13 OCTOBER 2018

SITUATION ANALYSIS:
EARTHQUAKE & TSUNAMI
SULAWESI, INDONESIA
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## ABBREVIATIONS AND ACRONYMS

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<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td>ACT</td>
<td>Artemisinin-based combination therapy</td>
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<tr>
<td>ADD</td>
<td>Acute Diarrheal Diseases</td>
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<tr>
<td>AHA</td>
<td>ASEAN Coordinating Centre for Humanitarian Assistance</td>
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<td>API</td>
<td>Annual Parasite Incid</td>
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<td>ARI</td>
<td>Acute Respiratory Infection</td>
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<tr>
<td>ASEAN ERAT</td>
<td>ASEAN-Emergency Response and Assessment Team</td>
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<tr>
<td>BNPB</td>
<td>The National Board for Disaster Management</td>
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<td>DHO</td>
<td>District Health Office</td>
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<td>EMT</td>
<td>Emergency Medical Teams</td>
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<td>EQ</td>
<td>Earth Quake</td>
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<td>EWARS</td>
<td>Early Warning Alert and Response</td>
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<td>HC</td>
<td>Health Centre</td>
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<td>HCT</td>
<td>Humanitarian Country Team</td>
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<td>HIV</td>
<td>Human immunodeficiency virus</td>
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<td>IDP</td>
<td>Internally displaced person</td>
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<td>IOM</td>
<td>International Organization for Migration</td>
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<tr>
<td>IR</td>
<td>Incidence Rate</td>
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<td>MCV</td>
<td>Measles-containing-vaccine</td>
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<td>MMR</td>
<td>Morbidity and Mortality Rate</td>
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<td>MR</td>
<td>Measles Rubella</td>
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<td>MDR TB</td>
<td>Multidrug-resistant TB</td>
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<td>MOH</td>
<td>Ministry of Health</td>
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<td>NCD</td>
<td>Non-communicable diseases</td>
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<td>NGO</td>
<td>Nongovernmental organization</td>
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<tr>
<td>OCA</td>
<td>Oral Chorea Vaccine</td>
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<td>OSOCC</td>
<td>On-Site Operations Coordination Centre</td>
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<td>PHC</td>
<td>Primary Health Centres</td>
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<td>PHO</td>
<td>Province Health Office</td>
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<td>RRT</td>
<td>Rapid Response Team</td>
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<td>US SAR</td>
<td>Urban Search and Rescue</td>
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<td>SMS</td>
<td>Short message service</td>
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<tr>
<td>SPHERE</td>
<td>Humanitarian Charter and Minimum Standards in Disaster Response</td>
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<td>TB</td>
<td>Tuberculosis</td>
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<tr>
<td>TNI</td>
<td>National Army</td>
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<td>UNFPA</td>
<td>United Nations Population Fund</td>
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<tr>
<td>Acronym</td>
<td>Description</td>
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<tr>
<td>UNICEF</td>
<td>United Nations Children’s Fund</td>
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<td>UNHCR</td>
<td>UN Refugee Agency</td>
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<td>VBD</td>
<td>Vector borne diseases</td>
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<td>VPD</td>
<td>Vaccine-preventable disease</td>
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<td>WASH</td>
<td>Water, sanitation and hygiene</td>
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<td>WFP</td>
<td>World Food Programme</td>
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<td>WHO</td>
<td>World Health Organization</td>
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SUMMARY

A 7.4 magnitude earthquake hit Donggala District Central Sulawesi, Indonesia on 28th September 2018, followed by aftershocks. The epicenter 8 KM northwest Donggala with the depth of 10 Km. A tsunami hit Palu City, province capital of Central Sulawesi, around fifteen minutes after the quake. Total affected population stands at 1.5 million people (exposed to moderate and strong shaking). Initial reports (as at 9 October) from BNPB have confirmed 2,037 fatalities with over 4,084 injuries, 671 missing persons, 152 are requiring immediately rescue efforts. There are currently almost 74,044 displaced populations in 120 sites. Emergency response operations is gradually improved as 100% power plant have functioned, 60% cellular operators have function, 75% fuel needs are in place, additional heavy equipments arrived to open road access to isolated affected areas to mobilize additional items but constraint remain due to size of the affected areas.

So far, 21 health facilities were affected including one hospital to be damaged whereas damage to other health facilities is being assessed. Interruption of general medical services, including child and maternal health, is affecting first aid and primary health care services. While deaths and trauma are likely to increase in coming days, the level of risk is intermediate due to existing in country disaster preparedness and response capacity. However, the affected areas are at intermediate risk of considerable levels of excess mortality or morbidity due to infectious diseases in the coming days and months. In addition to Acute Diarrheal Diseases (ADD) and Acute Respiratory Infection (ARI), malaria is of major concern as Sulawesi is endemic for malaria including drug resistant malaria. Measles and other VPDs such as diphtheria and tetanus are other public health concerns due to insufficient immunization coverage and widespread injuries. Lack of shelter and broken water sanitation facilities could lead to diarrhoea outbreaks and other communicable diseases. Pre-disaster EWARS data from Donggala, Sigi and Palu indicate ongoing activity of acute diarrheal diseases and acute respiratory infections.

