# SULAWESI, INDONESIA
Earthquake & tsunami

Several earthquakes struck Central Sulawesi province from 28–29 September. The strongest earthquake had a magnitude of 7.5 and triggered a tsunami that hit land at a speed of 800 kph with waves of up to 6m. Around 48,000 people have been displaced and 1,200 people killed, with these numbers expected to continue rising rapidly. At least, 300,000 people were exposed to category 5-8 shaking, while up to 1.5 million people who live in the area may be affected.

NEED FOR INTERNATIONAL ASSISTANCE

Not required   Moderate   Major

IMPACT

Very low   Moderate   Major
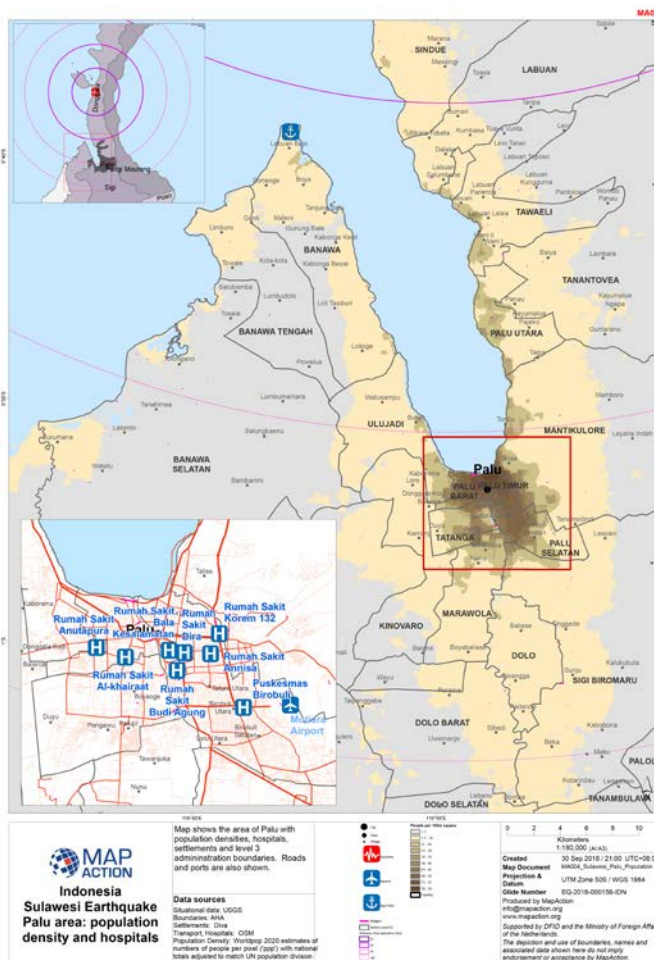
Humanitarian Constraints

Access to the affected areas is severely constrained, due to factors including a landslide across the main road into Palu, restrictions on flights into the airport, the destruction of major seaports and lack of communication with these areas. The full extent of damage in affected areas remains unknown. Aid convoys are travelling groups because of the risk of looting.

Map shows the area of Palu with population densities, hospitals, settlements and level 3 administration boundaries. Roads and ports are also shown.

MAP ACTION

Indonesia
Sulawesi Earthquake
Palu area: population
density and hospitals

Data sources
Situational data: USGS
Boundaries: AHA
Settlements: Diva
Transport, Hospitals: OSM
Population Density: Worldpop 2020 estimates of numbers of people per pixel ('ppp') with national totals adjusted to match UN population division.

Kilometers
1:180,000 (A4 A3)

Created   30 Sep 2018 / 21:00 UTC+08:00
Map Document   MA004_Sulawesi_Palu_Population
Projection &   UTM Zone 50S / WGS 1984
Datum
Glide Number   EQ-2018-000156-IDN

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Anticipated scope and scale

Donggala, Mamuji and Parigi Moutong have not yet been reached and assessed. These areas were closest to the epicentre and are likely to have been severely affected by both the earthquake and the tsunami. Casualties and the number of displaced people are also expected to rise rapidly in the coming days. If an effective and coordinated humanitarian response is not implemented quickly, the risk of disease outbreaks and a significant deterioration of health conditions is high. However, the speed of the response is also likely to be limited by severe access constraints.

Key priorities

+48,000
people displaced

Up to 1.5 million
People affected

+1,200
people killed

Limitations

Casualty numbers vary between sources and continue rising at the time of writing. Additionally, other disasters including mudslides and landslides have affected the humanitarian situation. However, it is beyond the scope of this briefing note to investigate them in any detail.

