%	4.1-11.4	1.0%	0.0-2.3	8.7%	4.9-12.6
Total	**6.8%**	**4.8-8.8**	**3.0%**	**1.7-4.4**	**9.9%**	**7.5-12.2**

Note: MAM and SAM proportions may not sum to GAM proportion due to rounding

In total, 20 children were identified as SAM (3.0%), with the highest numbers in the BMS Extension (n=8, 3.9%) and the KMS Extension (n=7, 3.7%).

3.8. Household arrivals and departures

The recall period, from 25 February 2017 to 12 November 2017 (last day of data collection), was 260 days; approximately 8.5 months. After accounting for arrivals and departures, births and deaths, the mean individual number of person days per individual was 247.3 days (95% CI: 246.5–248.0), the median was 254.6 days.

Of the 4,627 people sampled, 4,451 were living in the household at the start of the recall period and 4,383 at the end (Table 24)[23]. One hundred and twenty-two people joined the households included in the sample and 55 births were recorded, 140 people left the household before the end of the recall period and 105 people died.

Table 24. Permanent movement in or out of households over the recall period, by reason for movement

	Number	%
Total number of people included in study	4,627	100.0%
Number of people present at the start of the recall period	4,451	96.2%
Number of new arrivals (moved into the household)	122	2.6%
Number of births	55	1.2%
Number of people who left household (moved out)	140	3.0%
Number of deaths	105	2.3%
Number of people present at the end of the recall period	4,383	94.7%

Note: Only people who left or arrived permanently are included in the table above (not people who left temporarily).

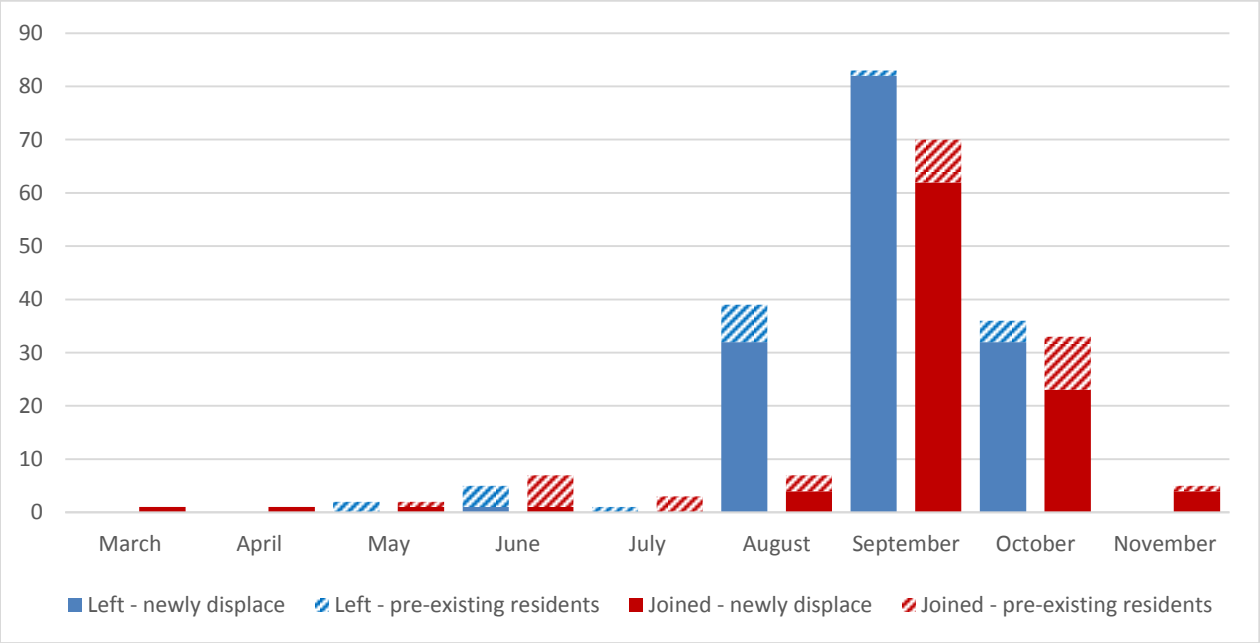


Figure 16. Permanent movement in and out of households by month

The majority of population movement occurred in August, September and October, to be expected given the commencement of the crisis on 25 August 2017 (Figure 16). The lack of reported population movements in November is explained by the majority of interviews, particularly in the KMS and BMS Extensions, being completed by 6 November 2017, therefore there is very little available data for the month.

When examined by area, households in the KMS Extension were more likely to have had at least one member who left the household during the recall period (5.7% of people who had lived in households in the KMS Extension had left [95% CI: 4.4-7.0]) than any other area. Households occupied by recently displaced people were significantly more likely to have had a household member leave (3.8% [95% CI: 3.2-4.5]) than pre-existing residents of the settlements (1.5% [95% CI: 0.8-2.2]). There was no difference between these groups in the proportion of people who had joined the household (2.7% & 2.5%, respectively).

4. Discussion

4.1. Demography

The population of Balukhali and Kutupalong settlements was comprised of 16.0% children under 5 years of age, and 46.0% aged <15 years, with a mean age of 20.8 years. The population pyramid broadly fits the expected shape for a growing population, with many more people in the younger age groups (0-14), however there is also a gap in the population pyramid in the 20-24 age group. Whether this reflects historical events in Myanmar, or more recent events is difficult to assess.

In the 20-24-year, 25-29-year, 40-44-year and 45-49-year age groups, the sex ratios (male to female) were 0.7, 0.8, 0.7 and 0.7, respectively, lower than the total population (0.9), suggesting that men are under-represented in this age group. Additional qualitative research may assist with further explanations for this demographic deficit. An understanding of whether these men are in fact missing, and why, or if this conforms to the population distribution prior to the recent crisis, would add valuable contextual knowledge to the slightly skewed gender distribution of the population.