The emergency response is being led and managed by the Government of Indonesia using its disaster management mechanisms and resources across sectors. As of 13 October 2018, there are a total of 112 humanitarian partners in Indonesia that have offered assistance.

Government of Indonesia, through BNPB and Ministry of Foreign Affairs, welcomed offers for international assistance and will select based on the humanitarian needs. Urgent needs identified by the Government are: air transportation, tents, water purification, generators, field hospital and vector control.

The earthquake and following tsunami have severely affected localized areas of Donggala district, Sigi district and Palu city. An urgent response will help mitigate the risks due to different public health threats. However, the disaster is complicated by unknown threats and risks of biological agents or safety and security concerns due to non-state actors or anti-government elements. Importantly, Indonesia has well developed in country disaster preparedness and response capacity including stockpiles of relief materials and health/medical supplies. Yet, on 01 October 2018, Government of Indonesia, through BNPB and Ministry of Foreign Affairs, welcomed offers for international assistance and will select based on the humanitarian needs. As part of the HCT team, WHO INO has been part of efforts to coordinate international support especially on situation assessment and response support planning. Key areas identified for support and to be offered to the Government include deployment of WHO classified and certified EMTs and support to an EMT Coordination Centre.
SITUATION OVERVIEW

A 7.4 magnitude earthquake hit Donggala District Central Sulawesi, Indonesia on 28th September 2018, followed by aftershocks. The epicenter 8 KM northwest Donggala with the depth of 10 Km. A tsunami wave hit Palu City, province capital of Central Sulawesi, around fifteen minutes after the quake.

As per ASEAN coordinating for Humanitarian Assistance (AHA) Center, out of the initial 1.5 million people affected (exposed to moderate and strong shaking), around 660,000 people were exposed to strong shaking as well as potentially directly affected by the following tsunami and liquefaction. Around 191,000 people in urgent needs of humanitarian assistance. Initial reports (as at 9 October) from BNPB have confirmed 2,037 fatalities with over 4,084 injuries, 671 missing persons, 152 are requiring immediately rescue efforts. There are currently almost 74,044 displaced population in 120 sites. As of 30 September, 71 foreign nationals are reported to have been affected by the earthquake.

Road access to the affected area from North side (Manado and Gorontalo Province) and from the South (from Makassar-Central Sulawesi and Poso District -South East of Central Sulawesi) have been cleared). Mutiara Sis al-Jufri Palu Airport was opened on Sunday 30 September 2018.

Emergency response operations is gradually improved as 100% power plant have functioned, 60% cellular operators have function, 75% fuel needs are in place, additional heavy equipments arrived to open road access to isolated affected areas to mobilize additional items but constraint remain due to size of the affected areas.

Due to constant threat of strong aftershocks, there are possibilities of landslides in mountainous/hilly areas and liquefaction in urban areas.

Photo: EPA-EFE/MAST IRHAM
HEALTH STATUS AND THREATS

Health status:

Indonesia has made significant progress in under-5 mortality (2013: 29 per 1000 live births) and MMR (190 per 100,000 live births) between 1990 and 2013. However, vaccination coverage remains to improve with both DPT3 and measles coverage just over 80%.

According to the World Fact Book, the degree of risk due to infectious diseases in Indonesia is ‘very high’. The major infectious disease threats include food or waterborne diseases (bacterial diarrhea, hepatitis A, and typhoid fever) and vector borne diseases (malaria and dengue fever). In Indonesia, acute respiratory infections (including influenza) are second most cause of death in under 5 and fourth most common cause of death in general with no change in trends between 2000 and 2012.

In Indonesia, the population using improved sanitation is just over 80% and whereas improved sanitation is used only by about 60% population with considerable variation between rural and urban areas. Accordingly, diarrheal diseases are eighth common cause of deaths among under-5 population. Before the earthquake, the overall sanitation situation in Central Sulawesi Province was poor, particularly in rural areas. In 2015, an estimated 59.2% of population in Central Sulawesi had access to improved (hygienic) sanitation; 82.8% in Palu, 62.9% in Donggala and 44.7% in Sigi. While population access to clean water was 65.96% for Central Sulawesi and the higher in district Palu 92.5%, Donggala 65.3% and Sigi 57.9%. Diarrhoea outbreaks have been reported in previous years from Palu and Donggala; cases of cholera have also been reported from nearby South Sulawesi in the past (Presentation by Musal Kadim, Child Health Department, University of Indonesian. Cholera updates in Indonesia. Available at http://www.cholera-network.org/wp-content/uploads/2017/05/musal-kadim.pdf)

As per Basic Health Survey (2013), Central Sulawesi is one of the five highest Province in term of incidence and prevalence of pneumonia all age group, 2.3% and 5.7%. with the highest case finding is Palu more than twice of the target (258%); Donggala 90.2% and Sigi 96%. Among respiratory infections, influenza circulates all years around in Indonesia, including in Sulawesi, with higher cases during rainy seasons around September to March.