Crisis impact

On 28 and 29 September, a series of earthquakes and at least 170 aftershocks hit the regency of Donggala, in the province of Central Sulawesi, Indonesia. The largest earthquake had a magnitude of 7.5 and, in combination with a landslide on the ocean floor (seaslide), triggered a tsunami that struck Palu Bay, north of Palu city and the western coast of the Donggala Regency. The tsunami struck land at a speed of 800 kmph with waves of up to 6 metres high. Local infrastructure has been devastated. Mudslides that were triggered by the earthquake and tsunami hit areas of south Palu city. (The Jakarta Post 01/10/2018, AHA 30/09/2018, The Telegraph 01/10/2018, IFRC 29/09/2018, Al Jazeera 29/09/2018).

Up to 1.5 million people across six regencies and 85 districts in Central Sulawesi may be affected by the earthquake and tsunami. (The Jakarta Post 01/10/2018, The Guardian 30/09/2018, AHA 01/10//2018, Oxfam 30/09/2018). Around 48,000 people are reported to have been displaced and they are residing in evacuation centres. It is not entirely clear where these facilities are situated, or how many there are, though estimates suggest between 100–200 centres (AHA 01/10/2018, OCHA 1/10/2018). Separate reports indicate that 1,400 people were evacuated to the south of the Island by plane. It is unclear if these people are included among the 48,000 displaced people. Casualty figures range from 850–1,200, though these numbers are expectedly to rise rapidly. Authorities are concerned that bodies may have been washed out to sea (The Straits Times 01/10/2018, Time 30/09/2018, The Guardian 30/09/2018). Humanitarian needs are severe across all sectors (ECHO 30/09/2018, AHA 30/09/2018).

The full impact of the damage remains unknown as many affected areas have not yet been accessed, which means no assessments have been conducted. Palu city is thought to be one of the worst affected areas. However, Donggala, Mamuji and Parigi Moutong, which have a combined population of 1.2 million and are situated close to the epicentre north of Palu city, have not yet been reached; therefore, the most in need population cannot currently be determined (The Telegraph 01/10/2018, The Telegraph 01/10/2018, Al Jazeera 30/09/2018).

The government of Indonesia has declared a state of emergency for the next two weeks (Al Jazeera 01/10/2018). International assistance has been requested.

Food: People have been left with very limited access to food. Reports suggest markets are not operating as normal, though limited information is available. There are reports of looting, as the affected populations have no other access to food and water (Al Jazeera 30/09/2018; The Washington Post 30/09/2018). Anecdotal reporting states that foods needs are becoming more urgent as people have now gone several days without eating, and hunger is fuelling population movements towards Palu airport as IDPs search for food and safety (Associated Press 01/20/2018, Reuters 01/10/2018). Ready-to-eat rations and food are expected to be an urgent humanitarian need in the coming days (AHA 30/09/2018). The state logistics agency has promised to send hundreds of metric tons of rice to the affected areas (Reuters 01/10/2018). However, it is not yet clear, due to the lack of assessment or access, if this will meet needs or whether displaced populations will have the facilities to prepare food themselves.

Health: More than 632 injuries have been recorded, with this number expected to rise significantly (Humanity First 30/09/2018, AHA 01/10/2018). There are calls for medical staff and medicines, which are in very short supply and running out (Reuters 01/10/2018, Al Jazeera 01/10/2018, Deutsche Welle 30/09/2018).

Some hospitals have been destroyed, while those that continue to function are overwhelmed. Open air clinics are being established, but many more are needed (The Guardian 30/09/2018, Al Jazeera 29/09/2018). The newly refurbished Salvation Army hospital in Palu was evacuated due to structural damage (IFRC 29/09/2018). All hospitals will be affected by the current power outages (Humanity First 30/09/2018).

Indonesian authorities are concerned about diseases outbreaks resulting from decomposing corpses and have started digging mass graves for victims who have been identified (Al Jazeera 01/10/2018, Associated Press 01/10/2018). An unknown number of people remain trapped under rubble and in mud. Schistosomiasis, a disease spread by the presence of parasitic flatworms in fresh water, is endemic to three areas in the Central Sulawesi highlands. Access to these areas is likely to be cut off as they also experienced earthquakes and landslides. This isolation and lack of access to fresh drinking water may increase the spread of schistosomiasis. The presence of stagnant water also increases the risk of malaria (AHA 01/10/2018). The need for psychosocial support has also been raised (AHA 01/10//2018).