The average household size was 5.1, with 1.5 of those aged under 5 years. This differs from the data obtained by community surveillance (BMS / BMS Ext household size = 4.2, KMS Ext = 4.3[24]), which may be explained by information being gathered about residents who were not present at the time of the interview.

As expected, the proportion of the population in both Extension areas comprised mostly newly arrived refugees – these areas were not populated prior to the recent influx. Despite being fully populated prior to the August influx, the pre-existing makeshift settlements comprised 53.5% new arrivals in BMS and 41.2% in KMS. These areas have seen a substantial increase in population with the new arrivals and should continue to be considered in the implementation of medical activities and other forms of humanitarian assistance.

4.2. Mortality

The mortality survey identified a CMR of 0.93 per 10,000 per day (95% CI: 0.77-1.13) for the period 25 February 2017 to 12 November 2017, with an U5MR of 0.74 per 10,000 per day (95% CI: 0.43-1.27). However, due to the vastly different experiences between the recently displaced and the pre-existing refugees, these mortality rates do not tell the complete story.

Limiting the mortality analysis to the population recently displaced from Rakhine State, we saw a very different picture. Although the CMR was 1.17 per 10,000 per day (95% CI: 0.96-1.43) for the entire recall period, the majority of deaths (64.9%) occurred between 25 August and 24 September 2017. This corresponds to a high CMR for this 31-day period, immediately following the crisis (6.31 per 10,000 per day [95% CI: 4.93-8.08]), nearly 15 times higher than before the crisis (0.42 per 10,000 per day [95% CI: 0.28-0.62]) and more than 9 times higher than the period from 25 September until the end of the recall period (0.67 per 10,000 per day [95% CI: 0.35-1.29]). This was also reflected in age-specific mortality rates for all age groups, with an U5MR from 25 August to 24 September of 4.56 per 10,000 per day (95% CI: 2.18-9.57), a 5-49 mortality rate in 5-49 year olds of 5.32 per 10,000 per day (95% CI: 3.90-7.25) and

[24] MSF exhaustive population count conducted in KMS during the period of drafting this report, household size data not yet available at time of writing

an even higher ≥50 year old mortality rate of (17.28 per 10,000 per day [95% CI: 10.58-28.20]). Two thirds of deaths in this period were attributed to violence (66.7%), the majority of which were shootings (69.0%), followed by burned to death in home (11.9%) and 'killed by military' (14.3%). These results begin to show the scale of the violence experienced in Rakhine State by the Rohingya population, and the potential scale of lives lost during the exodus.

Among the pre-existing population in the settlements, mortality rates were consistently below the recognised emergency thresholds for the entire recall period, with a CMR of 0.27 per 10,000 per day (95% CI: 0.13-0.54) for the entire recall period. This suggests that the influx of the new population has not had a dramatic effect on the health status of the existing population in the settlements. It was hypothesised prior to the survey that the health status of the existing population may have declined, due to increased strain on services, or may have improved due to the arrival of many new actors and the establishment of new health facilities, but neither of these appears to be the case when considering mortality. Elephant attacks accounted for half of the deaths in this pre-existing population, an ongoing concern in the settlements as they are constructed on land that lies on the migratory pathways of the local elephant population.

The mortality results from this survey highlight the level of violence and mortality experienced by the displaced population both at home in Rakhine and during their displacement to Bangladesh. Mortality in the settlements does not significantly exceed the accepted emergency threshold of 1 per 10,000 per day, with data from community surveillance suggesting that mortality rates within the settlements remain low, although there are not yet enough epidemiological weeks of data available to consider these to be stable.

4.3. Violence

The scale of violence experienced by the recently displaced population from Rakhine State is high, with over a quarter (25.8% [95% CI: 24.3-27.3]) having experienced at least one violent event. The majority of violent events amongst the recently displaced population occurred between 25th August and 25th September 2017 (N=738, 84.8% of all violent events), with few violent events reported before August 2017. Males were more likely to experience violence (27.8% [95% CI: 26.2-30.5]) than females (23.0% [95% CI: 21.3-25.3]), although this difference was not very large, suggesting that violence against the Rohingya was indiscriminate. Females were nearly twice as likely as males to have experienced sexual violence, with no other difference observed in the type of violence experienced between genders. Reports from respondents were that 29 people from households interviewed during the survey were shot and killed during the exodus.

On average, those who experienced violence suffered an average of 3.7 violent incidents. When paired with the high proportion of respondents who experienced violence, this indicates that the violence faced by the Rohingya in Rakhine was not only exceptional but recurrent. Less than 10% of violent events resulted in death (5.9%), with no statistically significant difference observed between males and females.

Sexual violence emerged as a considerable health and humanitarian concern in this survey, especially among females whereby 3.3% of the recently displaced female sample population reported experiencing or witnessing one or more sexual violence incidents between 25th August and 24th September 97% of which occurred prior to arrival in the settlements in Bangladesh. The proportion may

be an underrepresentation because there is no defined target population – the denominator is all females of all ages in the sample population.

Violence experienced by the recently displaced population took place predominantly at home or on the journey. The departure from Rakhine State for the majority of the recently displaced population occurred rapidly, and anecdotal reports from the settlement suggest that the majority of people arrived in Bangladesh with very few possessions or money. Furthermore, the theft of money or extortion was reported by a small number of the respondents who experienced violence, however further information on this was not provided.

There were no questions asked by the survey team regarding perpetrators of violence (e.g. if they were known to the respondent, if they were wearing uniforms, etc.) because this was deemed a possible security risk for the individual respondent.

4.4. Morbidity

One third (33.2%) of the sampled population reported being ill in the two weeks prior to data collection. This was slightly, but not statistically significantly, higher amongst females (35.1%) than males (31.3%), and statistically significantly higher among those aged ≥50 years (52.4%) compared with other age groups. Commonly the proportion of females reporting ill health in health surveys is higher, as males are considered less likely to report ill health; however, that does not appear to be the case in this population.[25] No other community-level data on morbidity in the settlements is available for comparison.