Reported routine DPT/HiB-3 immunization coverage in 2017 was recorded as - Palu 99.3%, Donggala 88.97% and Sigi 96%. However, measles immunization coverage in Central Sulawesi Province as per 7 October 2018 has been: Province 49.3%, Palu 65%, Donggala 50.5% and Sigi 51.5 (Immunization reporting system). In recent campaigns in 2018, vaccination coverage rates achieved for measles and rubella in Donggola province were 75.14%, Palu 48.48 %, and Sigi 66.04%. Measles continues to be a public health concern in Central Sulawesi as outbreaks have been reported in previous years from Palu and Donggala. In the past three years, at three outbreaks have been recorded in Central Sulawesi:

| History of VPD outbreak in Central Sulawesi Province, 2016-18 |
| --- | --- | --- |
| No | Disease | Event |
| 1 | Suspec Diphtheria, at Parigi | 1 case /event, March 2016 |
| 2 | Suspec Diphtheria, at Marowali | 1 case /event, Dec 2017 |
| 3 | Measles outbreak, at Tauna Sept 2018 | 5 cases / 1 event, Sept 2018 |
Given the low coverage of MCV 1 & 2 in the region, MR campaigns have been launched which are proposed to be continued in post-crisis scenario, despite disruptions.

Indonesia is a malaria endemic country with 94% country as low transmission area and remaining 6% as high transmission. An estimated 1,281,000 cases and 2,200 deaths due to malaria occur annually. In recent years, Central Sulawesi has shown improvement in Malaria control indicator achievement, Malaria incidence rate in Central Sulawesi still above the National target (API < 1‰). Annual Parasite Incidence in the Province is remain 1.06 ‰. Five districts in Central Sulawesi are endemic malaria and considered to have medium level of malaria transmission. Eight districts have Annual Parasite Incidence (API) < 1%. These include Palu (API: 0.05%) and Sigi (API: 0.06%), while Donggala has API 1.22%. Dengue cases is higher during rainy season.

Sulawesi is also endemic to dengue, and chikungunya. Aedes aegypti and Aedes albopictus are found extensively in the region. While incidence Rate (IR) of Dengue is high in Palu district 168.50 per 100,000. Palu reported highest dengue cases among other districts with 650 cases in 2015, and Sigi (103 cases) and Poso (179 cases). Most dengue cases are 15-44 years followed by 4-14 years old.

**Endemic diseases**

Schistosomiasis is specifically endemic in three neighbouring areas: Napu, Lindu and Bada valleys, all located in the highlands of Central Sulawesi province. The disease, which is better known as snail fever, has been identified in 28 villages, in the two districts where the valleys are located. These include five villages located in Lembah Lindu, Lindu sub district Sigi district. In 2014-2015, Sigi and Donggala have reported filariasis cases.

According to health profile of central Sulawesi 2015, Donggala has high Leprosy prevalence of 1.43/10,000 population, while reports Sigi 2.34/10,000 population. Filariasis is a challenge in Central Sulawesi.

Tuberculosis and HIV

As per 2017, 3,842 TB cases were reported including 2,211 new cases of acid fast positive TB, were reported in Central Sulawesi (2017 Indonesia Health Profile), and as per 8 October 55 drug resistant TB patients are hospitalized at Provincial Public Hospital (UNDATA Hospital), including 11 cases from Palu city, 4 from Sigi and 2 from Donggala.

HIV

Up to 2017, a cumulative 712 AIDS cases were reported from Central Sulawesi and in 2017 there were 156 new HIV cases (2017 Indonesia Health Profile).

After EQ hit, people suffer from these two diseases and being under treatment are most likely their medication is interrupted as health facilities at three affected district are damaged and most of them unfunction and people are displaced and residing in the tent camps.

Hypertension and diabetes are high in Palu compared with Donggala and Sigi. Donggala has reported high rates of malnutrition, with 101 cases reported in 2015, while Palu reported 53 cases and Sigi 15 cases.
Immediate threats:

As earthquakes and landslides are reported in affected areas, access to provide clean water and basic medical services are disrupted. Hence the risk of disease transmission will increase. In addition, other health risks are also anticipated as below:

Additional injuries: as per 9 October, BNPB have confirmed 2,037 fatalities with over 4,084 injuries, 671 missing persons, 152 requiring immediately rescue efforts. There are currently over 74,044 evacuees being housed in 120 evacuation sites. Additional injuries are expected as major health problem as many areas that remain inaccessible due to landslides and the destruction of infrastructure including roads and bridges are reached out. Even after the evacuations are stopped, additional deaths and causalities are expected, as aftershocks and liquefaction continue to be threats.

![Photo: Indonesian National Search and Rescue Agency](image)

Acute diarrheal diseases (ADD) and WASH issues: Pre-disaster EWARS data from week 34 shows ongoing activity of ADD, dysentery and suspected typhoid in both Palu city and Donggola district. Post-disaster, water and sanitation conditions are way below acceptable minimum standard. Sanitation facilities are lacking for affected population including severely damaged houses. As a result, open defecation is being practice at some settlements and scattered camps at the field including roadside areas. Likewise, there is a severe shortage of clean drinking water; lots of water pipe supplies are severely damaged and deep/shallow wells are muddy. Moreover, a detailed picture of the extent of damage to water and sanitation in the more remote communities is still unavailable.

The lack of existing WASH infrastructure, limited physical access to new settlement areas, even with all available resources it would be months before minimum WASH standards could feasibly be reached. Due to lack of shelter and broken water sanitation facilities, the risk of ADDs and waterborne diseases is likely to increase.

