The data in this document are drawn from the Early Warning and Response System (EWARS), daily data received from the Ministry of Health and Family Welfare, and information gathered by WHO from health service providers in Forcibly Displaced Myanmar Nationals (FDMN) settlements and health care facilities in Cox’s Bazar. Although the information is incomplete, it represents a first attempt to give health agencies in the field a reasonably accurate picture of morbidity and mortality in the refugee population. We thank all partners who are contributing to the EWARS.

The EWARS itself and the reports generated therefrom remain a work in progress. We welcome all comments and feedback to help us improve both the system and our joint understanding of the prevailing epidemiological situation, the ultimate aim being to prevent the spread of diseases and thereby help ensure better health outcomes for the population affected by this crisis.

Contact Information:

Dr. Edwin Salvador, Deputy WHO Representative, salvadore@who.int
Dr. Hammam El Sakka, Senior Medical Epidemiologist, Team Leader, HSE, elsakkam@who.int
WHO Bangladesh: http://www.searo.who.int/bangladesh
1. Population under Surveillance and Reporting Units

During epidemiological week 46 (12-18 November 2017), there was a 0.4% increase in the population\(^1\) under surveillance compared to the previous epidemiological week (823,084 and 819,812 respectively). A total of 400 daily Early Warning and Response System (EWARS) forms were received on time during epidemiological week 46.

The Kutupalong makeshift camp population increased by 0.5% (439,623 vs 437,633), mainly due to the ongoing relocation of FDMNs from other camps and settlements. The remaining camp population remained more or less stable.

EWARS reports were received from partner agencies active in the field and from different departments (admission, emergency, surgery, paediatrics, gynaecology and internal medicine) of Cox’s Bazar Sadar hospital and Teknaf and Ukha Health Complexes (population of 100,400). The population of the settlements fluctuates daily due to movements between camps and new arrivals.

For the reasons stated above, it was difficult to estimate the actual catchment population covered by the medical mobile teams working in camps and settlement areas. During epidemiological week 46, the number of daily reports per camp/settlement in Cox’s Bazar increased by 7% compared with the previous week (from 375 to 400 reports). Table 1 below shows the population per camp and the daily number of EWARS reporting forms submitted from each of them.

<table>
<thead>
<tr>
<th>Camp/Settlement</th>
<th>W46 Population</th>
<th>Epidemiological Week 46</th>
<th>TOT</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>12/11</td>
<td>13/11</td>
<td>14/11</td>
</tr>
<tr>
<td>Makeshift Settlements</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kutupalong Expansion*</td>
<td>439,623</td>
<td>19</td>
<td>29</td>
</tr>
<tr>
<td>Kutupalong RC</td>
<td>25,743</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Leda MS</td>
<td>24,026</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Nayapara RC</td>
<td>34,557</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Shamlapur</td>
<td>26,326</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td><strong>Sub-total</strong></td>
<td>550,275</td>
<td>27</td>
<td>38</td>
</tr>
<tr>
<td>New Spontaneous Settlements</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hakimpara</td>
<td>55,181</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>Thangkhali</td>
<td>29,704</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Unchiprang</td>
<td>30,384</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>Jamtoli</td>
<td>33,298</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>Moynarghona</td>
<td>21,464</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td><strong>Sub-total</strong></td>
<td>170,031</td>
<td>19</td>
<td>20</td>
</tr>
<tr>
<td>MoH</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Host Community</td>
<td>102,778</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Mobile Unit</td>
<td>NA</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td><strong>Sub-total</strong></td>
<td>102,778</td>
<td>9</td>
<td>10</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>823,084</td>
<td>55</td>
<td>68</td>
</tr>
</tbody>
</table>

---

The total number of consultations reported through EWARS increased by 1% compared to the previous week (86,445 vs 85,077). The trend of the number of reporting units is showing a steady increase since the ERWAS started in epidemiological week 34 (20-26 August 2017). The weekly number of reporting and the number of consultations is shown in figure 1.

Figure 1: Number of EWARS reports and consultations, Cox’s Bazar, Bangladesh, 25 August-18 November 2017.

2. Proportion of Primary Causes of Cases and Deaths

During the period 25 August-18 November 2017, a total of 419,747 consultations were reported through EWARS. Of these, 51% (212,561/419,747) were events under surveillance; 49% (104,591) were males. Fevers of unexplained origin accounted for 30%, (63,668/212,561), followed by acute respiratory infections (ARIs) 26% (55,300), acute watery diarrhoea (22%, 45,790), skin diseases (9%, 19,579), injuries (3%, 5,501), eye infections (2%, 4,728) and malaria (2%, 4,810). The remaining 6% were due to other causes including bloody diarrhoea, acute jaundice syndrome (AJS), meningitis like diseases and malnutrition.