The most commonly reported illnesses were fever (66.4% of those unwell), respiratory issues (36.0%), "other" types of illness (24.9%) and diarrhoea (14.8%)[26]. "Other" types of illness predominantly included musculoskeletal complaints, stomach problems, high blood pressure / hypertension, skin diseases / rashes and eye problems. Musculoskeletal complaints may be caused by a variety of conditions; however, they are commonly seen as a physical manifestation of mental health issues.[27] To date no comprehensive assessment of the mental health status of the population has been conducted, but when the morbidity data is looked at in conjunction with the results regarding mortality and violence, the need for psychosocial support in the recently displaced population appears to be high. Skin diseases / rashes, eye problems and diarrhoea may be attributed to poor water and sanitation conditions in the settlement. Children under 5 years were more likely to suffer from diarrhoea than those aged five years or above, common in settings of this type, and were also more likely to suffer fever.

When examined by area, residents of the BMS Extension and KMS Extension were more likely to have been ill in the two weeks preceding the survey than residents of the BMS and KMS, although this was only statistically significant for the BMS Extension. Residents of the extension areas have arrived more recently, and these areas are less developed in terms of basic infrastructure including water and sanitation facilities, which may increase the risk of ill health for those living there.

[25] Vlassoff C. Gender Differences in Determinants and Consequences of Health and Illness. *Journal of Health, Population, and Nutrition*. 2007;25(1):47-61.

[26] Proportions do not sum to 100% as respondents could self-report more than one symptom

[27] Gupta MA. Review of somatic symptoms in post-traumatic stress disorder. International Review of Psychiatry.2013;1:86-99.

Just under half (49.0%) of people who reported being ill said they had visited a health facility, with 9.2% not accessing any form of health care and 37.1% reporting self-medication, a finding which may represent a sizeable public health concern. Residents of the BMS reported greater utilisation of healthcare services than residents of any other area, perhaps linked to the proximity of clinics in the area.

In KMS, and to a lesser extent the BMS Extension and KMS Extension, money was the main reported barrier for healthcare access. This should be explored further through an assessment of other health actors in the area and policies around charging for services, alongside further community sensitisation regarding the availability of free healthcare from MSF.

In BMS, a lack of time was the most common prohibitive factor for seeking healthcare, rather than any geographical barrier, although it should be considered that the number of people not seeking healthcare was quite low and therefore the confidence intervals wide for these results. This contrasted with the BMS Extension and KMS Extension, where geographical barriers were the most commonly reported obstacles to healthcare access. Given the large size of the extension areas, this is not surprising, with anecdotal reports from MSF team members who have visited remote areas suggesting that the distances required to reach healthcare services were either too far to travel in a sick condition, or that residents of these areas were afraid of becoming lost if they travelled far from their shelter.

4.5. Malnutrition

Based on assessment using MUAC measurement, the overall GAM in the settlements was 9.9% (95% CI: 7.5-12.2]) and the SAM rate was 3.0% (95% CI: 1.7-4.4), meeting the accepted emergency threshold.[28] There was no significant difference between areas in the SAM or GAM rate. Whilst not comprehensively assessed, there are anecdotal reports of a relatively high prevalence of chronic undernourishment and stunting in the population. A recent SMART survey conducted by Action Contre la Faim (ACF) in the registered Kutupalong Refugee Camp showed a GAM rate of 5.9% (95% CI: 3.7-9.4) when assessed using MUAC, compared to a GAM rate of 24.3% (95% CI: 19.5-29.7) in the same population when assessed using anthropometric measurement. This clearly highlights the need to consider which method is the most appropriate when conducting community-level malnutrition screening.

The SAM rates from this survey are alarming, and should also be considered in the context of an ongoing measles outbreak in the settlements, with increased rates of malnutrition commonly reported following measles outbreaks.[29]

4.6. Vaccination

In the weeks prior to the commencement of the health survey, an OCV campaign was conducted in the settlements, targeting the entire population with a single dose of OCV. A second dose follow-up campaign was conducted during the survey, targeting the population aged 1-5 years. Data collection for the survey focused on the first, single dose campaign, with 68.3% (95% CI: 66.9-69.8) of the sampled population receiving the vaccine. The coverage was variable by area, with lower coverage in the KMS

[28] ENN. Treatment of SAM and MAM in low- and middle-income settings: a systematic review http://www.ennonline.net/fex/47/treatment

[29] Bhaskaram, P. (1995). Measles & malnutrition. The Indian journal of medical research. 102. 195-9.

Extension area (55.8%), partly explained by the arrival of some residents after the vaccination campaign took place. In addition, the relatively difficult access to the KMS Extension may have also contributed to the lower vaccination coverage in that area, but this was not measurable in this survey. The impact of the new arrivals on the vaccination coverage in KMS Extension illustrates the importance of vaccination on arrival to ensure continued high vaccination coverage in the population.

Commencing shortly before the data collection for this survey, and growing rapidly afterwards, was a measles outbreak in the settlements. In September 2017, the MoHFW and WHO conducted a mass measles vaccination campaign reportedly vaccinating 135,519 children aged 9 months to 14 years. Despite this, measles vaccination coverage among children aged 6-59 months in this survey was low: 23.2% (95% CI: 19.9-26.5), highlighting the risk for a continuing and large-scale outbreak in the settlements. There was no statistically significant difference between areas, or between the pre-existing population and new arrivals in vaccination coverage. Clearly this represents a large public health risk in the population. The MoHFW and UNICEF with support from MSF and other health actors have planned and commenced a mass measles vaccination campaign on 18 November 2017, across all settlements, targeting children aged 6 months to 15 years in attempt to limit the extent of the ongoing outbreak and protect the unvaccinated population.

Polio vaccination coverage among children under 5 across all areas was 49.9% (95% CI: 46.1-53.8). Children living in BMS (64.5% [95% CI: 56.9-72.1]) and KMS (51.6% [95% CI: 44.4-58.9]) areas were more likely to have been vaccinated than children living in the extension areas. In parallel with the mass measles vaccination campaign in September 2017, a polio (OPV) vaccination campaign was conducted that reached 72,334 children. In addition, a second OPV campaign was conducted in conjunction with the second phase of the cholera vaccination campaign during which a further 210,000 children under five years of age were targeted for polio vaccination. The results of the second round of polio vaccination were not counted in this survey and so polio vaccination coverage should reliably be higher than was quantified in the data collection for this report.