Acute respiratory infections including pneumonias: The number of internally displaced persons is expected to continue to rise as Government of Indonesia assessments are ongoing. Pre-
disaster EWARS data of week 34 shows ongoing activity of ARIs including pneumonias and influenza like illnesses (ILIs) in both Palu city and Donggola district. ARI including pneumonias are likely to increase among IDPs.

**Measles and other vaccine preventable diseases:** Vaccine preventable disease commonly occur in populations with low level of immunity. Infected people experience symptoms of respiratory illness or neurological illness. Spreading of disease is associated with factors such as low level vaccination coverage, population density and movement. Diseases are easily transmitted from human to human via direct contact with sick people and transmitted through droplet, airborne and contaminated goods. Overcrowding, lack of adequate sanitation and hygiene and negative impact on nutritional needs can all likely increase the transmission of measles and other VPDs.

Measles and DPT3 coverage in some of the affected areas is modest. Due to the earthquake, ongoing MR campaign has been disrupted. Therefore, lower baseline immunity will further increase the susceptibility to these diseases and increase mortality and morbidity. Due to widespread injuries, there is also a risk of tetanus infections with potential complications and need for intensive medical attention.

**Malaria and other vector borne diseases:** The risk of transmission of malaria and other VBDs may increase as environmental management is disrupted due to the disaster in the affected areas that are known to be endemic. Fresh water collections following rains are likely to increase the risk of breeding sites and therefore increased transmission. In addition, displaced population living in densely populated camps with poor waste management tends to get more exposure to vector borne disease. It has been observed that there are piles of garbage, used materials and goods that retain water scattered within the vicinity of the camps. People have moved from areas of low endemicity to areas where parasite and/or virus circulation still continues, making them more susceptible. Notably, in Indonesia, malaria is resistant to traditional treatments such as chloroquine and sulphadoxine-pyrimethamine that further malaria treatment in Indonesia using Artemisinin based Combination Therapies (ACT).

**Parasitic and other endemic diseases:** The distribution of schistosomiasis is limited to the villages due to limited location where the transmitting agents of the parasite are present. However, the incidence and burden of other endemic diseases are likely to increase as control programs are affected due to disruptions.

**Mental health:** The sudden and widespread destruction due to the disaster has impacted the mental health of affected population and led to huge need for psycho-social support.

**Gender based violence:** Riot and psycho-social impact of disaster may trigger gender-based violence.

**Tuberculosis and HIV:** Routine health care services that include disease control programmes are likely to be disrupted in the aftermath of the earthquake. Overcrowding due to displaced population living in densely populated camps may increase risk of TB spread.

**Non-communicable diseases:** NCDs that include conditions such as hypertension and diabetes need long term management, including continuous monitoring for emergent complications. Once the acute phase of disaster is over, lack of treatment due to disruption of health care services and enhanced focus on other immediate health priorities, such as
injuries and communicable diseases, is likely to increase the complications treatment needs of cases of NCDs.

HEALTH SYSTEM STATUS & LOCAL HEALTH SYSTEM DISRUPTIONS

Health system status

There is a total of 24 hospitals in Central Sulawesi. Donggala has 15 primary healthcare centres (PHC) with 71 sub PHC, Kota Palu 12 PHC with 30 sub PHC, and Sigi 19 PHC with 48 sub PHC (Source: Central Sulawesi health profile 2015).

The target ratio for healthcare personnel for 100,000 population is as follows: specialists/100,000 population, medical doctor 40/100,000 populations, nurses 117/100,000 population, midwives/100,000 population, pharmacy 10/100,000 population, 40 public health practitioners/100,000 population, environmental health technicians 40/100,000 population. Central Sulawesi has 12,979 healthcare workers (nurses 42.43%, midwives 25.76%, public health practitioners 10.77%, environmental health technicians 10.77%, pharmacy 3.87%, medical doctor 3.39%. Central Sulawesi has a physician density of 451 healthcare workers per 100,000 population, with medical doctor ratio of 15 per 100,000 population.

Indonesia has also well-developed national capacity for responding to disaster. The National Board for Disaster Management (BNPB), Regional Crisis Centres and provincial / district disaster agency (BPBD) are mandated for preparedness and response to disaster. Central Sulawesi is part of the South Sulawesi Regional Crisis Center. Importantly, in the five-year government development plan Donggala District and Palu City are two out of 170 high priority districts to be improved the disaster risk index grade by the Ministry of Health.

As per the preparedness and response plans, in response to Earthquake and tsunami in Central Sulawesi, the GoI has engaged multiple sectors to mobilize resources. Command centre has been established. Regional Crisis centre, disaster agencies from neighbouring provinces (South Sulawesi, Gorontalo, East Kalimantan) have supported the response.

Indonesia has an EWARS system that has been operational in Donggala, Sigi and Palu. The EWARS in Donggala covers 19 primary healthcare centres, in Sigi 19 primary health care centres and in Palu it covers 13 primary healthcare centres. The completeness and timeliness of reporting is 100% in Palu but less than 40% in Donggala and Sigi.

