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1. National Early Warning Alert and Response Surveillance (NEWARS)

1.1 Reporting status of health centers under 20 Dzongkhags

A total of 3,588 weekly reports were expected from 276 health centers across the country. Overall, 88.95% of them had provided reports in the NEWARS Information System. Out of those reports, 73.25% of them were reported on time while 15.7% of them were reported late (Figure 1).

Bumthang, Dagana, Lhuentse, Mongar, Samdrup Jongkhar, Trashigang, Trashiyangtse and Tsiyang dzongkhags have timely reporting rate of more than 80.0%, while Gasa dzongkhag had the least timely reporting rate of 50.0% followed by Zhemgang with 55.66%.

The health centers that had not reported during this period were Laya and Lingnana BHU under Gasa, Banjar BHU under Mongar, Goenshari BHU under Punakha, Barshong BHU, Kuzhungchen BHU and Seleka subpost under Thimphu, Bjimthangkha BHU II and Gangtey subpost under Wangdiphodrang, and Tshibi subpost under Zhemgang dzongkhag.

Other health centers that had non-reporting rate of more than 70% were Rinchentse BHU under Chukha, Jangphutse subpost under Trashiyangtse, and Kagtong BHU under Zhemgang dzongkhag.

![Figure 1: Dzongkhag-wise weekly reporting status for 2nd quarter 2018](image)

1.2 Status of Notifiable Diseases/Syndromes reported by health centers

Among 21 weekly reportable diseases/syndromes, highest number of cases reported was ARI (49.376) followed by AWD (9,425), ABD (1,119), SARI (988) and FWR (263) (Table 1).

Table 1: Notifiable diseases/syndromes reported by each dzongkhag.

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Abbreviation: ANT (Anthrax), ABD (Acute Bloody Diarrhea), AWD (Acute Watery Diarrhea), AES (Acute Encephalitis Syndrome), AFP (Acute Flaccid Paralyisis), AHF (Acute Hemorrhagic Fever), AJS (Acute Jaundice Syndrome), ARI (Acute Respiratory Infection), BMG (Bacterial Meningitis), DGF (Dengue Fever), MUM (Mumps), DIP (Diphtheria), FWR (Fever with Rashes), FDP (Food Poisoning), MAL (Malaria), PTS (Pertussis), RBH (Human Rabies), TTN (Tetanus), TPF (Typhoid/paratyphoid Fever), SARI (Severe Acute Respiratory Infection), RKS (Rickettsioses).
1.3 Descriptive analysis of Respiratory Illness (ARI and SARI) syndrome

A total of 50,364 cases of respiratory illness were reported (ARI: 98.03% and SARI: 1.97%), which has increased by more than 31.00% from the previous quarter (n=38,186). The maximum number of ARI was reported in week 14 and week 20 with 4488 and 4483 cases respectively. SARI cases remained nearly constant throughout the epidemiological week (Figure 2).

The maximum cases of ARI were observed in 25-49 years followed by 5-9 years and 1-4 years age group. SARI cases on the other hand, were predominantly seen in 1-4 years followed by 1-11 months age group (Figure 3).

Chukha and Samtse dzongkhag reported the highest number of ARI cases followed by Samdrup Jongkhar. SARI cases were reported mostly from Tsirang and Sarpang dzongkhag (Figure 4).
A total of 10,544 cases of diarrheal syndromes were reported (AWD: 89.31% and ABD: 10.69%), which has increased by more than 40.00% from the previous quarter (n=6,945). The frequency of both AWD and ABD cases fluctuated with small spike observed in week 20 for both the syndrome (Figure 5).

Children with 1-4 years age group had the highest incidence of AWD, while the age group 25-49 years group predominated the ABD syndrome (Figure 6).

All dzongkhags have reported AWD syndrome with highest incidence reported from Paro. Mongar has reported the maximum ABD syndrome followed by Wangdiphodrang dzongkhag (Figure 7).

**Immediately Reportable Notifiable Diseases**

These diseases are of major public health importance as a single case may lead to an outbreak or public health threat that requires immediate action. Hence it requires immediate report.