Vaccination coverage for meningitis (MenACWY) appears to be low or non-existent, with no children under 5 years of age reportedly having been vaccinated. The same applies for the pentavalent vaccine. The survey team were trained on describing these conditions / vaccines and explaining the diseases for which pentavalent provides protection, however it is possible that some people in the community are not familiar with the specific names of the vaccines and therefore did not report administration of these vaccines. Coverage for the PCV vaccine also appears to be low, with 2.3% (95% CI: 1.2-3.5]) of all children under 5 years of age having received the vaccination, with no statistically significant difference seen between areas. This lack of / low coverage for these three vaccinations highlights an ongoing public health risk in the settlements, particularly with the dry winter season approaching in Bangladesh, typically a time of higher meningitis incidence.

4.7. Limitations

Although all care was taken planning and conducting the survey, and during analysis, there were several limitations that may affect the validity of the study including the following:

- There are a few disadvantages associated with the use of crude mortality rates for assessing the scale of complex humanitarian emergencies, particularly in prolonged emergencies affecting large, rural populations in wide geographic locations, as reported by Salama et al.[30]. Using general alert thresholds, rather than comparisons with existing data specific to the population, dismisses the intricacies and gravity of the situation and may result in late action by humanitarian agencies (i.e. interventions should occur before emergency threshold is reached). Given that this crisis was already declared an international humanitarian emergency before this survey was undertaken, the possibility of inaction would appear remote. Nevertheless, the possibility for the underestimation of the gravity of the situation due to contextual blindness remains very real.
- The recall period was 8.5 months: this probably introduced a degree of recall bias. While, in general, people could remember at least approximately the month and day that events took place, this may not have been exact. This may have resulted in events occurring earlier in the recall period being underreported, or over-reported if the death of a family member occurred outside the recall period and the respondent wanted to ensure this was included. This risk is potentially increased by the gravity of the situation faced in Rakhine State by most respondents. Similarly, traumatic events (e.g. death) may be recalled as occurring more recently than they did.
- Survival bias, whereby whole households were not surveyed because there were no survivors, may have been an issue in this survey and may have resulted in underestimated mortality rates.
- Cause of death data should be interpreted with caution because they were reported by family members based generally on symptoms only; no autopsy or clinical diagnosis was used to deduce cause of death.
- Although close monitoring and supervision of survey teams was undertaken, it is possible that small deviations in sampling and recording occurred.

[30] Salama P, Spiegel P, Talley L et al. Lessons learned from complex emergencies over past decade. The Lancet, Volume 364, Issue 9447, 1801 - 1813

5. Conclusions

The crude mortality rate between 25th August and 24th September for the recently displaced was 6.31 per 10,000 per day (95% CI: 4.93-8.08) more than 15 times higher than the period 25th February to 24th August before the crisis [0.42 (95% CI: 0.28-0.62)] and more than 9 times higher than the period 25 September to the end of the recall period, [0.67 (95% CI: 0.35-1.29)]. Most of the deaths of the recently arrived refugees were caused by violence. Furthermore, it is possible that entire families did not make it to Bangladesh during the displacement, which may underestimate the CMR for the period following the beginning of the crisis in Rakhine.

The experiences of the recently displaced population are not just summarised by mortality statistics, but also by the level of violence reported by this population, with over a quarter having experienced at least one violent event. These events included shooting, physical violence and detentions / kidnapping, with sexual violence also reportedly experienced by 3.3% of all women amongst the recently displaced population between 25th August and 24th September. Together, the information gathered on mortality and violence in the recently displaced population shows exposure to an extreme degree of violence following the commencement of the crisis on 25th August.

Regarding the situation in the settlements, mortality rates appear to be low, a finding which is supported by low mortality rates reported by prospective community surveillance. However, there is currently an ongoing measles outbreak in all areas of the settlements, with growing case numbers each week. This survey showed measles vaccination rates to be low (23.2% of children under 5 years) so the outbreak remains a major public health concern. Another vaccination coverage survey directly after the campaign is recommended to evaluate the success of the campaign and the risk of potential future outbreaks. Following a recent mass vaccination campaign for cholera, coverage was 68.3% (95% CI: 66.9-69.8), close to the minimum coverage target of 70% which was achieved in all sections except the KMS Extension (55.8%). Health actors should continue developing preparedness plans for a potential cholera outbreak in the event of this occurring. Furthermore, vaccination coverage for meningitis and the pentavalent and PCV vaccines appear very low, again a sizeable public health concern.

One third of the sampled population reported being sick in the 2 weeks prior to the survey, mostly due to fever, respiratory infections and diarrhoea. Utilisation of healthcare services was reported by just under half of people who had been ill, highlighting that there may be a need for further community sensitisation about MSF health facilities. A particularly concerning finding was that 42% of the sampled population who had not accessed healthcare reported a lack of money as a prohibitive factor for seeking healthcare. An assessment of healthcare provided by other actors could help explain this finding and further sensitisation may be required about the options for free healthcare.

Malnutrition in the settlements is concerning. The findings of this survey (overall GAM=9.9% and SAM =3%) indicate concerning SAM rates but are based on MUAC measurements, which in a recent SMART survey showed significant discordancy with anthropometric measurements. This should be explored further to determine the most accurate means to identify and classify malnutrition in the population, which can then be employed for future assessments and screening.