Rapid Response Team (RRT) already exist in Central Sulawesi province and district level, including Palu, Donggala and Sigi. However, the RRT might have been affected by disaster. There is provincial health laboratory at Central Sulawesi. The laboratory under NIHRD MoH at Donggala might also have been affected by disaster.

Primary healthcare centre (PHC) in Indonesia, including in the affected areas deliver disease control programme for Tuberculosis, HIV/AIDS, Vector borne diseases including zoonosis, VPD, filariasis and schistosomiasis.

Health system disruptions

Damage to health facilities is being assessed. Interruption of general medical services, including child and maternal health, is affecting first aid and primary health care services. While the information from MoH led rapid needs and health assessments is awaited, disease
control programs particularly, immunization, vector borne diseases, tuberculosis and HIV/AIDS could get affected.

*Infrastructural damage*

Due to aftershocks and cracks in buildings, structures remain unsafe and most of health services were delivered under the tents. As per latest AHA information, 45 health facilities suffering various degree of damages, Palu City 1 hospital, 11 health centers and 3 satellite health centers; Donggala 10 health centers, 1 satellite health center and 5 village health post; Sigi 14 health centers.

At PHCs, just about 30 – 40% of health workers have returned to work with adherence support from both fixed and mobile EMTs type 1 mobilized following the disaster. Similarly, at DHOs and PHOs, an average of 50% and 70% health workers at returned to work in temporary offices and tents as permanent offices are damaged and unsafe.

![Photo: WHO Indonesia](image)

*Disruption of Supplies*

Medicine supplies for basic health services at PHCs are adequate, with the exception of some pediatric medicines and shortage of ORS/Zinc tablets in remote PHCs. Warehouses at DHO has been moderately damaged. As a result DHO is being supported with supplies from PHO. Because of incoming medicines from humanitarian aid, PHO has sufficient stockpiles to serve requests from Puskesmas, health posts and DHO.
Immunization services

Immunization Vaccine-preventable Diseases (IVD) teams which consist of National Officers and MOH officers, are experienced and have been managing nationwide measles and polio vaccination programmes for 10 years. The cold chain has been assessed following the earthquake and results indicate limited damage. Since power supply has been fully restored, provincial cold room are functioning adequately. However, in Sigi district, the capacity for vaccine storage (cold room) is limited; only 1 unit of TCW2000 SDD available and functioning. This capacity is considered insufficient for store vaccine needed for routine and campaign

Surveillance and EWARS

Following the disaster, Palu city, Donggala and Sigi are unable to report EWARS., . As per 13 Oct 2018, number of HC that sent EWAR report to PHO increasing gradually, Palu from 23% to 38%, Donggala from 0 to 31%, and Sigi from 0 to 11%. Restoration of reporting system has also been gradual.

HUMANITARIAN HEALTH RESPONSE

As of 13 October 2018 AHA on their situation update no.12 highlighted, there are a total of 112 humanitarian partners in Indonesia that have offered assistance. Assistance has been offered (and is being reviewed by the Government) in the areas of early recovery, emergency telecom, food, health and medial, logistics and transportation, Search and Rescue (SAR), WASH, and experts in different areas.

The emergency response is being led and managed by the Government of Indonesia using its disaster management mechanisms and resources across sectors. The following measures have been put in place and/or are planned:

- Indonesian National Board for Disaster Management (BNPB) is coordinating with related ministries/agencies and NGOs; conducting rapid impact assessment and quick emergency response.
- MoH coordinated by Health Crisis Center led Rapid Health Assessment with support from relevant UN Agencies and other Institutions and in collaboration with Provincial and District Health Officers.
- PHO supported by Health Crisis Center is coordinating with cross-sectors and primary healthcare centers within the affected areas.
- Regional Crisis Centres from Makasar are deployed to support initiating the rapid health assessment and will assist open national/sub-national health cluster coordination post.
- Three TNI (national army) EMTs and two ships (equivalent to type-2 EMTs) from Surabaya and Alor joining eight NGO medical team equivalent to EMT type-1 mobile to the field. Local type 1 and type 2 EMTs currently have been distributed to Puskesmas and hospitals located in the three most affected districts to support health service delivery for affected population including those residing at displaced camps. Hospital is providing medical services for outpatient, inpatient and referral referral patients from Puskesmas who need specialist medical treatment. Should the patient required more intensive specialist treatment then patient will refer to Hasanudin hospital at Makassar, South Sulawesi.
Governor of Central Sulawesi has announced an initial 14 days of emergency response period dated 28 September to 11 October 2018. In addition, the governor elected Commander of Military Resort 132/Tadulako as Incident Commander with the Incident Command Post located at Makorem 132/Tadulako. This initial emergency response is extended for the next 14 days named as emergency response transition.

Government of Indonesia, through BNPB and Ministry of Foreign Affairs, welcomed offers for international assistance and will select based on the humanitarian needs. EWARS using an active syndromic surveillance of suspected cases of epidemic-prone diseases is being instituted as per standard protocol at all levels of health facilities located in the affected sites including all hospitals outpatient departments (OPDs). The geographic coverage of these OPDs included the 3 affected districts. Support is being sought from WHO and FETP secretariat to establish the EWARS for diseases of outbreak potential including acute watery diarrhea, bloody diarrhea, suspected measles, suspected diphtheria, acute hemorrhagic fever, jaundice, and ARI. Provincial and District surveillance officers are being supported by the Central Surveillance Staff and assisted by FETP student deployed from 4 universities. Several students also deployed to 5 health centers to assist surveillance staff in data management.

