Prevalence and correlates of depression among Rohingya refugees and Bangladeshis living in Cox's Bazar: a representative, cross-sectional survey.

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Introduction

Forced displacement has reached an unprecedented scale worldwide and has created both development challenges and massive public health threats (World Health Organization, 2019; Smith, 2018). At the end of 2018, a historically significant 70.8 million people had left their homes to escape persecution, violence, or human rights violations, and the vast majority – more than 80 percent – resettled in a developing country (UNHCR 2019). The burden of providing for a large influx of refugees can stymie efforts to reduce poverty and promote development in host countries and increase the risk of communicable and noncommunicable diseases. Among the latter, common mental health disorders are widespread due to exposure to violence, and they are risk factors for disability and unemployment. Yet they are much less likely to be treated than physical conditions due to stigma and a lack of reliable epidemiological data (Stein et al. 2019).

We investigate the prevalence of depression and its association with lifetime trauma and ongoing stressors among both Rohingya refugees from Myanmar, and the population of Cox's Bazar, the district of Bangladesh hosting the Rohingya refugees. Depression is a leading cause of years lived with disability and of deaths by suicide worldwide (Anwar et al., 2018; World Health Organization, 2017; Vos et al., 2015). Depression can be both a cause and a consequence of poverty (Lund et al. 2018). It can interfere with cognitive function and decision-making, often resulting in decreases in labor force participation, productivity, savings, and investment in health (Haushofer and Fehr 2014; Peng et al. 2016; Strulik 2019).

Cox's Bazar is currently home to over 860,000 stateless Rohingya refugees, the vast majority of whom live in densely populated camps and depend on emergency aid to cover daily needs. Following decades of restrictions on movement, limited access to public services, and clashes with civilians and the military in Myanmar (Mahmood et al. 2017), a campaign of targeted violence against the Muslim minority in August 2017 sparked the largest and fastest refugee influx in Bangladesh's history. At present, an estimated 1.2 million people depend on humanitarian assistance, out of which 72 percent are refugees and 27 percent are hosts (UN Strategic Executive Group 2019).

As it is the case in most refugee-receiving communities in low- and middle-income countries, there is very limited data to guide the design and targeting of interventions in Cox's Bazar (UNHCR 2019). Existing research on the prevalence of mental health disorders in host developing countries has reported outcomes for migrants only (Riley et al. 2017; Feyera et al. 2015; Onyut et al. 2009; Cardozo et al. 2004; Sabin et al. 2003) or focused on narrow, non-representative segments of the population, such as adults aged 60 or older (Chaaya et al. 2007). We provide some of the first evidence on the prevalence of depression drawn from representative samples of both refugee and host communities, offering new insight on the relationship between forced displacement and mental health, and some guidance for policy responses.

Our survey revealed alarming rates of depression in Cox's Bazar: 29·6 percent of refugees and 25·5 percent of hosts meet the symptom criteria for depression. Two sub-populations at higher risk are adults above the age of 45 and those who report experiencing five or more traumatic events. Perhaps the most surprising finding is that the host community in Cox's Bazar has rates of depression almost as high as the refugees, a population now crowded into refugee camps after fleeing systematic persecution. Nearly 62 percent of the non-refugee Bangladeshi population experienced at least one traumatic event in their lifetime.

The large aid response targeting the recent refugee arrivals from Myanmar has created political tension between humanitarian actors and poor Bangladeshis living in Cox's Bazar who desire access to similar

services (Rogers 2018; UNDP 2018). Our data indicate that the host communities are in need of similar mental health services. However, our data also suggests that the ideal mental health interventions may be different for the host and refugee communities. While both groups have experienced high levels of trauma, detailed interviews reveal that the nature of traumatic experiences differs systematically between refugees and hosts. Much of the trauma among hosts stems from domestic violence incidents, while the Rohingya experienced combat, murder, rape, and other large-scale state-sponsored violence. Trauma is more predictive of depression in the host population, possibly because rape and sexual abuse carry greater social stigma, and appears to be systematically under-reported by the Rohingya.

Our findings suggest that both refugee and host populations in Cox's bazar are in dire need of mental health screening and referral services, and a few screening questions can help identify those with the most urgent need. Future studies might benefit from using biomarkers and qualitative interviews focused on experiences with trauma to improve our understanding of depression (Schaakxs et al. 2018; Collishaw et al. 2016; Hagan et al. 2015; Bellón et al. 2008). In particular, collecting information on the severity of trauma and age of exposure is likely to improve our ability to predict the onset of depression and mental health outcomes later in life (Wise et al. 2001).