6. Appendices

Appendix 1: Questionnaire

Household Questionnaire: Kutupalong / Balukhali Refugee settlements, Bangladesh

Date |__|__| / __ / 2017 Area: _____

Team N° |__|__| Household N° |__|__|

IF HOUSEHOLD RANDOMLY SELECTED BUT EXCLUDED FROM SURVEY, WHY?
- ☐ No one home
- ☐ Participant < 18 years of age
- ☐ Refused to participate
- ☐ Other (specify)_____

Verbal consent obtained? ☐ *Yes* ☐ *No (end interview)*

Instructions: Start with the head of the household present on the day of the survey.
If there are more than 12 members in the household, use a second questionnaire to continue until ALL consenting household members are registered.
Ask to interview the head of the household alone (before violence questions (indicated by bold line)

#	Sex	If female, pregnant?	Age	If <5 years: Measles/Polio/ MenACWY/ Pentavalent/ PCV?	If yes: Vacc card?	Sick in last 2 wks?	Symptoms	Health care sought	If none: why?	Date of arrival in camp	Experienced a violent event in recall period?	# violent events	Type of violence	Date of most recent violent event	Place of violence
	M/F	N=No Y=Yes	mths or yrs	M=Measles P=Polio Men=ACWY PV=Penta PCV=PCV OCV=Cholera (multiple responses allowed)	N=No Y=Yes	N=No Y=Yes	1=Diarrhoea, 2=Respiratory, 3=Malnutrition, 4=Pregnancy-related, 5=Malaria/fever, 6=Trauma/accident, 7=Violence, 8=Unknown, 9=Other (specify)	0=None 1=Self-medicated 2=Clinic (specify) 3 =Traditional healer 4=Other (specify)	1=no money/ too expensive, 2=too sick, 3=not sick enough, 4=clinic too far, 5=no time to go 6=no trust in clinic, 7=security problem, 8=care was refused at clinic, 9=other (specify)	dd/mm/yy	N=No Y=Yes		1=Beaten 2=Sexual 3=Shot 4=Detained/ Kidnapped 5=Unknown 6=Other (specify) [multiple responses allowed]	dd/mm/yy	1=Home 2=Work 3=During journey 4=Unknown 5=Other (specify)
1															
2															
3															
4															
5															
6															
7															
8															
9															
10															
11															
12															

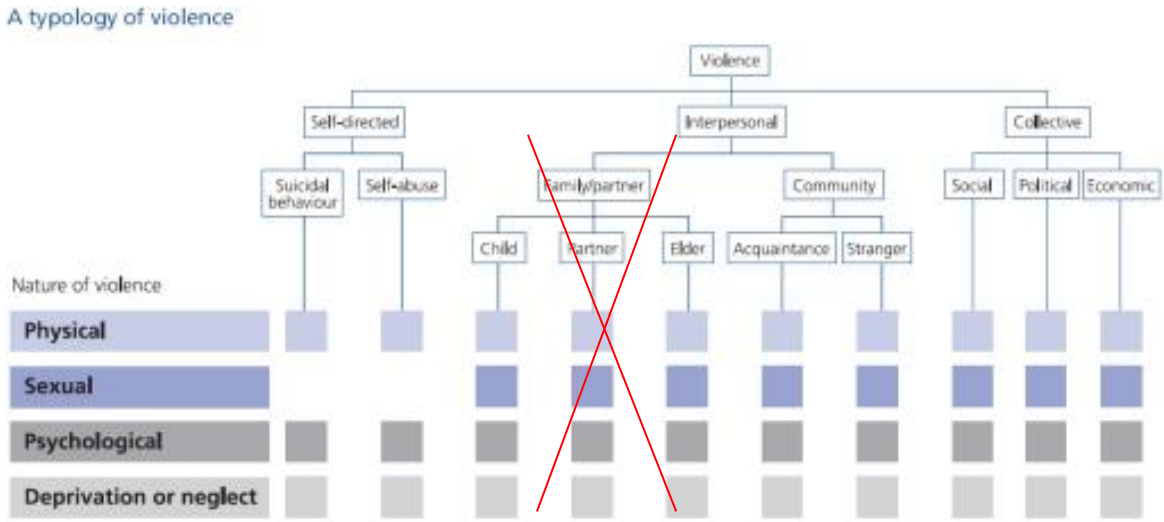
#	Arrived in HH during recall period	Reason for arrival	Left HH during recall period	Reason for departure	Born during recall period	Died during recall period	Main cause of death	If cause of death was violence: Type?	Place of death	Comments (e.g. experience prior to arrival)
	Date of arrival (dd/mm/yy)	1=Displacement 2=Other (specify)	Date of departure (dd/mm/yy)	1=Displacement 2=Other (specify)	Date of birth (dd/mm/yy)	Date of death (dd/mm/yy)	1=Diarrhoea, 2=Respiratory, 3=Malnutrition, 4=Pregnancy-related, 5=Malaria/fever, 6=Trauma/accident, 7=Violence, 8=Unknown, 9=Other (specify)	1= Beaten 2= Sexual 3= Shot 4= Detained/ kidnapped 5= Unknown 6= Other (specify)	1=Home 2=Hospital 3=Unknown 4=Other (specify)	
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										
11										
12										

Back-check question: Did anybody in your household die between the start of the recall period and today?

- ☐ No (end interview)
- ☐ Yes >> *If yes, add the HH member who died to this questionnaire, and complete all necessary information*

THANK YOU FOR PARTICIPATING IN THIS SURVEY.