**Partners response:**

- ASEAN-ERAT is currently being mobilised to gather information on the impact of the earthquake and assess the needs, in support of BNPB and BPBD’s ground assessment efforts.
- WHO Indonesia in coordination with Crisis Center Ministry of Health are monitoring thirteen international EMT and thirty-four USAR teams registered in the relief teams tab in virtual OSOCC.
- The Humanitarian Country Team (HCT) was convened on 30 September in Jakarta to discuss on the need to have a coherent, structured, coordinated assessment covering various sectors (logistics, health and displacement).
- WHO and UNFPA is working closely with Ministry of Health (Pusat Krisis Kesehatan) to support requests from sub-clusters.
- WFP is currently working through their national offices to support the operations.
- IOM and UNICEF are working closely with Ministry of Social Welfare to support the displacement tracking, social welfare and psycho-social needs.

**WHO Response:**

- WHO is monitoring the situation closely with the Crisis Center of MoH.
- As part of the HCT team, WHO INO is meeting to prepare for coordinated international support especially on situation assessment and response support planning.
- WHO in coordination with Crisis Center Ministry of Health is also exploring to offer deployment of international EMTs that are classified and certified by WHO.
RISK CHARACTERIZATION

Indonesia also has a well-developed national capacity for responding to disaster. This is complemented by an existing EWARS, though with wide variation in performance, and a system of RRTs. Primary health care including delivery of disease control programs is done through primary PHCs. As per the preparedness and response plans, in response to Earthquake and tsunami in Central Sulawesi, the GoI has engaged multiple sectors to mobilize resources. As of 13 October 2018, there are a total of 112 humanitarian partners in Indonesia that have offered assistance.

However, the earthquake followed by tsunami that struck Central Sulawesi (Donggala and Palu) on 28 September 2018 have driven an estimated 191,000 in need of humanitarian assistance. Extent of damage to healthcare facilities is being assessed but basic services that were available prior to the disaster, including delivery of disease control programs, are already under severe strain due to the destruction and influx of patients of injuries. EWARS reporting has dropped in many of the affected areas and RRTs are also likely to have been affected.

While there is existing response capacity in place, there are also threats and risks that have emerged in the aftermath of the disaster, that the system will have to respond efficiently and effectively.

There are challenges of no access to water and sanitation facilities. In addition to lower vaccination coverage in affected areas, ongoing immunization campaigns especially in Palu have been disrupted. There are massive unmet shelter and site management needs across all sites. From food and nutrition perspective, people are in need of emergency food assistance.
Affected regions of Donggala and Palu are endemic and have high burden of different communicable diseases. Both sites have ongoing activity of ADD (including suspected typhoid and dysentery) and ARIs (including pneumonias and influenza-like illnesses). Both sites have also witnessed in recent times outbreaks of ADD, measles, dengue, and chikungunya. Schistosomiasis is endemic to the area although in few pockets in affected areas/populations. While progress has been made in malaria control, Central Sulawesi continues to be amongst the malaria endemic areas of Indonesia. This is further complicated by drug resistant malaria.

In this backdrop of high background endemicity of communicable diseases and worsening health, nutrition and environmental conditions due to current crisis, affected populations are at high risk of local outbreaks of waterborne (cholera, hepatitis E, dysentery), foodborne (cholera, dysentery) and vector borne diseases (dengue, chikungunya, malaria, scrub typhus).

The disaster has also resulted in overcrowding in temporary shelters, raising the risk of transmission of certain communicable diseases that are spread from person to person through respiratory droplets such as measles, diphtheria, pertussis, acute respiratory infections (ARI) and tuberculosis, especially MDR TB. This risk will increase due to inadequate ventilation. Lack of adequate shelter for affected populations may also increase the risk of malaria and dengue due to increased exposure to vectors.

Diseases such as dengue/DHF and chikungunya are endemic in Central Sulawesi can present with severe clinical manifestations requiring critical secondary care. Such cases, especially in an outbreak form, are likely to further compromise the already stretched health services in refugee areas.

Key risks in the coming days and weeks (2-3 months) are as per the table below:

<table>
<thead>
<tr>
<th>Public health risk</th>
<th>Geographical scope</th>
<th>Likelihood</th>
<th>Public health consequences</th>
<th>Level of risk</th>
<th>Rationale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trauma</td>
<td>Affected area, particularly Donggala district</td>
<td>Almost certain</td>
<td>Moderate</td>
<td></td>
<td>Many areas remain inaccessible; Donggala is closer to the epicentre; adequate existing disaster preparedness and response structure</td>
</tr>
<tr>
<td>ADD</td>
<td>Affected area</td>
<td>Very likely</td>
<td>Moderate</td>
<td></td>
<td>Poor WaSH conditions</td>
</tr>
<tr>
<td>ARI</td>
<td>Affected area</td>
<td>Very likely</td>
<td>Moderate</td>
<td></td>
<td>Overcrowding</td>
</tr>
<tr>
<td>Malaria and other VBDs</td>
<td>Affected area, particularly Donggala</td>
<td>Very likely</td>
<td>High</td>
<td></td>
<td>Lack of shelters, disruption of health care services, additional breeding</td>
</tr>
</tbody>
</table>
RISK STATEMENT