**Weekly Reportable Notifiable Diseases**

These diseases selected based on criteria such as potential to cause epidemic, vaccine preventable diseases, diseases that are aimed for elimination & disease with high morbidity and mortality.
1.5 Descriptive analysis of Fever with Rashes syndrome

A total of 263 cases of fever with rash (FWR) syndrome were reported, which has almost doubled from the previous quarter (n=133). The cases showed an increasing trend from week 14 to 26 (Figure 8).

[Graph showing the number of Fever with Rashes cases by epidemiological week]

High incidence of fever with rashes was reported in children with age below 14 years of age and 25-49 years age group (Figure 9).

[Bar chart showing the distribution of fever with rashes by age group]

Dagana have reported the highest cases of FWR syndrome followed by Pemagatshel, Punakha and Tsirang in the descending order. Bumthang, Chukha, Gasa and Paro dzongkhag have not reported any case (Figure 10).

[Map showing the distribution of Fever with Rashes cases by dzongkhag]

1.6 Immediately Notifiable Diseases/syndromes

Majority of the immediately notifiable diseases/syndromes were suspected measles/rubella with 99 cases. Among those, 3 (3.03%) and 1 (1.01%) were laboratory confirmed for measles and rubella respectively. Eight cases of acute encephalitis syndrome and seven cases of suspected bacterial meningitis and seven cases laboratory confirmed malaria were reported (Figure 11).

[Map showing the distribution of immediately notifiable diseases/syndrome by dzongkhag]
1.7 Reported Events/Outbreaks

1. ARI outbreaks were reported from:
   1.1 Zhempang Central School (n=33). Eight of the ten throat swab samples (80%) tested positive for Influenza B/Victoria lineage.
   1.2 Jakar Higher Secondary School (n=50). Samples were not collected from the site.

2. Food-borne illnesses were reported from:
   2.1 Thirdangbi village, Saling, Mongar (n=2). The event was associated with the consumption of mushroom which they had never eaten before.
   2.2 Gaselo Central School, Wangdi-phodrang (n=11). The affected students consumed wild fruits (Amon).
   2.3 Samthang VTI, Wangdiphodrang (n=3). The tomato paste pickle has been implicated as the likely source of an event.

3. Acute gastroenteritis outbreaks:
   3.1 Jaringay village, Dumtoe, Samtse (n=12). Shigella sonnei was identified from three of the four stool samples. All isolates were sensitive to cotrimoxazole and resistant to ciprofloxacin.
   3.2 Ugyen Academy, Khuruthang, Punakha (n=32).
   3.3 Nagor Middle Secondary School, Silambi, Mongar (n=33).
   3.4 Dorokha Central School construction site, Samtse (n=3).

4. Chickenpox outbreaks were reported from:
   4.1 Khoma Lower Secondary School, Lhuentse (n=13).
   4.2 Norbugang Central School, Samtse (n=10).
   4.3 Bjishong Central School, Gasa (n=11).
   4.4 Waichur Community Primary School, Drametse, Mongar (n=11).

5. Suspected rabies which were associated with the bite of the confirmed rabid dog were reported from:
   5.1 Peljorling, Sibseroo, Samtse (n=3).
   5.2 Tendru Central School, Samtse (n=7)
   5.3 Trashicholing, Sibseroo, Samtse (n=5)

6. Two cases of enteric fever was reported from Chamkhar, Bumthang.

7. An infected skin wounds/scabies which affected 47 students was reported from Chungkha Primary School under Chukha dzongkhag (Figure 12).

All events were responded by the respective health centers (DHRRT) upon the recommendations and support provided by RCDC.