Methods

Sample. The study had a sample size of 5,020 households, divided almost equally between refugee camps (n=2,493) and host communities (n=2,527) across Cox's Bazar. For the host sample, we used mauzas – the lowest administrative unit in Bangladesh – as Primary Sampling Units (PSUs). We stratified mauzas into "high spillover" areas – those within 15 kilometers or 3-hour walking distance from camps – and "low spillover" areas – farther than 15 kilometers away from camps – and selected a random sample of PSUs via probability proportional to population size. Each mauza was divided into segments of roughly 100-150

households based on the latest population census. We randomly selected three segments from each mauza, conducted a listing in each, and sampled 13 households per segment via simple random sampling (SRS).

We used a two-stage procedure to create a representative sample of camp residents. First, we selected 192 PSUs using PPS from the 1,954 camp blocks defined by the International Organization for Migration (IOM) Needs and Population Monitoring Round 12 (NPM12). Second, we conducted a household listing in each selected PSU and selected 13 households per block via SRS.

In each household, we randomly selected two adults for detailed interviews covering a wide range of topics, including trauma and mental health. Our sample consisted of 9,393 individuals aged 15 or older. Of those, 4,733 were living in host communities and identified as Bangladeshi. Another 4,616 identified as Rohingya and were either born on Myanmar or descended directly from a Myanmar citizen; out of these, 3,914 left Myanmar during or after 2017, and the remainder 702 left Myanmar before August 2017.

Before starting the data collection, we conducted a mixed-methods pilot study in a sample of 436 households (220 in host communities and 216 in refugee camps) to examine the nature of the trauma experienced by each subpopulation. In each household, we asked to speak with two non-randomly selected adults among those available on the day of the survey. We interviewed at least one adult per household. The questionnaire included two open-ended questions on the most terrifying events experienced by the respondent, and the nature of any torture faced. We excluded the households selected for the mixed-methods pilot from the main large-sample quantitative survey.

Literature search. We searched PubMed, Google Scholar, and PsycARTICLES for original research articles using the terms “depression” or “mental health”, and “refugee” or “forcibly displaced” or “native” or “host population” or “host community” up to February 6, 2020. We searched for studies that reported the prevalence and correlates of depression among refugee and refugee-receiving populations in low- and

high-income countries. We found that there is a growing body of literature documenting differences in depression severity between refugees and hosts in high-income countries. Data from low-income countries – where the vast majority of refugees worldwide have resettled – is very limited. We only found two studies that met our search criteria, and both of them were focused on narrow segments of the refugee and host populations.

Ethical Considerations. A growing literature supports the notion that trauma research involves minimal risk, although questions about traumatic experiences may be distressing for some respondents (McClinton et al., 2020; Gibbs et al., 2018; Walker et al., 2012; Legerski and Bunnell, 2010). In our setting, the difficulty in assuring privacy throughout the survey warranted additional precautions. We chose standard self-reported scales that have been extensively used by researchers and health practitioners across the world to measure depression and trauma. To minimize the risk of unduly upsetting respondents and protecting their privacy, we followed the recommendations made by the Trauma Psychology Division of the American Psychological Association. We measured perceived costs and benefits during the pilot phase, using Newman and colleagues' Reaction to Research Participation Questionnaire (Newman et al., 2001). We provided appropriate consent on the nature of the questions that would be asked, and the costs and benefits from taking part in the study. We instructed enumerators to politely ask respondents to find a quiet place to talk and assigned to each participant a number to identify the data collected during the survey. We provided continuous consent by reminding participants that questions about traumatic events would be asked immediately before administering any violence-specific questions. We established a referral protocol for participants who showed symptoms of distress. Enumerators were required to attend a three-week training workshop covering a manual of procedures and ethical considerations. We received IRB approval from Innovations for Poverty Action.

Outcome measures. We measured symptoms of depression using the 9-item version of the Patient Health Questionnaire (PHQ-9). Each item captures the presence of the nine Diagnostic and Statistical Manual of

Mental Disorders criteria for major depressive disorder (American Psychiatric Association, 2000) in the two weeks prior to the survey. Responses range from "not at all" to "nearly every day". Scores are increasing in the likelihood and severity of the disorder. We use a cut-off score of 10 as a marker for depression (Kroenke et al., 2001; Manea et al., 2012). Following Kroenke and colleagues, we excluded observations with more than two missing values (Kroenke et al., 2001).