Earthquake and tsunami affected areas of Palu city and Donggala district are at intermediate risk of considerable levels of excess mortality or morbidity due to communicable diseases in the coming days and month. Poor access to improved sanitation and clean water, inadequate vaccination coverage, inadequate surveillance and vector control capacity are some of the important drivers of common communicable diseases in the affected areas. In addition to ADD and ARI, malaria is of major concern as Sulawesi is endemic for malaria including drug resistant malaria. Measles and other VPDs such as Diphtheria tetanus are other public health concerns. While deaths and trauma are likely to increase in coming days, the level of risk is intermediate due to existing in country disaster preparedness and response capacity. However, levels of risks will be reviewed regularly as this will also evolve as basic services return and response evolves.
Overall, it is imperative to augment currently strained health services, especially revitalizing primary health care services, to meet the immediate to medium term health needs of the affected population. Specifically, in response to the impending public health threats, ensuring **uninterrupted and sufficient provision of safe drinking-water** is the most important preventive measure in reducing the risk of outbreaks of waterborne diseases.

- UNHCR, WHO and SPHERE recommend that each person be supplied with at least 15-20 litres of clean water per day.
- There are a number of water treatment methods (boiling, filtration, chlorine, coagulation, flocculation, and solar) that have demonstrated effective removal of pathogens in the laboratory and reductions in diarrhoea when used in the field. WHO has recently begun international testing of water treatment technologies according to WHO performance standards and the latest list of tested technologies and their performance should be consulted.
- The preferred method or combination of methods depends on a number of factors including turbidity or number of suspended particles in the water, existing methods in use and accepted by the population, supply chains, and cost.
- In addition to exploring point of use filters or other technology already being used in Indonesia, it is important to note that chlorine is often used in emergencies as it is inexpensive and in certain forms easy to transport. Several considerations should be given to chlorine including:
  - For household water treatment, the most practical forms of free chlorine are liquid sodium hypochlorite, sodium calcium hypochlorite and bleaching powder.
  - The amount of chlorine needed depends mainly on the concentration of organic matter in the water and has to be determined for each situation. Chlorine may be ineffective with water which is highly turbid, such as from rivers and/or ponds. In such cases other treatment options, such as filtration or coagulation-flocculation should be considered.
  - After 30 minutes, the residual concentration of active free chlorine in the water should be 0.5 mg/litre, which can be determined by using a simple field chlorine test kit.
  - Chlorine is ineffective against certain protozoa, most notably **cryptosporidium**, a pathogen which can cause especially serious health conditions for individuals with HIV. Greater protection of drinking-water sources would combine chlorination with other methods or select a method such as membrane filtration that would effectively protect against the range of pathogens most commonly associated with diarrhoeal diseases.
- Regular monitoring of WASH related health risks through sanitary surveys and use of rapid fecal indicator water quality tests, is an important mechanism for assessing and managing risks. A number of field kits are available for assessing water quality and efforts should be made to quantify fecal contamination, where possible.
- Key messages on food hygiene and regular handwashing with soap should be promoted to sensitize communities to the relevant health risks.
- In addition, adequate sanitation facilities should be provided in the form of improved and well maintained latrines or designated, protected defecation areas. Sanitation efforts should also incorporate behaviour change approaches considering the common practice of open defecation.
- All health-care waste (for example, contaminated syringes and needles) should be properly segregated and disposed of in designated containers and destroyed as
appropriate. The safest and most environmentally friendly method is autoclaving, however, this requires reliable water and power. Incineration is the next preferred option, using dual chamber, high temperature equipment. If no other options are available, burning in pits or burying may be a temporary measure.

**Shelter and site planning** are other important considerations for the prevention of communicable disease. Wherever possible, shelters for the displaced or homeless must be positioned with sufficient space between them and, aimed at preventing diseases related to overcrowding or lack of ventilation, such as measles, ARI, diarrhoeal diseases, TB and vector-borne diseases.

- Domestic waste should be disposed in a pit, away from shelters and protected from rodents to reduce the exposure of the population to rodents and other vectors of disease.
- Shelters should be equipped with long-lasting insecticidal nets (LLIN) for each sleeping space to prevent malaria transmission. In addition, adequate sanitation facilities should be provided in the form of latrines or designated defecation areas. These should be separate sex-specific facilities designed and located with attention to security issues.