Appendix 2: A typology of violence by WHO (2002)[23], excluding components not relevant to this survey



Appendix 3: “Other” violence experiences

	Number reported
Arrested and subsequently extorted	9
Attempted stabbing	2
Beatings	1
Burned house	96
Destruction of possessions	1
Drowned / boat capsized	5
Forced labour in Border Guard Police camp	2
"Taken"	9
Theft of money	18
Unclear	38
Witnessed beatings	7
Witnessed detentions	4
Witnessed sexual violence	3
Witnessed shootings	19

Appendix 4: "Other" causes of morbidity

	Number reported
Abdominal pain	6
Anaemia	4
Asthma	3
Chronic polio	1
Diabetes	9
Disability	5
Eye problem	11
Headache	7
Heart disease	12
High blood pressure / hypertension	16
HIV	1
Jaundice	6
Joint pain	43
Kidney stone	1
Lethargy	5
Liver	1
Measles	1
Menstrual problem	3
Nausea	9
Oedema	1
Paralysis	3
Physical mobility	5
Rheumatic arthritis	2
Skin disease	13
Stomach problem	36
Typhoid	1
Unclear	77

Appendix 5: "Other" clinics utilised

	Number reported
ACF	2
Army	1
BRAC	26
Cox's Bazar hospital	8
Don't know name	26
Free medical camp	81
Friendship clinic	4
ICRC	1
IOM	24
Other	3
Other hospital	16
Pharmacy	15
Public drug distribution	37
UNHCR	9

Appendix 6: Summary results for each survey

	BMS Ext		BMS		KMS Ext		KMS		Pooled	
Demography	N	%	N	%	N	%	N	%	N	%
Households interviewed	235		220		235		215		905	
Number of people interviewed	1190		1059		1219		1159		4627	
Average number of people per household	5.1		4.8		5.1		5.3		5.1	
Male	577	48.90%	526	49.70%	581	47.70%	580	50.00%	2264	48.70%
Female	613	51.50%	533	50.30%	638	52.30%	579	50.00%	2363	51.20%
Male / female sex ratio	0.94		0.99		0.91		1		0.96	
Pregnant women	52	8.50%	34	6.40%	43	6.70%	28	4.80%	157	6.50%
People <5 years	209	17.60%	155	14.60%	191	15.70%	184	15.90%	739	16.00%
Mean age	20.3		20.8		21.5		20		20.8	
Median age	16		17		16		16		16	
Average number of children <5 years per household	1.6		1.5		1.5		1.5		1.5	
Recently-arrived refugees	1180	99.20%	567	53.50%	1206	98.90%	478	41.20%	3431	77.90%
Pre-existing refugees	10	0.80%	492	46.50%	13	1.10%	681	58.80%	1196	22.10%
Mortality	N	Rate	N	Rate	N	Rate	N	Rate	N	Rate
Mean number of person-days	244.2815		246.3681		237.5781		245.5437		242.1	
Total deaths	41	1.41 (1.04-1.92)	13	0.50 (0.29-0.86)	34	1.17 (0.84-1.64)	17	0.60 (0.37-0.96)	105	0.93 (0.77-1.13)
Male deaths	23	1.63 (1.08-2.45)	8	0.61 (0.31-1.23)	18	1.31 (0.83-2.08)	11	0.77 (0.43-1.40)	60	1.09 (0.85-1.40)
Female deaths	18	1.20 (0.76-1.91)	5	0.38 (0.16-0.92)	16	1.05 (0.64-1.72)	6	0.42 (0.19-0.94)	45	0.78 (0.58-1.05)

<5 death	5	1.00 (0.42-2.40)	2	0.54 (0.13-2.14)	5	1.13 (0.47-2.71)	1	0.23 (0.03-1.60)	13	0.74 (0.43-1.27)
5-49 deaths	27	1.25 (0.86-1.82)	7	0.35 (0.17-0.74)	21	0.98 (0.64-1.50)	9	0.41 (0.21-0.79)	64	0.76 (0.59-0.97)
≥50 deaths	9	3.69 (1.92-7.10)	4	1.62 (0.61-4.31)	8	2.56 (1.28-5.11)	7	3.11 (1.48-6.51)	28	2.72 (1.88-3.94)
Recently displaced refugees										
Total population	41	1.42 (1.05-1.93)	11	0.79 (0.44-1.43)	34	1.19 (0.85-1.66)	11	0.97 (0.53-1.74)	97	1.17 (0.96-1.43)
February 25 - August 24	Not estimated								25	0.42 (0.28-0.62)
August 25 - September 24									63	6.31 (4.93-8.07)
September 25 - October 30									9	0.67 (0.35-1.29)
Males	23	1.64 (1.09-2.47)	8	1.15 (0.58-2.31)	18	1.32 (0.83-2.10)	7	1.19 (0.57-2.50)	56	1.39 (1.07-1.80)
February 25 - August 24	Not estimated								17	0.59 (0.36-0.94)
August 25 - September 24									36	7.43 (5.36-10.30)
September 25 - October 30									3	0.46 (0.15-1.43)

Females	18	1.21 (0.77-1.93)	3	0.43 (0.14-1.34)	16	1.06 (0.65-1.73)	4	0.72 (0.27-1.93)	41	0.97 (0.71-1.32)
February 25 - August 24	Not estimated								8	0.26 (0.13-0.53)
August 25 - September 24									27	5.25 (3.60-7.66)
September 25 - October 30									6	0.86 (0.39-1.92)
<5 years	5	1.01 (0.42-2.42)	2	1.39 (0.35-5.55)	5	1.14 (0.47-2.73)	1	0.62 (0.09-4.38)	13	1.05 (0.61-1.80)
February 25 - August 24	Not estimated								2	0.23 (0.06-0.91)
August 25 - September 24									7	4.56 (2.18-9.57)
September 25 - October 30									4	1.91 (0.72-5.10)
5-49 years	27	1.26 (0.86-1.83)	5	0.46 (0.19-1.12)	21	0.99 (0.65-1.52)	6	0.67 (0.30-1.49)	59	0.95 (0.73-1.22)
February 25 - August 24	Not estimated								16	0.36 (0.22-0.58)
August 25 - September 24									40	5.32 (3.90-7.25)
September 25 - October 30									3	0.30 (0.10-0.92)