Shelter and NFIs: Destruction of shelter is widespread. In Palu, many houses were submerged in the earth as the earthquake caused soil liquification (Reuters 01/10/2018). The full extent of damage to shelter is not yet known.

Alongside the 100–200 displacements sites, many IDPs are also staying in makeshift shelters or in the open due to fear of further damage from aftershocks or more earthquakes (The Guardian 30/09/2018, Al Jazeera 29/09/2018, South China Morning Post 30/09/2018). Tarpaulins and blankets to support those staying outside of their home are also urgently needed (Al Jazeera 29/09/2018).

Power is out across Palu and people are queuing for hours for fuel, which is also in very short supply. The government has said it will deliver 4,000 litres of fuel to the affected areas, though the timeframe for this delivery is not clear (Reuters 01/10/2018, Humanity First 30/09/2018, Time 30/09/2018).

WASH: The full extent of damage to WASH infrastructure is not clear; however, initial reports suggest water pipes have been badly damaged (The Guardian 30/09/2018). The lack of electricity in the area means it is likely that waste treatment plants are not functioning.

Drinking water is in very short supply and has been described by the Indonesian disaster agency as an urgent need, as water sources have become contaminated with sediment and other materials (The Washington Post 30/09/2018, Time 30/09/2018).

Protection: A number of children were reportedly separated from their caregivers during the tsunami. There are reports of children turning up alone at hospitals (BBC 01/10/2018). A general lack of law and order may increase the vulnerability of certain groups, while limited resources may lead to fighting between civilians.

Impact on critical infrastructure

Thousands of homes, hotels, mosques and other communal buildings have collapsed and communication lines have been extensively damaged, creating barriers to accessing affected populations and coordinating humanitarian responses (Telecoms sans frontiers 28/09/2018, The Guardian 30/09/2018). Several bridges have collapsed and landslides are affecting access. Palu's airport is now open after a 24-hour closure, but only to pilots who can land by sight and humanitarian flights (The Jakarta Post 30/09/2018, The Telegraph 30/09/2018, Al Jazeera 30/09/2018). Satellite imagery indicates severe damage at major seaports, with shipping containers and boats tossed inland by the tsunami (Al Jazeera 30/09/2018).

Humanitarian and operational constraints

Access is an extremely significant constraint, due to a combination of destroyed communication channels, roads and bridges, as well as landslides in multiple areas. The main road to Palu was blocked by a landslide (Al Jazeera 29/09/2018). Donggala has been cut off to all communication since the earthquake (Reuters 01/10/2018, The Washington Post 30/09/2018, ndtv 30/09/2018). The possibility of more landslides and soil movement caused by soil liquification pose risks to humanitarians wishing to operate in the area (AHA 30/09/2018).

There is insufficient heavy machinery to assist with search and rescue operations that involve lifting heavy debris, though more equipment is due to arrive (The Guardian 30/09/2018, CT 28/09/2018). Relief actors are travelling in convoys to prevent theft and looting (Reuters 01/10/2018).

Aggravating factors

Previous earthquakes

Indonesia sits on the 'Pacific ring of fire', having experienced several earthquakes in the past two months as well as volcanic eruptions and tsunamis in recent years (The Guardian 30/09/2018). In August, Lombok regency suffered several major earthquakes that killed up to 550 people (The Guardian 30/09/2018). The Indonesian national disaster agency released a statement on 1 October reminding the media that thousands of survivors from the Lombok and Sumbawa earthquakes were still in need of humanitarian assistance (BNPB 01/10/2018). Multiple humanitarian disasters are stretching the resources of the Indonesian government and limiting its ability to respond.

Risk of related disasters

Severe mudflows hit several areas in Central Sulawesi after the earthquake. Petobo subdistrict, south of Palu, has been affected, while more mudflows and landslides are expected. Reporting suggests 2,000 people may have died as a result of mudflows (The Jakarta post 01/10/2018).

Population density and location

The tsunami hit the most heavily populated districts situated on the bay of Palu (MapAction 30/09/2018). The shape of the narrow bay around which Palu is built intensified the force of the tsunami waters as they hit land (Deutsche Welle 30/09/2018; Time 30/09/2018).