Statistical analysis. The analysis includes only individuals who answered the PHQ-9 and could be identified either as a Rohingya refugee or as a Bangladeshi national (n=9,353).

We categorize survey respondents in one of several groups. The first group, "hosts," includes all individuals who self-identify as Bengali and were born in Bangladesh. The second group, "refugees," includes all individuals who self-identify as Rohingya, including those who were born in Bangladesh but in households in which the parents of the eldest member were born in Myanmar. In some analyses, we distinguish between refugees who arrived before and after the large influx that followed the 2017 outbreak of violence in Myanmar. We also distinguish between hosts who are currently living in communities within 15 kilometers from the closest refugee camp and farther away. We excluded from our analysis the only case in which an individual could have been categorized both as a host and a refugee using these criteria, and 33 individuals who did not provide enough information to establish their identity.

We report descriptive statistics for respondents in each subpopulation group, including age, education, and gender, and three proxies for chronic strains: current employment, household assets, and food insecurity. We define household wealth as the total value of all assets owned by the household and grouped households within each stratum (camps, communities within 15 kilometers from camps, and communities farther away) in quintiles.

We calculate prevalence rates of depression for refugees and hosts with and 95% CI and estimate logistic models with the prevalence of depression as our primary outcome. We conducted the statistical analysis using Stata 15.1.

Role of the funding source. The study funders had no role in the design of the study, data collection, analysis, interpretation, or writing of the report. The authors had full access to all study data and had final responsibility for the decision to submit for publication.

Results

Demographic and socioeconomic characteristics. Our sample was majority female (ranging from 55·58% and 59·72% across sub-samples) and young. 33·43% of hosts and 40·35%–41·37% of refugees pre- and post-2017 arrivals respectively were between 15 years and 24 years of age (Table 1). Refugees have a significantly lower level of educational attainment than hosts (Table 1). Around 46·67% (95% CI 43·53-49·83) of hosts have less than primary education, compared to 76·90% (74·63-79·02) of post-2017 arrivals and 85·32% (80·63-89·03) of pre-2017 arrivals.

Bangladeshi men (65·48%, 62·24-68·58) were significantly more likely than refugees to have worked at least one hour in the week prior to the survey. The fraction of pre-2017 refugees who were working (44·28%, 36·39-52·46) is higher than that of post-2017 arrivals (37·70%, 34·92-40·56), but the difference is not significant (Table 1). Female labor force participation was low in all three subpopulations. Only 5·61 % (95% CI 4·56–6·89) of newer arrivals and 13·63 % (10·10–18·15) of earlier refugee cohorts were working in the week prior to the survey, compared to 17·75% (15·47–20·28) of Bangladeshi women.

Despite the availability of food aid in camps, refugees were significantly more likely than hosts to experience food insecurity, with 97·58% (96·5-98·34) - 96·98% (94·56-98·34) reporting having consumed low quality food items or having little food diversity, and 64·02% (60·5-67·41) - 63·37% (57·14-69·18) reporting having had to cut portions or limit the number of meals due to a shortage of food.

Lifetime Trauma. Between 87·17% (95% CI 84·64–89·33) and 83·21% (79·15–86·61) of refugees (post- and pre-2017 respectively) experienced at least one traumatic experience (table 2). Approximately one-half (54·72%, 51·49–57·92 of post-2017 arrivals and 43·36%, 37·34-49·59 of pre-2017 arrivals) report having survived a near-death experience. Between 28·74–35·32% had a family member or friend murdered; 26·35–32·29% experienced or witnessed the unnatural death of a family member or a friend, and another 23·47% (18·84-28·85) to 24·73% (22·15-27·50) was separated from their family.

While the underlying sources of trauma are different, almost two-thirds of hosts (62·01%, 58·62-65·28) report at least one traumatic experience. Many report torture (15·35%, 13·37-17·56) and near-death experiences (29·11%, 26·26-32·13). Responses to qualitative questions suggest that violence within families and against women account for many of the trauma events experienced by hosts. When asked about experiences with torture, both male and female hosts reported enduring or witnessing beatings by husbands or in-laws. For example, a 22-year-old responded, “husband beats (me) for unreasonable issues.” Domestic violence is not limited to spousal abuse. A 27-year-old host recalled, “my husband beat up his sister and banished her from the house.” Some also spoke about violence against women perpetrated by non-family members: “a girl from my neighborhood was taken to a hotel, tortured, and killed,” explained a 17-year-old male host.