2. Surveillance of Drug Resistant Tuberculosis

From a total of 381 patient samples received in National Tuberculosis reference laboratory (NTRL), 156 (40.94%) were pulmonary tuberculosis (PTB) cases, 55 (14.43%) were extra pulmonary tuberculosis (EPTB), 136 (35.69%) were follow-up samples for MDR-TB patients and 34 (8.93%) cases were for visa. Among the PTB cases, new smear positive, new smear negative, previously treated, unknown and re-culture constituted 116(74.35%), 10(6.41%), 3(1.92%), 16(10.26%) and 11(7.05%) cases respectively (Figure 13).
3. Influenza Sentinel Surveillance

3.1 Influenza Like-Illness (ILI)

Incidence of ILI for the 2nd quarter was 344 per 10000 hospital visits, which is little higher than the previous quarter (294/10000 visits) and lower than the same quarter of the last year (433/10000 visits). Influenza viruses detected in this quarter of the year was influenza B/Yamagata and B/Victoria followed by influenza A/H3 and Influenza A/Pdm09 (Figure 16 and 17). This is in contrast to the same quarter of the last year where Influenza A/pdm09 and A/H3 were the predominating Influenza subtypes.

The proportion of Influenza positivity was 35.19% of 378 total samples which has relatively increased compared to the previous quarter (27.0%). Influenza B/Yamagata (68%) and Influenza B/Victoria (11%) was most predominant strain among the laboratory confirmed ILI cases followed by Influenza A/H3.

ILI cases reported comprised mostly of young adults of 15-29 years. However, laboratory confirmed cases were common in children of 5-14 years (Figure 18). 

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**Figure 14: Type of MDR-TB**

**Figure 15: Distribution of MDR-TB cases by age groups**

**Figure 16: Influenza positivity and cases reported for ILI**

**Figure 17: Distribution of Influenza virus subtypes in the sentinel sites**
SARI incidence was 7 per 100 hospital admissions, which is same as the previous quarter (7/100 hospital admissions). Coincidently same incidence rate was experienced during the same quarter of the last year. Influenza-A and Influenza-B virus; Human meta-pneumovirus (hMPV), Respiratory syncytial virus (RSV) and Para-influenza virus-1, 2, 3 were circulating among the SARI laboratory confirmed cases (Figure 19).

The proportion of influenza positivity among the SARI cases was 20% of total 114 samples. Among laboratory SARI confirmed cases, RSV and Influenza B were most predominant strain followed by Influenza A/H3. PIV-1, PIV-2 and PIV-3 were also detected among SARI samples in this quarter.

The most affected age group was 0-1 years (Figure 20).

### 3.2 Severe Acute Respiratory Illness (SARI)

SARI incidence was 7 per 100 hospital admissions, which is same as the previous quarter (7/100 hospital admissions). Coincidently same incidence rate was experienced during the same quarter of the last year. Influenza-A and Influenza-B virus; Human meta-pneumovirus (hMPV), Respiratory syncytial virus (RSV) and Para-influenza virus-1, 2, 3 were circulating among the SARI laboratory confirmed cases (Figure 19).

The proportion of influenza positivity among the SARI cases was 20% of total 114 samples. Among laboratory SARI confirmed cases, RSV and Influenza B were most predominant strain followed by Influenza A/H3. PIV-1, PIV-2 and PIV-3 were also detected among SARI samples in this quarter.

The most affected age group was 0-1 years (Figure 20).
4. Measles & Rubella Surveillance

A total of 99 serum samples were received from suspected measles cases. From those samples, 3 (3.03%) were laboratory confirmed for anti-measles IgM and 1 (1.01%) for anti-rubella IgM (Figure 21).

![Figure 21: Measles and Rubella positive cases by months](image)

5. Acute Undifferentiated Febrile Illness (AUFI)

From a total of 36 serum samples received from the AUFI sentinel sites, Scrub typhus IgM and Dengue IgM were positive in four and three samples respectively (Figure 22).

Of the 36 clinical samples, 19 samples were tested for Japanese encephalitis IgM (9; serum and 10; CSF; positive=0).

All the 5 samples tested for herpes simplex virus I and II (HSV I & II) tested positive for HSV IgM.

And 15 (of 16) serum samples referred in tested positive for Mumps IgM from parotitis outbreak in Samtse.

Of the 20 samples referred in for dengue serology, 4 samples tested positive (Figure 23).