≥50 years	9	3.76 (1.95-7.22)	4	2.42 (0.91-6.46)	8	2.56 (1.28-5.11)	4	5.01 (1.88-13.00)	36	3.13 (2.12-4.64)
February 25 - August 24	Not estimated								7	1.21 (0.57-2.53)
August 25 - September 24									16	17.28 (10.58-28.20)
September 25 - October 30									2	1.65 (0.41-6.58)
Cause of death										
Violence	24	58.50%	0	0.00%	18	52.90%	8	72.70%	50	51.60%
Other	3	7.30%	6	54.60%	4	11.80%	0	0.00%	13	13.40%
Trauma / accident	3	7.30%	2	18.20%	7	20.60%	0	0.00%	12	12.40%
Unknown	6	14.60%	2	18.20%	3	8.82%	2	18.20%	13	13.40%
Fever	5	12.20%	0	0.00%	1	2.90%	1	9.10%	7	7.20%
Diarrhoea	0	0.00%	1	9.10%	0	0.00%	0	0.00%	1	1.00%
Respiratory	0	0.00%	0	0.00%	1	2.90%	0	0.00%	1	1.00%
February 25 - August 24	Not estimated									
Other									11	44.00%
Violence									7	28.00%
Unknown									6	24.00%
Trauma / accident									1	4.00%
August 25 - September 24	Not estimated									
Violence									42	66.70%
Trauma / accident									9	14.30%
Fever									6	9.50%

Unknown									5	7.90%
Other									1	1.60%
September 25 - October 30										
Other									1	11.10%
Violence									1	11.10%
Trauma / accident									2	22.20%
Unknown									2	22.20%
Diarrhoea									1	11.10%
Respiratory									1	11.10%
Fever									1	11.10%
Violence-specific cause of death										
August 25 - September 24										
Shot									29	69.00%
Killed by military									6	14.29%
Burned to death in home									5	11.90%
Sexual									1	2.40%
Other									1	2.38%
Place of death										
February 25 - August 24										
Home									20	80.00%
During journey									4	16.00%
Unknown									1	4.00%
August 25 - September 24										
Home									25	39.70%
During journey									26	41.30%

Other*									4	6.40%
Unknown									7	11.10%
Work									1	1.60%
September 25 - October 30										
Other**	Not estimated								3	33.30%
Home									4	44.40%
During journey									2	22.20%
Pre-existing refugees										
Total population	Not estimated								8	0.27 (0.13-0.54)
February 25 - August 24									7	0.34 (0.16-0.70)
August 25 - September 24									0	-
September 25 - October 30									1	0.19 (0.03-1.32)
Males									4	0.28 (0.10-0.73)
Females									4	0.26 (0.10-0.70)
<5 years									0	-
5-49 years									5	0.22 (0.09-0.54)
≥50 years									3	1.3 (0.42-4.02)

Cause of death										
Diarrhoea	Not estimated								1	12.50%
Other*									4	50.00%
Violence									1	12.50%
Unknown									2	25.00%
Location of death										
Home	Not estimated								2	25.00%
Other									6	75.00%
	N	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**
Violence	356	29.90%	124	11.70%	277	22.70%	165	14.20%	922	20.60%
Male	196	34.00%	69	13.10%	148	25.50%	83	14.30%	496	22.60%
Female	160	26.10%	55	10.30%	129	20.20%	82	14.20%	426	18.70%
Died	24	6.70%	0	0%	18	6.50%	9	5.50%	51	5.90%
Died male	Not estimated								33	7.30%
Died female									18	4.40%
Average N violent events	4		3.4		3		5.1		3.7	
Recently displaced	349	29.60%	106	18.70%	275	22.80%	155	32.40%	885	25.80%
Male	192	33.60%	60	21.10%	148	25.70%	76	30.90%	476	28.40%
Female	157	25.80%	46	16.30%	127	20.10%	79	34.10%	409	23.30%
<5 years	Not estimated								93	17.60%
≥5 years									792	27.30%
Died									50	5.70%
Average N in recently displaced	4		3.5		3		5.2		3.9	
Pre-existing population	7	70%	18	3.70%	2	15.40%	10	1.50%	37	3.10%

Male	Not estimated								20	3.40%
Female									17	2.80%
<5 years									5	2.40%
≥5 years									32	3.30%
Died									1	2.70%
Average N in pre-existing	2.3		2.9		1		4		3	
Recently displaced										
25th February - 24th August									96	2.80%
Male	Not estimated								64	3.80%
Female									32	1.80%
<5 years									8	1.50%
≥5 years									88	3.00%
25th August - 24th September									738	21.50%
Male	Not estimated								385	23.00%
Female									353	20.10%
<5 years									81	15.30%
≥5 years									657	22.60%
25th September - End of recall period									36	1.10%
Male	Not estimated								17	1.00%
Female									19	1.00%
<5 years									4	0.80%
≥5 years									32	1.10%
Previously displaced										
25th February - 24th August									6	0.50%
Male	Not estimated								4	0.70%
Female									2	0.30%

<5 years									0	0.00%
≥5 years									6	0.60%
25th August - 24th September									5	0.40%
Male									3	0.50%
Female									2	0.30%
<5 years									1	0.50%
≥5 years									4	0.40%
25th September - End of recall period									7	0.60%
Male									3	0.50%
Female									4	0.70%
<5 years									2	1.00%
≥5 years									5	0.50%
Recently displaced, 25th August - 24th September - type of violence										
Beaten									443	60.00%
Male									235	61.00%
Female									208	58.90%
<5 years									24	29.60%
≥5 years									419	63.80%
Sexual violence									93	12.60%
Male									35	9.00%
Female									58	16.40%
<5 years									2	2.50%
≥5 years									91	13.90%
Shooting									562	76.20%

Male	Not estimated								289	75.00%
Female									273	77.30%
<5 years									71	87.70%
≥5 years									491	74.70%
Detained / kidnapped									249	33.70%
Male	Not estimated								126	32.70%
Female									123	34.80%
<5 years									6	7.40%
≥5 years									243	37.00%
Unknown									3	0.40%
Male	Not estimated								3	0.80%
Female									0	0.00%
<5 years									3	0.80%
≥5 years									0	0.00%
Other									207	28.10%
Male	Not estimated								104	27.00%
Female									103	29.20%
<5 years									7	8.60%
≥5 years									200	30.40%
Recently displaced, 25th August - 24th September - location of violence										
Home									498	68.70%
Male	Not estimated								250	66.30%
Female									248	71.30%
<5 years									34	43.60%
≥5 years									464	71.70%