**Surveillance/early warning and response system** for rapid detection of cases of epidemic-prone diseases is essential to ensure rapid control. The existing EWARS is a SMS based system that is simple to use, uniform in style and includes standard case definitions and reporting form. Diseases targeted include 6 syndrome of epidemic prone diseases. EWARS has been disrupted in the aftermath of earthquake with majority PHCs not being able to report data. In addition to efforts to restore EWARS and in order to improve and increase possibility of capturing signal of epidemic prone disease, all EMTs are advised to fill up EWARS reporting form provided when registering their presentation and send their report using the android application to health center for further compilation and transmission to DHO and PHO. Case definition recommended for use for EWARS should be as per the National Guideline on Early Warning Alert and Response System (EWARS). In principle, the surveillance/early warning and response system should:

- Be set-up urgently and ensure sensitivity of the existing SMS based EWARS based on health facilities. Where EWARS is not functioning, it should be urgently re-expanded. Consider EWARS in the box to allow for rapidly expansion of the network and offline transmission of data.
- Focus on the priority epidemic-prone communicable diseases in the existing EWARS; expand the list to diseases most likely to occur in the disaster-affected population
- Emergency coordination should urgently consider EWARS and referral systems at community level relying on community leaders and their networks.
- Diagnostic capacity could be surged using rapid diagnostic tests; include outbreak preparedness, with development of specific outbreak response plans and adequate stockpile of supplies, as well as outbreak investigation kits and transport material for laboratory specimens;
- Ensure that EWARS is sensitive to unusual emerging and re-emerging communicable diseases of major public concern in the aftermath of the earthquake, including dengue and diphtheria; identify key laboratories for prompt diagnosis and confirmation of the main communicable disease threats, as well as protocols for transport and tracking of specimens;
- Ensure data is forwarded to the local health authorities.
Immunization for measles/rubella is recommended for all persons 6 months-35 years of age. The vaccine of choice is measles-rubella containing vaccine (MR). Vaccine should be administered as soon as they enter an organized camp or settlement, regardless of previous vaccination or history of measles disease, neither of which are contraindications to receiving the vaccine. Emergency public health personnel, both national and international, should be routinely vaccinated against measles and rubella, regardless of age. Depending upon local immunization coverage data, similar consideration need to be given to diphtheria vaccination.

Earthquake and tsunami have led to injuries of different types and nature in affected areas. Immunization against tetanus should be another priority to prevent cases and outbreaks of tetanus.

At initial stage of the emergency response, the immunization program could target high risk groups such as search and rescue workers, people seeking for protection against tetanus risk, health workers and volunteers with TD vaccination campaign. Following this initial stage and with assessment of cold chain capacity and facilities as well as revival of health centers, EPI program should consider to expedite resuming the MR campaign as well as routine immunization programs including DT vaccination targeting total population in the IDPs camps and the communities.

Based on the immunization coverage of previous years, Sigi and Donggala are to be prioritized for immunization against Diphtheria & Tetanus to achieve immunization targets of total population in camp or settlement. According to age group, following vaccines could be used: DPT HB Hib for < 5 year-old, TD for 5-7 year-old, Td for above 7 year-old; in Palu target group to be > 5 year-old.

Given the current situation in Sulawesi (and past reports of cholera from nearby South Sulawesi), the fact that the affected areas are prone to ADDs and the start of the rains towards the middle of October, various public health interventions including stockpiling of Oral Cholera Vaccine (OCV) in anticipation of potential risk of cholera to protect the population most at risk against the disease could be considered based on local situation and in close monitoring of epidemiological situation in the affected areas. A risk assessment could be done to help decide on where and how to use OCV should be conducted as soon as possible within the framework for vaccination in humanitarian emergencies. When the situation stabilizes, routine vaccinations offered by the national immunization programme should be made available to all infants, pregnant women and other people as part of the provision of basic emergency health-care services.

Risk Communication. Information may be the most important commodity during emergencies. Information may also be the most rapid public health response ahead of the delivery of aid. In addition, the dissemination of information in a timely and transparent manner also helps generate trust and credibility in response activities and agencies providing relief. Heightened community awareness of the need for early treatment and reinforcement of proper case management are important in reducing the impact of communicable diseases.

It is important to convey to all parties that corpses do not represent a public health threat. When death is due to the initial impact of the event and not because of disease, dead bodies have not been associated with outbreaks. Standard infection control precautions are recommended for those managing corpses.

The use of standard treatment protocols in health-care facilities with agreed upon first-line drugs is crucial to ensure effective diagnosis and treatment for ARI, the main epidemic-prone
diseases (including cholera, dysentery, shigellosis, typhoid, dengue and DHF, hepatitis, measles, malaria, meningitis and influenza A).

- Standard Precautions aim to ensure hand hygiene and the avoidance of direct contact with blood and body fluids. Therefore essential supplies should include waterless hand antiseptics and personal protection (e.g. gloves). Additional specific (transmission-based) precautions should be determined by risk assessment. It is important that Standard Precautions should be used not only at health-care facilities, but also by health-care workers providing care in the field.

- Malaria treatment: In the emergency phase, severe falciparum malaria can be treated with artemether by the intramuscular route as an acceptable and practical alternative. However, as soon as intensive case monitoring becomes possible, artesunate by the intravenous or intramuscular route should be used as the treatment of choice, followed by intravenous quinine. Preference should be given to earliest resumption of existing pre-disaster standard treatment guidelines being followed in the affected area, as they are also evidence based especially for drug resistance patterns.

- Provision of anti-TB treatment must be ensured for TB patients who were previously receiving treatment in the affected areas.

REFERENCES

1. WHO Country Office for Indonesia. Sulawesi earthquake and tsunami. SitRep no. 4. 1 October 2018
7. 1st quarter report 2018, NAP, MoH
8. Rapid Pro MR campaign data