

PAPUA NEW GUINEA

Highlands Earthquake

On 25 February an earthquake of magnitude 7.5 hit Papua New Guinea (PNG) affecting mainly Southern Highlands, Hela, Western Highlands, Western Province, and Enga provinces. The affected area is mountainous and remote, although impact has been reported in Mendi city, almost 100km away. An estimated 274,600 people are within 50km of the epicentre. Approximately 326,000 people are estimated to be very strongly impacted, according to the Modified Mercalli Scale. Initial reports are limited but there are indications of urgent needs, including for health, shelter and WASH assistance. Various impact, including damage, casualties and landslides, has been reported in at least seven locations: Hides, Porgera, Mendi, Nipa-Kutubu, Tari-Pori, and Huilya (see map on back page).

Affected areas	Resident population	Male	Females	Average Household Size
Southern Highlands	510,245	263,523	246,722	5.8
Western Highlands	362,850	183,791	179,059	4.3
Hela	249,449	128,895	120,554	3.8
Western Province	201,351	103,762	97,589	6.4

Sources: CENSUS 2011

NEED FOR INTERNATIONAL ASSISTANCE



IMPACT



Distance from epicentre of 25 February shake	Population
Within 15 km	33,863
Within 30 km	90,297
Within 50 km	274,595

Sources: WFP 25/02/2018

Anticipated scope and scale

The main affected provinces are **Southern Highlands, Hela, Western Highlands, Western Province, and Enga provinces**. To date, **communications are disrupted**, and **infrastructures damaged** so there estimates of the full scope and scale remain limited. **Pre-existing vulnerabilities** mean that multi-sectoral assistance is likely necessary. **Aftershocks** have been recorded and **landslides** pose an ongoing risk to buildings and infrastructure, and could block waterways **inducing flooding**. Oil, gas and mining sites in the area raise concerns about potential **toxic spills**.

Key priorities



Health facility damage and casualties reported



Damaged homes, buildings and infrastructure



WASH risks incl. water contamination, shortage

Humanitarian constraints



Communications are disrupted. There are initial reports on landslides, damaged roads and airstrips. Adverse weather conditions could hamper assessments and assistance.

Limitations

Secondary data is limited and assessments are still ongoing. Many areas are yet to be reported on, making prioritisation of affected areas difficult.

Crisis impact

On 25 February at 17:44 (UTC), an earthquake of magnitude 7.5 at a depth of 35 km hit Papua New Guinea mainly affecting Southern Highlands, Hela, Western Highlands and Western provinces. The epicentre was located in Nipa-Kutubu district. At least 20 aftershocks above magnitude 5.0 were recorded after the initial shake [OCHA 26/02/2018; OCHA 26/02/2018]. On 1 March, the PNG Prime Minister declared a State of Emergency for Hela, Southern Highlands, Western Highlands and Enga provinces [SBS 01/03/2018].

The population in the area is highly dispersed and living in remote and rural communities with no major urban areas in the immediate vicinity. Casualties, however, have been reported in Mendi city, 96 km from the epicentre [ABC 28/02/2018]. The estimated population within 15km of the epicentre is 33,868, within 30km is 90,297, and within 50km is 274,595 [WFP 25/02/2018]. According to the Modified Mercalli Scale, some 34,000 people are estimated to have been violently exposed (IX), 270,000 severely impacted (VIII), and 326,000 very strongly impacted (VII) [DG ECHO 26/02/2018]. The UN estimates that 273,814 people are likely in need of immediate assistance, including those facing risk of displacement and food insecurity. Of these, 143,127 are in the area around the epicentre. The other 130,687 are further from epicentre. [UN PNG 28/02/2018].

The quake triggered numerous landslides and sinkholes that blocked roads and rivers. Phone networks, power lines and municipal and domestic water tanks have been damaged, houses buried and damaged, and the airstrip at Komo is damaged and unusable. [OCHA 26/02/2018, MAF aerial assessment 27/02/2018] The area hosts oil and gas plants and mines and coffee plantations. Some have been reported to have been shut down and the non-essential staff evacuated [NEWS ON 6 27/02/2018; OCHA 26/02/2018; ONE PNG 26/02/2018].

Secondary risks include the possibility of further landslides and the threat of flooding as rivers temporarily blocked by landslides breach the blockage.