Work									131	18.10%
Male	Not estimated								110	29.20%
Female									21	6.00%
<5 years									2	2.60%
≥5 years									129	19.90%
During journey									455	62.80%
Male	Not estimated								243	64.50%
Female									212	60.90%
<5 years									61	78.20%
≥5 years									394	60.90%
Unknown									0	0.00%
Male	Not estimated								0	0.00%
Female									0	0.00%
<5 years									0	0.00%
≥5 years									0	0.00%
Other									18	2.50%
Male	Not estimated								14	3.70%
Female									4	1.20%
<5 years									0	0.00%
≥5 years									18	2.80%
Missing									13	1.80%
Male	Not estimated								8	2.10%
Female									5	1.40%
<5 years									3	3.70%
≥5 years									10	1.50%
	N	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**

Morbidity										
Ill in the last two weeks	434	37.00%	312	30.00%	415	35.30%	329	28.80%	1490	33.20%
Male	191	33.80%	146	28.50%	187	34.00%	153	26.90%	677	31.30%
Female	243	40.10%	166	31.50%	228	36.50%	176	30.70%	813	35.10%
<5 years	85	40.90%	43	28.30%	70	37.60%	64	35.00%	262	36.60%
5-49 years	299	34.50%	220	27.80%	277	32.00%	220	25.40%	1016	30.10%
≥50 years	50	51.60%	49	51.00%	68	55.30%	45	48.40%	212	52.40%
Recently displaced	431	37.10%	160	29.00%	411	35.30%	132	28.20%	1134	34.20%
Pre-existing refugees	3	30.00%	152	31.20%	4	33.30%	197	29.20%	356	29.80%
Number of symptoms										
1	247	21.10%	165	15.90%	247	21.00%	181	15.80%	840	57.20%
2	158	13.50%	128	12.30%	141	12.00%	116	10.20%	543	35.60%
3	27	2.30%	17	1.60%	25	2.10%	29	2.50%	98	6.70%
4	1	0.10%	2	0.20%	2	0.20%	1	0.10%	6	0.40%
5	1	0.10%	0	0.00%	0	0.00%	1	0.10%	2	0.00%
Type of symptom										
Diarrhoea	91	21.00%	25	8.00%	64	15.40%	35	10.60%	215	14.80%
Respiratory	125	28.80%	134	43.00%	140	33.70%	125	38.00%	524	36.00%
Malnutrition	19	4.40%	12	3.90%	25	6.00%	22	6.70%	78	5.60%
Pregnancy-related	14	3.20%	12	3.90%	8	1.90%	10	3.00%	44	2.70%
Fever	313	72.10%	205	65.70%	270	65.10%	210	63.80%	998	66.40%
Accident	2	0.50%	4	1.30%	1	0.20%	2	0.60%	9	0.50%
Violence	2	0.50%	0	0.00%	3	0.70%	0	0.00%	5	0.40%
Unknown	3	0.70%	4	1.30%	0	0.00%	8	2.40%	15	0.90%
Other	84	19.40%	85	27.20%	102	24.60%	98	29.80%	369	24.90%

<5 years										
Diarrhoea	27	31.80%	5	11.60%	11	15.70%	11	17.20%	54	19.80%
Respiratory	33	38.80%	27	62.80%	31	44.30%	33	51.60%	124	45.10%
Malnutrition	5	5.90%	4	9.30%	11	15.70%	15	23.40%	35	14.80%
Fever	63	74.10%	36	83.70%	50	71.40%	46	71.90%	195	73.20%
Accident	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Violence	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Unknown	1	1.20%	0	0.00%	0	0.00%	1	1.60%	2	0.70%
Other	10	11.80%	4	9.30%	11	15.70%	12	18.80%	37	15.00%
Health seeking										
Sought care from:										
Clinic	200	45.90%	199	63.80%	194	46.80%	164	49.70%	757	49.00%
Did not seek care	46	10.60%	17	5.50%	43	10.40%	24	7.30%	130	9.20%
Self-medicated	181	41.70%	68	21.80%	165	39.80%	114	34.70%	528	37.10%
Traditional	12	2.80%	15	4.80%	15	3.60%	13	4.00%	55	3.60%
Other	0	0.00%	0	0.00%	7	1.70%	0	0.00%	7	0.70%
Reason not attending health facility										
No cash	16	34.80%	2	11.80%	17	39.50%	16	66.70%	51	41.80%
Too ill	2	4.40%	0	0.00%	2	4.70%	3	12.50%	7	5.80%
Not ill enough	5	10.90%	2	11.80%	2	4.70%	1	4.20%	10	6.60%
Clinic too far away	17	37.00%	0	0.00%	12	27.90%	3	12.50%	32	25.60%
No time	6	13.00%	11	64.70%	10	23.30%	2	8.30%	29	20.30%
No trust in clinic	1	2.20%	1	5.90%	1	2.30%	0	0.00%	3	2.10%
Security	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%

Care refused at clinic	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Clinic visited										
MSF	109	55.30%	147	75.40%	95	52.20%	122	79.70%	122	62.70%
Other	88	44.70%	48	24.60%	87	47.80%	31	20.30%	31	37.30%
Vaccination coverage										
OCV (≥1 year)	861	74.00%	798	77.00%	669	55.80%	892	79.10%	3220	68.30%
Measles (<5 years)	39	18.70%	44	28.40%	49	25.70%	39	21.20%	171	23.20%
Polio (<5 years)	100	47.90%	100	64.50%	88	46.10%	95	51.60%	383	49.90%
MenACWY	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Pentavalent	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
PCV	9	4.30%	5	3.20%	5	2.60%	0	0.00%	19	2.30%
Malnutrition										
GAM	20	9.70%	5	3.30%	21	11.20%	19	10.40%	65	9.90%
MAM	12	5.80%	4	2.70%	14	7.50%	15	8.20%	45	6.80%
SAM	8	3.40%	1	0.70%	7	3.70%	4	2.20%	20	3.00%