By contrast, state violence accounted for most of the trauma among refugees. A female camp resident aged 40 recalled, “the (Myanmar) army used to abduct my husband and torture him for money.” A 23-year-old female added, “the police used to abduct people to torture them.” Unlike the host population, much of the

violence against Rohingya women was perpetrated by the army. A 16-year-old female refugee explained, "the Myanmar army took young girls away if they found any and then raped them and killed them." Trauma perpetrated by family members is still ongoing for some. A female camp resident aged 20 reported, "(my) husband, father-in-law, and mother-in-law torture (me) without any reason."

Prevalence of depression. Nearly one-third of refugees – 28·94% (26·81-31·16) of post-2017 arrivals and 32·64% (28·38-37·22) of pre-2017 arrivals – and one-fourth of hosts – 25·48% (23·05-28·07) – screened positive for depression (table 3). The difference in means (two-sample t-test, not reported) between hosts and both pre-2017 and post-2017 arrivals is statistically significant at the 5 percent level.

The prevalence rate of depression is higher among both refugee populations compared to hosts, with pre-2017 arrivals faring significantly worse. The unadjusted odds ratios [OR] are 1·19 (95% CI 1·01–1·41) for post-2017 arrivals and 1·42 (1·11–1·80) for pre-2017 arrivals (table A1). After adjusting for age, gender, and education, the differences between hosts and post-2017 arrivals become insignificant (table A1). The difference between hosts and pre-2017 arrivals becomes insignificant after accounting for demographic characteristics and current living conditions (employment, wealth, and food security). These results suggest that hosts and refugees are equally vulnerable to depression when exposed to similar levels of trauma and chronic stressors.

Correlates with demographic characteristics. Women are at a higher risk for depression than men, both among refugees (1·26, 1·08-1·48) and hosts (1·56, 1·23-1·99). Older age is positively correlated with depression, with adults aged 45 or older reporting significantly higher symptoms of depression than younger adults.

Correlates with trauma. Cumulative trauma is strongly correlated with depression (tables 4). Being exposed to five or more traumatic events is strongly, positively correlated with depression (1·87, 1·27-2·76

for refugees and 4·35, 2·86-6·62 for hosts). The associations between depression and exposure to specific events is noisy and hard to interpret (table 5). For example, survivors or torture are at a higher risk of developing depression, but the strength of the correlation is relatively small for refugees (1·33, 1·12-1·59, compared to 2·32, 1·84-2·93 for hosts). We conjecture that this is explained, at least in part, by differences in the nature of the events experienced by refugees and hosts.

Correlates with current living conditions. Individuals who worked at least one hour in the week prior to the survey (0·79, 0·63-0·99 for refugees and 0·79, 0·61-1·01 for hosts) were significantly less likely to report symptoms of depression. Hosts with high educational attainment are less likely to screen positive for depression (0·61, 0·43-0·88 for those with secondary education completed). Among refugees, education is not correlated with depression. By contrast, household wealth is negatively correlated with depression among refugees (0·69, 0·52-0·92 for those in the 5th quintile) but not among hosts.

Worrying about not having enough food is positively correlated with depression but experiencing actual shortages in food supply is only significant for hosts, and low food quality is only significant for refugees.

Discussion

This study is among the first reporting the prevalence and correlates of depression among forcibly displaced migrants and hosts living in a low-income setting. We show that both populations are highly vulnerable to depression. In line with previous studies, our data suggest that cumulative trauma is strongly correlated with mental health (Mollica et al. 1998a; Mollica et al. 1998b; Green et al. 2000; De Jong et al. 2001). More surprisingly, we found that, while different in nature, traumatic experiences were common not only among refugees but also among hosts.

The extent of mental health concerns in Cox's Bazar argues for broad-based assessments and interventions. Validated, low-cost screening scales like the PHQ-9 could be incorporated more widely into the humanitarian and development infrastructure serving Cox's Bazar. Meanwhile, the capacity for traditional modes of treatment is limited, suggesting two priorities should be i) innovations that can expand the reach of existing treatment capacity and ii) expanding treatment capacity through training and recruitment. Given the relatively high prevalence among trauma survivors and adults 45 and older, targeting these population segments is likely to have high returns.