For the under-5 age group, a total of 82,382 events under surveillance were reported through EWARS, constituting 39% of the events under surveillance; 49% (40,375) of them were males. A total of 32% (26,197) of these cases were attributed to ARIs, while 27% (22,320) were due to fevers of unexplained origin, 23% (18,931) to acute watery diarrhoea (AWD), 6% (4,869) skin diseases, 1% (1,171) eye infections, 1% (683) injuries, 1% (602) malaria and the remaining 9% were due to other cases including neonatal diseases.

For the over-5 age group, a total number of 130,179 events under surveillance were reported through EWARS, constituting 61% of the events under surveillance; 48% (62,584) of them were males. A total of 32% (41,348) of these cases were attributed to fevers of unexplained origin, while 22% (29,103) were due to ARIs, 21% (26,858) to AWD, 11% (14,710) skin diseases, 4% (4,647) injuries, 3% (4,208) malaria, 1% (1,171) eye infections and the remaining 6% were due to other cases. The proportion of primary causes of reported cases for both age groups is shown in figure 2.
During the same period, there were 218 reported deaths. Of these, 28% (60) were due to ARIs, followed by INJ (11%, 23), cardiovascular disease (8%, 18), NDs (7%, 16), AWD (6%, 12), meningitis like diseases (5%, 10), and UNK (11%, 24). The remaining 24% (55) were due to other causes.

There were 81 reported deaths in the under-5 age group, representing 37% of total deaths. Of these, 38% (31) were ARI-related, followed by NDs (20%, 16), AWD (10%, 8), severe malnutrition (7%, 6), meningitis (6%, 5), INJ (4%, 3). The remaining 15% (12) were due to other causes including measles (2).

On 14 November 2017, a seven-day-old male baby was admitted to Sadar Hospital in Cox’s Bazar with a history of convulsions followed by generalized body stiffness; he passed away at the same day. Investigation of the case showed that the mother was not vaccinated against tetanus.

There were 137 reported deaths in the over-5 age group, representing 63% of total deaths. Of these, 21% (29) were ARI-related, followed by INJ (15%, 20), cardiovascular disease (13%, 18), Meningitis (4%, 5), AWD (3%, 4), and UNK (12%, 17). The remaining 32% (44) were due to other causes including, jaundice, TB and malaria. The weekly distribution of reported deaths is shown in figure 3.
ARI, UNFEV and AWD continue to contribute significantly to overall consultations in all reporting camps and settlements. The attack rates per 1000 population of the 3 diseases showed slight increases compared to the last week. The weekly attack rates of ARI, UNFEV and AWD are shown in figure 4.
3. **Acute Respiratory Infection**

Between 25 August and 18 November 2017 (epidemiological weeks 34-46), a total of **55,300** ARI cases were reported. Of these, **47%** (26,197/55,300) occurred in the under-5 age group. There were **60** ARI related deaths (**CFR 0.11%**). The weekly distribution of ARI cases is shown in Figure 5.

![Reported ARI Cases in FDMNs Settlements by Age Group](image1)

**Figure 5**: Weekly distribution of reported ARI cases by age group, Cox’s Bazar, Bangladesh, 25 August-18 November 2017.

Ukhia reported **81%** (45,049/55,300) of total ARI cases followed by Teknaf with **18%** (10,153) and Cox’s Bazar (1%, 98). The weekly distribution of ARI cases by upazila is shown in Figure 6.

![Reported ARI Cases in FDMNs Settlements by Upazila](image2)

**Figure 6**: Weekly distribution of reported ARI cases by upazila, Cox’s Bazar, Bangladesh, 25 August-18 November 2017.

The highest ARI attack rate (AR) was reported from Moynarghna with 150/1,000 population followed by Kutupalong Registered camp (131/1,000), Jamtoli settlement (114/1,000), and Thangkhali (96/1000). The ARI attack rate in selected camps is shown in figure 7.

Over the last 4 epidemiological weeks (43-46), the attack rate for ARI increased in Thangkhali and Nayapara but decreased in Jamtoli, Kutapalong registered camp and Moynarghna. The weekly ARI attack rate in selected camps is shown in figure 8.
4. Acute Watery Diarrhoea

Between 25 August and 18 November 2017 (epidemiological weeks 34-46), a total of 45,790 AWD cases were reported including 11 related deaths (CFR 0.02%). Of these 41% (18,931) were in the under-5 age group. The trend of the number of reported cases is showing an increase over the last 3 epidemiological weeks (44-46). The weekly distribution of AWD cases by age group is shown in figure 9.