Buildings and infrastructures

Limited building regulations address earthquake risks, and there are not enough resources or qualified construction workers to ensure sufficient quality standards of infrastructure and building construction. Poor-quality structures are susceptible to earthquake damage (World Conference on Earthquake Engineering 10/2008).

Rainy season

Late October is the beginning of the rainy season (Indonesia Travel accessed 01/10/2018). The rains are yet to fall heavily, but the response to the earthquake will be further complicated as the season picks up. Needs will increase quickly, and WASH, health and shelter needs will be even more critical.

Poor tsunami warning system

A tsunami warning system was developed across Indonesia following the devastating tsunami of 2004. However, a multitude of factors including a lack of funding and technical issues, as well as a poor maintenance, mean the early warning systems were not functioning properly when the earthquake struck. Tide gauges consequently provided little to no warning, so many individuals did not seek higher ground (Associated Press 01/20/2018).

Key characteristics

Demographics: Indonesia

0-14 years: 26.2% (male 33,854,520/female 32,648,568)

15-24 years: 17.1% (male 22,067,716/female 21,291,548)

25-54 years: 42.3% (male 54,500,650/female 52,723,359)

55-64 years: 7.9% (male 9,257,637/female 10,780,724)

65 years and over: 6.4% (male 7,176,865/female 9,308,056)

51% of the population live in urban areas (CIA World Factbook 2014).

WASH 84.3% use of improved drinking water sources (urban: 92.8%, rural: 75.5%), 58.7% use of improved sanitation facilities (urban: 73.4%, rural: 43.5%) (UNICEF 2012).

Health: infant mortality rate 47/1000, under-five mortality rate 52/1000, maternal mortality ratio 190 per 100,000 live births (National Statistics Indonesia, 2012)

Nutrition 13.3% acute malnutrition; 35.6% chronic malnutrition (UNICEF 2012).

Literacy: Youth literacy: 98.8% (male and female) (UNICEF 2012).

Response capacity

Local and national response capacity

The national disaster agency (BPBD) is coordinating the response and assessing the impact of the earthquake and tsunami. Local authorities have begun search-and-rescue efforts with the involvement of several national agencies and the Indonesian army, which have also been deployed to assist rescue teams (The Guardian 30/09/2018, IFRC 29/09/2018).

The Indonesian government has allocated $37.5 million for disaster recovery (ndtv 30/09/2018). The national authorities are arranging the provision of more doctors, heavy machinery for rescue teams, and fuel and rice deliveries (Reuters 01/10/2018, Al Jazeera 29/09/2018). Local authorities are also organising mass graves to prevent possible disease outbreaks (The Guardian 30/09/2018).

International response capacity

The Indonesian government has asked for international humanitarian assistance and said it would accept worldwide assistance, which includes $1.74 million in immediate aid from the EU (Reuters 01/10/2018, European Commission 30/09/2018, Al Jazeera 01/10/2018). This is different from previous disasters, when the government rejected international humanitarian assistance (AHA Centre 8/8/2018).

The Humanitarian Country team met on 30 September to discuss the implementation of a coordinated response, focusing on displacement, logistics and health (AHA 30/09/2018).

Relief teams began arriving on 30 September after long drives in and around areas with landslides (The Washington Post 30/09/2018). WHO, UNFPA, WFP AND UNICEF are all working closely with relevant national ministries. NGOs and INGOs are also deploying and implementing through local partners, and several INGOs including Save the Children are assisting with initial rapid assessments (AHA 01/10/2018).

Information gaps and needs

Total lack of information from Donggala as rescuers have been unable to access the area.

There is no official assessment of the damage caused by the earthquake and tsunami (Al Jazeera 30/09/2018).

Lessons learned

The same issues that hindered the response to the Lombok earthquake, including a lack of heavy machinery for lifting debris, are affecting the response in Central Sulawesi.

Indonesia has suffered the most casualties from tsunamis in the world, and also experiences roughly 90% of all earthquakes (UNDAC 01/10/2018). Despite this, tsunami warning systems are still not adequate in providing advanced warning to civilians.