Mental health has a complex relationship with other aspects of human wellbeing. Providing livelihoods support, such as cash transfers and productive assets, alone or in combination with short-lived psychological interventions like Cognitive Behavioral Therapy, might be more effective in producing sustainable improvements in psychological and economic well-being than providing psychotherapy or psychosocial support only (Greene et al. 2019; Blattman et al. 2017). Providing a set of complementary interventions to both refugees and hosts has the additional potential benefit of reducing tensions between the communities, and those tensions may influence the political processes addressing critical issues like the relocation and repatriation of refugees.

Our study has some limitations. As in most surveys, some traumatic experiences – and other social sources mental health, including intimate partner violence and non-partner sexual abuse and rape — are likely to be underreported due to embarrassment or fear of retaliation (Abrahams et al. 2014). In our setting, qualitative work suggested that many refugees were also hesitant to respond to questions about hostility and discrimination. We thus believe that the prevalence rates of trauma reported here are a lower bound. Better understanding these topics will require time, effort, and resources to build trust, ensure privacy throughout the survey, and follow-up with respondents.

The estimated rates of depression should be interpreted with caution to the extent the Rohingya language has adopted many of the terms used to describe symptoms of depression from other languages and many Rohingya speakers may not be acquainted with such terms (Tay et al. 2018). To mitigate these concerns, we used one of the most-widely validated depression scales available (see Grupp et al. (2020) for a recent review of studies studying the properties and suitability of the PHQ-9 to assess depression in different countries, and its proximity to diagnostic criteria). We pre-tested and piloted all our survey instruments extensively and found compelling quantitative and qualitative evidence to suggest that respondents from the three population groups understood all the PHQ-9 questions correctly.

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Table 1 Respondent characteristics

Data are percentages (95% CI) for all variables except household assets· The average value of all assets is expressed in US dollars (95% CI), using an exchange rate of 1 USD= 84·80 BDT

	Hosts	**Rohingya displaced during or after August 2017**	**Rohingya displaced before August 2017**
	(n= 4,733)	**(n= 3,914)**	**(n= 702)**
Gender			
Male	44·42 (42·85-46)	43·66 (42·04-45·29)	40·28 (36·97-43·68)
Female	55·58 (54-57·15)	56·34 (54·71-57·96)	59·72 (56·32-63·03)
Age			
15-24	33·43 (31·61-35·3)	41·37 (39·7-43·07)	40·35 (35·86-45)
25-34	23·26 (21·85-24·73)	23·23 (21·64-24·9)	26·39 (22·58-30·59)
35-44	19·49 (18·02-21·06)	13·74 (12·59-14·97)	14·59 (11·55-18·28)
45+	23·81 (22·17-25·54)	21·66 (20·18-23·21)	18·66 (15·58-22·19)
Educational level			
Less than primary	46·67 (43·53-49·83)	76·90 (74·63-79·02)	85·32 (80·63-89·03)
Primary completed	34·82 (32·71-36·99)	19·78 (17·96-21·73)	12·08 (9·23-15·67)
Secondary completed	18·51 (15·74-21·64)	3·32 (2·61-4·22)	2·59 (1·27-5·24)
Household assets value (USD)	9,558·5 (8,206·91-10,910·09)	150·17 (84·92-215·42)	945·44 (36·95-1,853·92)
Employment last week			

Worked past 7 days, 2019 (men)	65·48 (62·24-68·58)	37·70 (34·92-40·56)	44·28 (36·39-52·46)
Worked past 7 days, 2019 (women)	17·75 (15·47-20·28)	5·61 (4·56-6·89)	13·63 (10·1-18·15)
Food insecurity (past 4 weeks)			
Worried about not having enough food	64·48 (60·89-67·92)	79·03 (75·82-81·91)	81·21 (75·5-85·84)
Food quality was low or lacked diversity	74·75 (71·34-77·88)	97·58 (96·5-98·34)	96·98 (94·56-98·34)
Food quantity was insufficient	46·28 (42·91-49·7)	64·02 (60·5-67·41)	63·37 (57·14-69·18)

Table 2 Lifetime prevalence of trauma exposure

Data are percentages (95% CI)