**Figure 9:** Weekly distribution of reported AWD cases by age group, Cox’s Bazar, Bangladesh, 25 August-18 November 2017.

Ukhia upazila reported 85% (39,381/45,790) of all AWD cases, followed by Teknaf with 14% (6,282) and Cox’s Bazar with 1%. The weekly distribution of AWD cases by upazila is shown in Figure 10.

**Figure 10:** Weekly distribution of reported AWD cases by upazila, Cox’s Bazar, Bangladesh, 25 August-18 November 2017.
The highest attack rate for AWD was reported from Moynarghna with 116/1,000 population followed by Kutupalong Registered camp (101/1,000), Thangkhali (100/1,000) and Unchiprang (84/1,000). The AWD attack rate in selected camps is shown in figure 11.

Over the last 4 epidemiological weeks (43-46), the attack rate of AWD cases increased in Thankgkhali, Moynarghna and Jamtoli but decreased in Unchiprang and Kutupalong Registered camp. The weekly AWD attack rate in selected camps is shown in figure 12.
4.1 Drinking Water Testing Results

Since the start of FDMNs influx in August 2017 to date, the WASH sector has reported the installation of 4,877 tube-wells out of which 3,389 are currently functional (69%). For sanitation, 27,595 emergency latrines have been built out of which 17,987 are functional (65%). A total of 86,878 hygiene kits/NFIs have been distributed in the major settlements and refugee camps.

Between 18 September and 14 November 2017, a total of 2,469 water samples were collected by WHO and Department of Public Health Engineering (DPHE) teams from households (1,638) and other water sources (831) in FDMN settlements. Using membrane filtration testing techniques, 82% (2,016/2,469) tested positive for faecal contamination with Escherichia coli (E.coli) as per the Bangladesh Standard and WHO guideline values\(^2\). The remaining 18% (453) of the samples were found negative for E.coli (0 cfu/100ml). Of the positive samples, 43% (855) were very highly (>100 cfu/100ml) and 28% (571) highly contaminated (>50 and <100 cfu/100ml). Intermediate contamination (<50 cfu/100ml) was found in 29% (589) of the samples. The E.coli water testing results by camp/settlement are shown in Figure 13.

Among household samples (1,638), 92% (1,503) were found to be positive for E.coli contamination, of which 48% (792) were highly contaminated (>100 cfu/100ml). The testing results showed that all the household water samples collected from streams (3) were highly contaminated with E. Coli, followed by 77% (27) collected from water tankers, 49% (745) and 41% (26) from shallow and deep tube-wells, respectively. The water testing results by water source are shown in figure 14.

Of the total 899 water samples that were collected at household level in the Kutupalong Expansion area, only 6% (52) were found negative for E.coli (0 cfu/100ml). All household water samples collected from the south-east part of the expansion namely HH, JJ, KK, and LL zones were contaminated and not suitable for drinking according to the Bangladesh Standard and WHO guideline value. The water testing results in Kutupalong extension is presented in figure 15.
High levels of faecal contamination have been detected in tube-wells, both in source and household samples. An immediate action plan is needed to prevent the spread of water borne diseases (cholera, bloody diarrhoea, typhoid and hepatitis E). The presence of E. coli is used as an indicator to monitor the possible presence of other more harmful microbes, such as Cryptosporidium, Giardia, Shigella, and norovirus.

The plan below summarizes key actions to ensure the safety of water supply to FDMN settlements in Cox’s Bazar district:

1. **Chlorination of contaminated shallow tube-wells** (start immediately and complete by February 2018): As the WHO water quality monitoring revealed that most of the drinking-water at household level is contaminated, all water points, including the shallow tube-wells, should be regularly chlorinated.

2. **Install new safe water points** (start immediately and complete by June 2018): Deep tube-wells are the preferred option and least susceptible to microbiological contamination. Hence, the installation of deep tube-wells needs to be expanded immediately, particularly in the very high-risk zones such as AA, OO, PP, QQ, II, JJ, KK and LL. Chlorinated water tankers might be considered until the deep-wells are installed.

3. **Decommission/relocate latrines near water sources** (start immediately and complete by February 2018): Pit latrines located adjacent to tube-wells (generally within 30 feet) are a potential source of contamination. Hence, all such latrines should be decommissioned or relocated without further delay.