![Figure 22: Laboratory test result for AUFI samples](image)

![Figure 23: Laboratory test results for referred-in samples](image)

Note: 28 serum samples for Chikungunya test pending due to reagent shortage

6. Sentinel Surveillance for Diarrheal Etiologic Agents

A total of 269 samples were collected from 12 sentinel sites. Table 2 shows the number of samples received from different sentinel sites. It was observed that majority of the samples were collected from JDWNR Hospital which could be due to increased number of diarrheal patients visiting the hospital and higher number of population compared to other sentinel sites. Compared to previous quarter, the total number of samples collected increased and non-reporting sites have also started sending the samples after providing comprehensive onsite training. However, only 67.92% of the target was achieved. Of these 231 samples collected, majority of the samples were either loose (62%) or watery (36%), while 1% constituted bloody characteristic. These samples were tested for bacterial, viral and parasitic pathogens.

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Mean age of the patients enrolled was 25.05 years and consisted of 52.0% male and 48.0% female. Mean duration of illness was 47.04 hours. The patient visiting hospital with diarrhea began to increase during the second quarter (Figure 24). However, data on diarrhea reported by some sentinel sites through NEWARS was observed to be grossly under-reported (Figure 25). Of 269 cases, 8.0% (22) required hospital admission while rests were treated on OPD basis.

6.1 Etiologic agents

Overall positivity rate of bacterial isolates was 10.4% (23/269). Details and number of pathogen isolated from the stool specimen during the quarter is shown in the Figure 26. Positivity rate of diarrheagenic E. coli was 7.41% of which, 61.0% (14/23) were EAEC, 22.0% (5/23) ETEC, 9.0% (2/23), EIEC, 4.0% (1/23) EPEC and 4.0 % (1/23) EHEC.
6.2 Antimicrobial Susceptibility Pattern

Enterohemorrhagic E.coli (EHEC) (n=1) isolate was resistant to ampicillin and amoxycillin and EIEC (n=1) was resistant to amoxycillin, ampicillin, tetracycline and co-trimoxazole and intermediate to cephalaxin and ciprofloxacin. An isolate of salmonella from Gelephu was resistant to amoxycillin, ampicillin, cefazolin, ceftriaxone and cephalaxin. Susceptibility characteristics of EAEC, ETEC and Aeromonas and Shigella species are shown in the following figures:

7. Drinking Water Quality Surveillance

7.1 Urban Drinking Water Quality Monitoring (UDWQM)

7.1.1 Bacteriology test (Thermotolerant coliform) Report

A total of 502 samples were collected and tested for Thermotolerant coliform from 34 urban health centers. From those samples, 54.2% were found to be safe (0 CFU) and rest were found to be unsafe (>1 CFU) (Figure 31)
7.2 Chlorination Report

Six health centers (Bajo, Bumthang, Gelephu, Phuntsholing, Samtse and Thimphu) are monitoring chlorine level in drinking water. The result illustrates that out of 161 samples tested, only 21% were adequately chlorinated while the rest did not meet acceptable value (0.2-0.5mg/L)* (Figure 32).

7.2 Rural Drinking Water Quality Monitoring (RDWQM)

RDWQM is carried out bi-annually (once in February-March and once in July-August) by health centers across the country. There are 231 health centers catering rural drinking water quality monitoring and reporting. From a total of 1420 samples analyzed, 70.30% were safe for drinking (Figure 33).

8. Drug Quality Monitoring

Drug samples from Drug Regulatory Authority, Gelephu Central Regional Referral Hospital, JDWNR Hospital, Medical Supplies Procurement Division (MSPD) and Bajo hospitals were tested for the following quality parameters:

1. Average Weight
2. Uniformity of Mass
3. Disintegration Test
4. Friability Test (for uncoated tablets)
5. Assay
6. Dissolution Test
7. Uniformity of Content.

Except for friability, assay and uniformity of content for some samples, all other test parameters have met the standards (Table 3). However, Assay, Dissolution test and Uniformity of content couldn’t be tested for all drugs due to unavailability of reference standards.

Table 3: No of drugs tested against each parameters