	Hosts	**Rohingya displaced during or after August 2017**	**Rohingya displaced before August 2017**
	(n= 4,733)	**(n= 3,914)**	**(n= 702)**
Experienced at least one trauma event	62·01 (58·62-65·28)	87·17 (84·64-89·33)	83·21 (79·15-86·61)
Experienced more than five trauma events	8·88 (7·46-10·55)	31·33 (28·51-34·29)	21·68 (16·74-27·59)

Trauma events by type			
Imprisonment	14·52 (12·48-16·82)	13·88 (11·93-16·09)	17·36 (13·99-21·34)
Serious injury	34·5 (31·82-37·27)	32·88 (30·27-35·59)	34·37 (29·36-39·75)
Combat situation	14·78 (12·83-16·95)	46·21 (42·71-49·74)	29·78 (24·63-35·51)
Rape or sexual abuse	2·18 (1·44-3·3)	5·74 (4·55-7·22)	4·13 (2·53-6·68)
Forced isolation from others	4·52 (3·63-5·61)	32·12 (29·04-35·37)	18·23 (13·89-23·56)
Being close to death	29·11 (26·26-32·13)	54·72 (51·49-57·92)	43·36 (37·34-49·59)
Forced separation from family members	9·06 (7·74-10·58)	24·73 (22·15-27·50)	23·47 (18·84-28·85)
Murder of family or friend	11·83 (9·72-14·33)	35·32 (32·71-38·03)	28·74 (22·96-35·32)
Unnatural death of family or friend	18·77 (16·32-21·5)	32·29 (29·95-34·72)	26·35 (21·77-31·51)
Murder of stranger or strangers	4·73 (3·64-6·11)	10·54 (8·94-12·4)	7·63 (4·81-11·91)
Lost or kidnapped	4·95 (3·84-6·35)	10·36 (8·57-12·47)	8·73 (6·04-12·46)
Torture	15·35 (13·37-17·56)	45·52 (41·72-49·38)	34·86 (29·25-40·92)

Table 3 Prevalence of depression

Data are percentages (95% CI)

	Hosts	Rohingya displaced during or after August 2017	Rohingya displaced before August 2017
	(n= 4,737)	**(n= 3,914)**	**(n= 702)**
All respondents	25·48 (23·05-28·07)	28·94 (26·81-31·16)	32·64 (28·38-37·22)
Gender			
Men	22·35 (19·42-25·59)	26·56 (24·14-29·13)	23·53 (18·38-29·6)
Women	28 (25·06-31·15)	30·79 (28·24-33·46)	38·97 (33·71-44·51)

Table 4 Multivariate analysis of factors associated with depression

Data are adjusted odds ratio (95% CI)

	Refugees		Hosts	
	(n= 4,616)		**(n= 4,737)**	
	Odds ratio (95% CI)	**p-value**	**Odds ratio (95% CI)**	**p-value**
Month/Year of Displacement				
August 2017 or later	1 (reference)	··	··	··
Before August 2017	1·41 (1·08-1·84)	0·012	··	··
Proximity to camps				
Farther than 15 km	··	··	1 (reference)	··
Within 15 km	··	··	0·65 (0·5-0·83)	0·001
Age				

15-24 (34·66 %)	1 (reference)	··	1 (reference)	··
25-34 (28·70 %)	1·62 (1·29-2·03)	p<0·001	1·57 (1·12-2·2)	0·010
35-44 (17·16%)	2·36 (1·85-3·02)	p<0·001	1·7 (1·17-2·46)	0·005
45+ (19·49%)	3·95 (3·13-4·98)	p<0·001	3·27 (2·39-4·48)	p<0·001
Gender				
Male	1 (reference)	··	1 (reference)	··
Female	1·26 (1·08-1·48)	0·004	1·56 (1·23-1·99)	p<0·001
Educational level completed				
Less than primary	1 (reference)	··	1 (reference)	··
Primary completed	0·98 (0·8-1·2)	0·843	0·73 (0·56-0·96)	0·024
Secondary completed	0·81 (0·49-1·33)	0·392	0·61 (0·43-0·88)	0·008
Employment last week				
No	1 (reference)	··	1 (reference)	··
Yes	0·79 (0·63-0·99)	0·040	0·79 (0·61-1·01)	0·057
Number of trauma events experienced				
None	1 (reference)	··	1 (reference)	··
One	0·87 (0·60-1·26)	0·465	1·19 (0·85-1·66)	0·304
Two	1·27 (0·85-1·89)	0·241	1·98 (1·40-2·82)	<0·001
Three	1·13 (0·77-1·66)	0·534	2·92 (1·98-4·32)	<0·001
Four	1·75 (1·13-2·70)	0·013	3·45 (2·17-5·47)	<0·001
Five or more	1·87 (1·27-2·76)	0·002	4·35 (2·86-6·62)	<0·001