4. **Conduct hygiene promotion activities** (start immediately and continue): Ensuring awareness of good practice among the community on how to treat water and translating that into healthy behaviour remains critical. Hygiene promotion should be intensified to increase people’s awareness of safe use of water sources; hygiene practices need to be improved to prevent the recontamination of safe water and effectively break the faecal-oral route of disease transmission.

5. **Chlorination plan for households** (start immediately and continue): A higher level of water contamination at household compared to source level indicates poor hygiene practices. Hence, in addition to hygiene promotion, household chlorination should be initiated immediately and continued until the source water is safe and the household hygiene level improves. The use of water purification tablets should provide 0.5 mg/l of residual chlorine after 30 minutes of contact time.

---

3 MF Ahmed; et al., Risk Assessment of Arsenic Mitigation Options (RAAMO), Arsenic Policy Support Unit (APSU), Bangladesh, 2005
5. Acute Jaundice Syndrome

Between 25 August and 18 November 2017 (epidemiological weeks 34-46), a total of 190 cases of acute jaundice syndrome (AJS) were reported through EWARS; of these 87% (165) were in the over-5 age group. The first case was reported on 6 September 2017, and the number of reported cases has increased since early October 2017. The highest attack rate for AJS was reported from Hakimpara with 0.46/1,000 population followed by Jamtoli (0.45/1,000).

WHO and partners are investigating the cases. As a response to the outbreak, active case finding was initiated and blood samples (testing for different hepatitis markers) taken from 12 acute cases; laboratory results are still pending. The daily distribution of AJS cases is shown in figure 16.

![Jaundice Cases in FDMNs Settlements by Age Group](image)

**Figure 16: Daily distribution of reported AJS cases, Cox’s Bazar, Bangladesh, 25 August-18 November 2017.**

Regarding the risk of a hepatitis E outbreak in FDMN settlements/camps, any information about the endemicity of the disease in the Myanmar and the hosting area needs to be considered. For example, when people are displaced from a low into a high hepatitis E virus (HEV)-endemic area, there is a greater risk of an HEV outbreak due to the new exposure to this virus. For populations moving from a high into low HEV-endemic area, the risk also has to be considered due to changes in the living conditions in the settlements and camps (overcrowding, water, sanitation), possibly leading to a higher exposure and therefore higher transmission.

Hepatitis E is an acute illness, similar in clinical presentation to hepatitis A. The clinical manifestation of HEV varies from asymptomatic infection (70%) of HEV infections, to acute viral hepatitis (30%). Hepatitis E is distinguishable from other hepatitis types due to its high attack rate in young adults and an increased mortality rate in pregnant women of up to 30%, while in the general population it is about 1%.

The faecal-oral route is the predominant mode of transmission of HEV, so lack of safe drinking water, safe disposal of human excreta and lack of personal hygiene are aggravating the risk for outbreaks in the settlements.
6. Unexplained Fever

Between 25 August and 18 November 2017 (epidemiological weeks 34-46), a total of 63,668 cases of unexplained fever (UNFEV) were reported through EWARS; of these 35% (22,320) were in the under-5 age group. The number has continuously increased since epidemiological week 44. WHO agreed to support the cost of laboratory testing for FDMNs until the laboratory capacity is enhanced in Cox’s Bazar. The weekly distribution of UNFEV cases by age group is shown in figure 17 and 18.

![Reported UNFEV Cases in FDMNs Settlements](image1)

*Figure 17: Weekly reported unexplained fever cases, Cox’s Bazar, Bangladesh, 25 August-18 November 2017.*

![Unexplained Fever Cases in FDMNs Settlements by Age Group](image2)

*Figure 18: Weekly reported UNFEV cases by age, Cox’s Bazar, Bangladesh, 25 August-18 November 2017.*
Ukhia upazila reported 87% (55,446/63,668) of all UNFEV cases, followed by Teknaf with 12% (8,169) and Cox’s Bazar with less than 1%. The highest attack rate for UNFEV was reported from Moynarghna with 163/1,000 population followed by Jamtoli (159/1,000), Thangkhali (150/1,000) and Unchiprang. The lowest attack rate was observed in Hakimpara with 59/1000 population. The UNFEV attack rate in selected camps is shown in figure 19.

Over the last 4 epidemiological weeks (43-46), the attack rate of UNFEV cases increased in Jamtoli, Thangkhali, Moynarghna and Hakimpara but decreased in Unchiprang. The weekly UNFEV attack rate in selected camps is shown in figure 20.
7. Measles Outbreak

Between 6 September and 18 November 2017, a total of 1,270 suspected cases of measles including two related deaths (CFR, 0.16 %) were reported from FDMN settlements in Cox’s Bazar. The median age of the patients was 2.0 years, ranging from 36 days to 44 years. The under-5 age group represented 82% of total cases. The age distribution of reported cases is shown in figure 21.