Casualties: On 28 February, the Southern Highlands emergency coordinator reported 30 deaths had occurred, mostly in Mendi city, due landslides and collapse of retaining walls [ABC 28/02/2018]. At least 300 people have been injured [GDACS 27/02/2018; SOUTH CHINA MORNING POST 27/02/2018; THE WATCHERS 25/02/2018]. Unconfirmed casualties are reported in Mendi, Ialibu, Pangia and Huilya (Southern Highlands) and in Falu, Aiya and Mapuli (Hela). Deaths have also been reported from Fau village (Western Province) [Post-Courier 01/03/2018].

Health: Hela Provincial Hospital is reported to be damaged [BBC 27/02/2018]. In Southern Highlands Province, Inu Sub-Health Centre is reported to be submerged, and equipment at Mendi Hospital reported broken, although power and water supplies were re-

connected by 28 February [EQ REPORT 27/02/2018; Radio New Zealand 26/02/2018]. Villages near Mendi are reported to be cut off from the hospital [CBC 01/03/2018]. It is likely that the remaining health facilities are under pressure to cope with the affected population's health needs, especially in light of reports of casualties.

Shelter: Homes are believed to be destroyed or damaged. Houses in the affected area are reported to be a mix of both vulnerable and earthquake resistant constructions. The majority of vulnerable building types are unreinforced brick masonry and informal constructions, made of metal and timber [THE WATCHERS 25/02/2018]. The vulnerable constructions are more likely to be damaged. Landslides have damaged a number of buildings and retaining walls [ABC 28/02/2018]. It is likely that part of the population are in need of prolonged shelter assistance until they can reconstruct.

WASH: Approximately 4.7 million litres of drinking water and 18.2 million of clean water and some 13,600 toilets are estimated to be needed in the most affected areas [UN PNG 28/02/2018]. The earthquake is likely to have caused serious damage to the WASH infrastructure of the affected areas: some areas in Hela report water contamination. In Southern and Western Highlands Provinces there are reports of no available clean water and damages to water tanks. In rural areas of PNG, the main sources of potable water are rainwater tanks, hand-dug wells, springs, creeks and rivers. Septic latrines, pit latrines and open defecation are commonly used for human waste disposal. 18% of the rural population is reported to use open defecation [WHO 2010; SOPAC 2007].

Education: The schools in Southern Highlands and Hela Provinces are reported to have been suspended indefinitely [OCHA 26/02/2018]. Children in these two provinces will therefore be in need of education assistance.

Food: Approximately 30% of the population of the most affected areas in Hela and Southern Highlands are estimated to be severely food insecure as per the Food Insecurity Experience Scale (FIES) [UN PNG 28/02/2018]. The disruption caused by the earthquake could impact on food security and livelihoods in the mid to long term. Some gardens are reported to have been destroyed, and crops are likely to have been damaged, which could limit food availability, and impact livelihoods and income. Delivery of food assistance in remote areas may be challenging. The UN estimates that approximately 765,200 kg of rice will be needed to assist those in need [UN PNG 28/02/2018].

Impact on critical infrastructure

Communications: roads and power lines are reported to be disrupted, though the extent remains unclear [NEWS ON 6 27/02/2018]. Power disruptions have been recorded in Pongera (Enga Province) and telecommunication in Tari (capital of Hela Province) and Mendi (capital of Southern Highlands) have been affected.

Roads: It remains unclear how many connecting roads have been rendered unusable or impassable. According to reports on the ground from 28 February, the status of roads are as follows: Kiunga–Ok Tedi Mine: damaged; Road to Kiunga Airport: damaged; Mendi–Kandep: landslides; Mendi – Poroba: accessible; Poroba – Nipa: blocked; Mount Hagen–Mendi Highlands Highway: conflicting reports; Moro–Gobe and Kutubu: blocked; Tari–Mount Hagen: open to 4WD; Tari–Mendi: bad conditions; Tari–Koroba: blocked; Tari–Hides: blocked.

Southern Highlands: Inu village, on Lake Kutubu is reported to be submerged, and some inhabitants stranded on an island [LOOP 27/02/2018]. Large landslides and blocked water courses are reported south of Komo area. The runway of Komo airstrip is currently damaged, not currently functional [DG ECHO 26/02/2018; OCHA 26/02/2018; ONE PNG 26/02/2018]. Moro airport is reported to be operational and Mendi airport appears to have no damage. Mendi's Southern Cross Water supply tank is reported to be damaged.