Household assets quintile (by strata)				
1st quintile (poorest)	1 (reference)	..	1 (reference)	..
2nd quintile	0·82 (0·64-1·05)	0·120	0·91 (0·63-1·32)	0·629
3rd quintile	0·69 (0·54-0·89)	0·004	0·97 (0·66-1·42)	0·887
4th quintile	0·91 (0·68-1·22)	0·532	0·90 (0·61-1·31)	0·569
5th quintile (richest)	0·69 (0·52-0·92)	0·011	1·32 (0·88-1·98)	0·178
Food insecurity (past 4 weeks)				
Worried about not having enough food	1·39 (1·08-1·79)	0·011	1·61 (1·16-2·23)	0·005
Food quality was low or lacked diversity	0·66 (0·42-1·04)	0·072	1·00 (0·69-1·45)	0·989
Food quantity was insufficient	1·09 (0·87-1·38)	0·443	2·14 (1·65-2·78)	p<0·001

Table 5 Association between lifetime trauma (events experienced) and depression

Data are adjusted odds ratio (95% CI)

	Refugees	**Hosts**	**Refugees**	**Hosts**
	(n= 4,616)	**(n= 4,737)**	**(n= 4,616)**	**(n= 4,737)**
Imprisonment	0·88 (0·69-1·12)	1·12 (0·85-1·49)	0·86 (0·65-1·14)	1·17 (0·81-1·69)
Serious injury	1·29 (1·05-1·58)	1·52 (1·19-1·94)	1·29 (1·02-1·62)	1·47 (0·94-2·32)
Combat situation	0·86 (0·70-1·06)	1·26 (0·95-1·67)	0·82 (0·64-1·05)	1·04 (0·73-1·48)
Rape or sexual assault	1·08 (0·72-1·63)	1·62 (0·97-2·71)	1·14 (0·75-1·74)	1·58 (0·91-2·76)

Forced isolation from others	1·25 (1·04-1·51)	1·56 (1·05-2·31)	1·22 (0·97-1·52)	1·45 (0·84-2·51)
Being close to death	1·15 (0·91-1·44)	1·14 (0·91-1·43)	0·99 (0·76-1·29)	0·87 (0·61-1·23)
Forced separation from family members	0·99 (0·80-1·22)	1·43 (1·00-2·03)	0·84 (0·66-1·08)	1·36 (0·85-2·19)
Murder of family or friend	1·38 (1·13-1·68)	0·90 (0·64-1·25)	1·43 (1·15-1·78)	0·91 (0·58-1·41)
Unnatural death of family or friend	1·37 (1·11-1·70)	1·59 (1·23-2·05)	1·36 (1·08-1·73)	1·55 (1·05-2·29)
Murder of stranger(s)	0·46 (0·33-0·66)	0·50 (0·33-0·76)	0·46 (0·31-0·67)	0·47 (0·29-0·74)
Lost or kidnapped	1·11 (0·84-1·46)	1·24 (0·75-2·04)	1·07 (0·79-1·45)	1·18 (0·70-2·00)
Torture	1·33 (1·12-1·59)	2·32 (1·84-2·93)	1·28 (1·01-1·62)	1·98 (1·32-2·96)
Age, gender, and education	NO	NO	YES	YES
Employment, wealth, and food security	NO	NO	YES	YES
Number of trauma events experienced	NO	NO	YES	YES

Table A1 Adjusted differences in the prevalence of depression between refugees and hosts

Sub-population				
Hosts	1 (reference)	1 (reference)	1 (reference)	1 (reference)

Rohingya displaced during or after August 2017	1·19 (1·01-1·41)	1·17 (0·97-1·40)	1·03 (0·86-1·25)	0·73 (0·59-0·91)
Rohingya displaced before August 2017	1·42 (1·11-1·80)	1·40 (1·08-1·80)	1·25 (0·97-1·62)	1·01 (0·77-1·33)
Age, gender, and education	NO	YES	YES	YES
Employment, wealth, and food security	NO	NO	YES	YES
Lifetime trauma events experienced	NO	NO	NO	YES