A total of 94% (1,192) of the cases were from Ukhia, followed by 6% (74) from Teknaf. Of the total number of cases, 99% (1,255/1,270) were from FDMNs and 1% (15) was from the host community. The age distribution of reported cases is shown in figure 21.

Samples were collected for laboratory confirmation (n=64), of these, 73% (47) were positive for measles-specific IgM, 19% (12) were negative, and 8% (5) are pending laboratory results. The distribution of cases by laboratory results and vaccination status are shown in figure 22 and 23.
A 14-day-long mass measles vaccination campaign was carried out in Cox’s Bazar from 16 September 2017. The campaign targeted 122,580 children <15 years old in the 2 upazilas of Cox’s Bazar (Tekaf, Ukhia) and Naikhongchhari upazila in Bandarban district. During the campaign, a total of 135,000 children (6 months-to-15 years) were vaccinated against measles and rubella.

As a response to the ongoing outbreak, intensification of MR vaccination through fixed and outreach sites to FDMNs targeting children 06 months to 15 years started from 18 November and will be completed within 3 weeks. Mass “catch-up” measles immunization campaigns are recommended by the World Health Organization (WHO) as one of the main strategies to control or eliminate measles. The goal of the immunization campaign in FDMN camps and settlements is to respond to the ongoing outbreak; control the incidence and mortality of the disease; and to achieve high coverage of MR in the area.

Supplementary immunization is targeting 336,943 between 6 months and 15 years. In the first 2 days of the campaign a total of 52,975 were vaccinated achieving coverage of 16%.

No AEFI s associated with MR vaccination were reported during the campaign. However, because a monitoring system for adverse events was not fully established, some adverse events might have been missed.
8. Suspected Diphtheria Cases

On 10 November 2017, MSF clinic reported a suspected case of diphtheria (a 30-year-old female from Balukhali makeshift settlement). The patient presented with a history of two days fever, sore throat, difficulty in swallowing, swollen neck and no history of DTP vaccination. On examination, thick grey-white slough over the back of the pharynx was found with a swollen "bull neck. Blood pressure was 90/60, respiratory rate 26/min with clear chest and soft abdomen without any obvious neurological signs.

She was admitted to the MSF isolation ward with a diagnosis suspected diphtheria, treated with IV fluids and azithromycin 500mg 3 times/day. On 12 November 2017, she absconded after receiving the morning antibiotic doses. On 16 November 2017, WHO sent an investigation team to the Balukhali makeshift settlement to locate the patient and here contacts, but was unable to find her. WHO circulated the diphtheria case definition (suspected and confirmed) to all partners and surveillance was enhanced in the camps to detect any new cases.

On 19 November 2017, MSF reported a second suspected case (10 years old child from the same settlement), presenting with a history of fever since 3 days, sore throat, neck swelling and inability to swallow. He was admitted to the isolation ward and received IV fluids and azithromycin. On 20 November 2017, the investigation team went to the Balukhali makeshift, where the case investigation identified a total of 10 persons in the household (8 children plus parents). One of them was found sick and the mother took him to MSF clinic. Two of the eight children (2 and 5 years old) reported a vaccination history in Cox’s Bazar but the father was not sure which vaccine was given. Throat swaps were collected and sent to IEDCR laboratory in Dhaka for confirmation but the results are still pending.

The occurrence of diphtheria reflects inadequate coverage of the FDMNs childhood immunization programme. Therefore, obstacles to optimal vaccine delivery must be identified and forceful measures taken to improve immunization coverage immediately. In addition, adequate quantities of diphtheria antitoxin (diphtheria antitoxin is not recommended for prophylaxis) should be available in Cox’s Bazar for medical case management.

The last confirmed diphtheria case from Bangladesh was reported by the MOH in Singapore on 3 August 2017. The patient is a 21-year-old construction worker from Bangladesh. He developed fever and swelling of the neck on 30 July, and sought medical treatment on 1 August. He passed away on 4 August. The sample tested positive for toxigenic Corynebacterium diphtheriae. As he had not travelled out of Singapore recently, he was likely infected in Singapore.

Diphtheria is a widespread severe infectious disease that has the potential for epidemics. The control of diphtheria is based on the following three measures: Prevention of disease by ensuring high population immunity through immunization; secondary prevention of spread by the rapid investigation of close contacts to ensure their timely and proper treatment; and tertiary prevention of complications and deaths by early diagnosis and proper management.