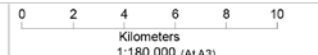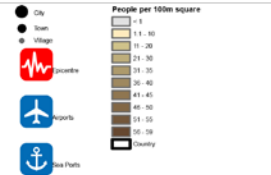# Map: population density and hospitals in Palu area, Sulawesi
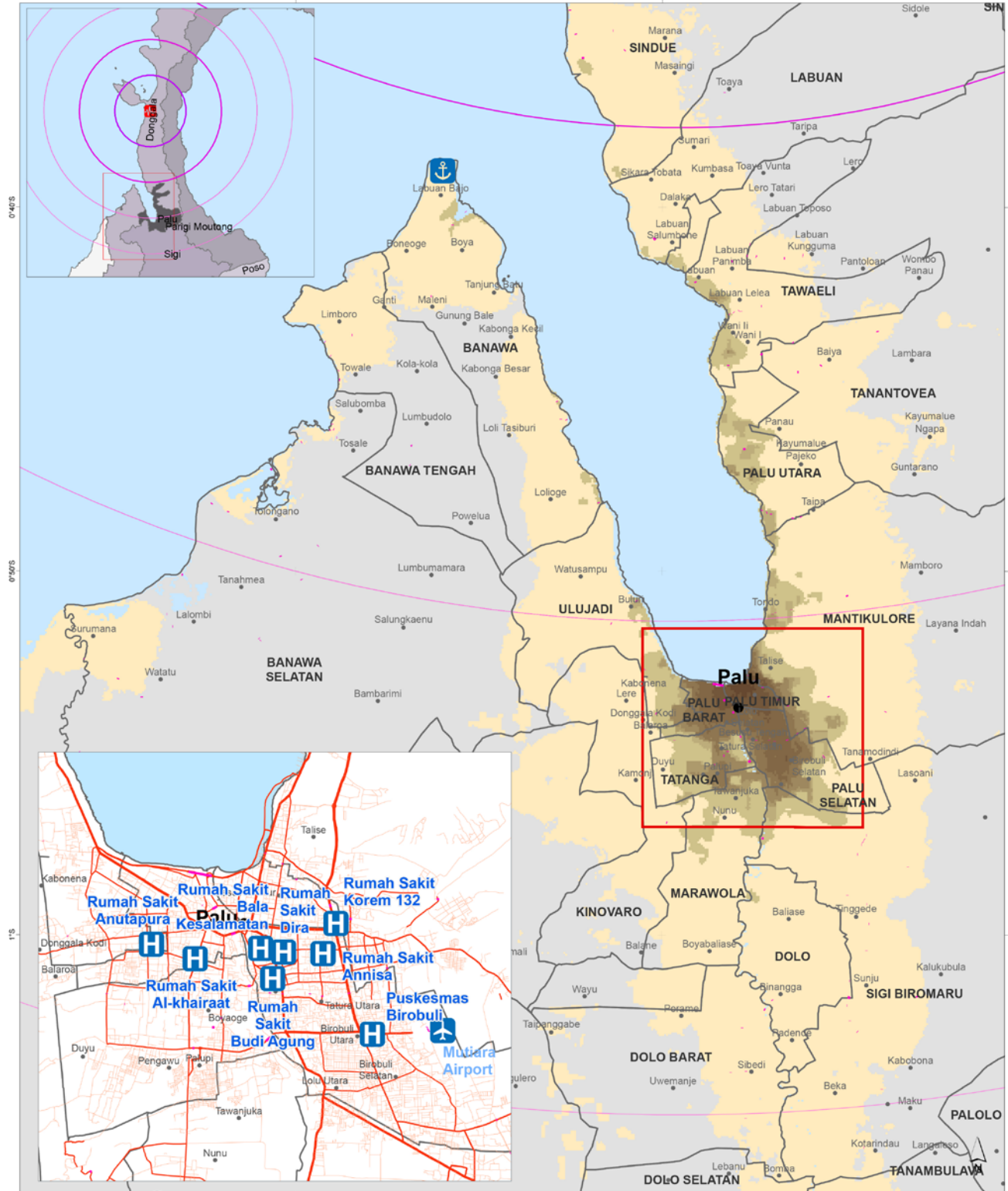
Map shows the area of Palu with population densities, hospitals, settlements and level 3 admininstration boundaries. Roads and ports are also shown.

Data sources
Situational data: USGS
Boundaries: AHA
Settlements: Diva
Transport, Hospitals: OSM
Population Density: Worldpop 2020 estimates of numbers of people per pixel ('ppp') with national totals adjusted to match UN population division

Indonesia Sulawesi Earthquake Palu area: population density and hospitals

People per 100m square

City
Town
Village
Epicentre
Airports
Sea Ports

Kilometers
1:180,000 (At A3)

Created	30 Sep 2018 / 21:00 UTC+08:00
Map Document	MA004_Sulawesi_Palu_Population
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