Hela: Tari airport reports cracks on runways, but there are conflicting reports on the functionality. Reports suggest it is open with restrictions to small aircrafts, using a 1000 metre runway. An aerial assessment identified Tari as the most impacted place with extensive damages on roads, communication towers, power pylons and buildings. But ground verification is not yet available. Tagari River is reported to be hit by major landslides along its banks [HUMANITY ROAD 27/02/2018].

Vulnerable groups affected

PNG has one of the highest rate of physical assault on women in the world. Displaced women, or women in need of shelter or WASH assistance are likely to be more exposed to gender-based violence and harmful coping strategies [UNDP 2010].

Humanitarian and operational constraints

Challenging terrain and the dispersed population combined with damages to phone networks and roads makes a full assessment either difficult or impossible [NPR 27/02/2018]. The National Disaster Centre undertook an initial damage assessment on 27 February [OCHA 26/02/2018]. In Hela, Southern Highlands and Western Highlands Provinces

there are a total of 25 airports, of which 2 are closed and the others status is unknown [HUMANITY ROAD 27/02/2018]. Impact to roads and airstrips, though unclear, is likely to hamper both further assessment and delivery of aid. In Hela and Southern Highlands Province, 60 of 72 mobile network sites are currently down, making the one of the only methods of communication the very high frequency (VHF) radio system run by the Mission Aviation Fellowship, a religion-based aviation service [LOOP 27/02/2018].

Aggravating factors

Weather

In Papua New Guinea the wet season runs from November to April. Southern Highlands and Hela are located at the extremity of the West Pacific Warm Pool, which experiences rain throughout the year [Pacific Climate Change Science Program 11/2011]. The country is also exposed to tropical cyclones. Floods and extreme weather conditions can heavily affect the displaced, hampering the temporary shelter and WASH response. Given that most of the affected areas are not reachable via road, weather could also hamper aerial assessments [REUTERS 28/02/2018].

“Ring of Fire”

PNG is located on the margins of the Australian and Pacific tectonic plates, on the “Ring of Fire”. It is a seismic area with the presence of active and dormant volcanoes [DW 07/12/2017]. The country experiences frequent earthquakes and volcanic eruptions.

El Niño

Papua New Guinea is vulnerable to El Niño, which can cause drought, frost and forest fires. El Niño could damage crops and agriculture resulting in food shortages and deterioration of the nutrition condition. It can lead to water shortages, deteriorating health and hygiene conditions. Drought can dry up rivers limiting transports on rivers and reducing hydro-power supply [El Niño Early Action Plan 31/07/2017]. Although the last El Niño period has passed, PNG was heavily affected and some areas are still recovering.

Proximity of critical infrastructure

Oil, gas plants and mining sites are present in the area. Some plants buildings are believed to be damaged [THE WATCHERS 25/02/2018]. Oil companies have halted oil and gas production to assess the damages [BBC 27/02/2018]. Some non-essential staff has been

evacuated. The presence of gas pipelines and pipes carrying mining waste raises concerns regarding toxic spills [The Sydney Morning Herald 27/02/2018].

Damages reported: Water supply, power and communication lines are reported to be affected in Kutubu Oil Search, as well as power line from Hides Gas plan to Porgera Gold Mine. Exxon Mobil Camp in Southern Highlands has land cracks and slips across the camp site. LNG site reports extensive damage. Barrick Ltd power generating facility in Enga is reported to be disrupted.

Other factors of vulnerability

37.5% of the people in the affected regions are living below the poverty line [WFP 25/02/2018]. Rural inhabitants are reported to have difficulties to obtain cash to cover basic needs [FAO 2009]. The earthquake is likely to put further pressure on the vulnerabilities of the most disadvantaged in these areas.

Key characteristics

If more than one area is affected and worth comparing, use the table at the end of the document (if not applicable remove table).

- **Demographic profile (countrywide):** Total population PNG 8,085,000; under 18 population 3,449,000; under 5 population 1,033,000; 89.9% rural population, 13.1% urban population [FAO STAT 2017].
- **Nutrition levels (countrywide):** 14.3% children under-5wasting, 49.5% children under-5 stunted [FAO STAT 2017].
- **Health statistics (countrywide):** under-5 mortality rate 54 deaths/ 1,000 births; 1,000 births; neonatal mortality rate 424 deaths/ 1,000 births [UNICEF 2016].
- **WASH statistics (countrywide):** use of basic drinking water services: total 37%, urban 84%, rural 29%; use of basic sanitation services: total19%, urban 55%, rural 13% [UNICEF 2016].
- **Literacy levels (countrywide):** youth (15-24 years) literacy rate: female 64%, male 69% [UNICEF 2016].

Response capacity

Local, national and international response capacity

On 27 February, the National Disaster Centre assesses the earthquake's damages and impacts, together with the local authorities. The Papua New Guinea Defence Force is assisting the first assessment and is reported to be delivering assistance to the affected population and to be working to restore services and infrastructures [EMTV 26/02/2018]. Currently 40 troops are reported to be deployed in Hides (Hela Province), 40 troops in Mendi (Southern Islands Province) and 70 in Mt Hagen (Western Highlands Province) [LOOP 27/02/2018]. Although there has been no request of international assistance so far, the Australian Government is providing logistical support to the PNG Defence Force and information management and coordination assistance to the PNG National Disaster Centre [Government of Australia 28/02/2018]. The PNG Red Cross is reported to be active in the area [CNN 28/02/2018; IFRC Asia Pacific Twitter 28/02/2018].

Information gaps and needs

The disruption in the communication services and the inaccessibility of some of the affected areas are making assessment difficult.

Some areas of Southern Highlands and Hela provinces, for example Kutubu, are reported as not having been reached by any emergency or disaster team [Post Courier 01/03/2018].

Some information and reports are conflicting, for example about access via the Mount Hagen – Mendi Highlands Highway road.

There is limited information on sectoral needs, particularly estimates of people in need. Reports on needs are likely to be available in the next days.

There is no information on numbers of houses damaged or people displaced.

Although there is information on existing health, communications or transport infrastructures, it is unclear if they are still functional or undamaged.

The last census dates back to 2011 and the population is estimated to have increased country-wide by over one million people since then [KNOEMA 2017].

Lessons learned

The most recent earthquakes in Papua New Guinea above magnitude 7.0 occurred in 2017 and 2010.

Lessons learned from the 2015-2016 El Nino response in the highlands area cover a range of issues around coordination and sectoral response [\[LL Workshop 09/05/2017\]](#).

Communicating with communities is challenging but the sharing of coordinated messaging via the National Broadcasting Corporation (NBC) was seen as a success in both reaching as wide an audience as possible and ensuring consistent messaging during the El Nino response in the Highlands. During the same response, coordination between national and sub-national actors and between the provincial and district levels was sub-optimal: not all actors had access to the most accurate information on needs and response. Vulnerable people were overlooked due to lack of capacity and skills of assessors although the few assessments tailored to include gender and protection considerations had a positive impact on subsequent response programming. [\[LL Workshop 09/05/2017\]](#).

Women and girls in PNG face secondary gendered risks in disasters, including an increase in gender-based violence, forced marriage and trafficking plus impaired sexual and reproductive health [\[CARE 09/2017\]](#). Increased anecdotal incidence of gender-based violence was also identified as a challenge to the response to El Nino in the Highlands in 2017 [\[LL Workshop 09/05/2017\]](#).

From prior experiences (e.g. Nepal and Ecuador earthquakes) gender-based violence risks increase in the aftermath of an earthquake because family structures are disrupted or displaced populations are vulnerable. [\[UNICEF 22/04/2016; Global Protection Cluster 05/2015\]](#).

A number of other lessons can be learned from past earthquake disasters, such as Nepal. For example, debris constitute a challenge but some of building material can be reused and should be temporarily stored. Rubble can be removed incrementally: first to allow access and later as reconstruction begins. Sensitivity might be necessary: some house owner may not want bricks to be removed due to family members burials or loss of belongings [\[ALNAP 2015\]](#).

Local disputes have caused insecurity and displacement in the past in the affected areas. In 2016 people were displaced in Hela Province, due to tribal conflict. Southern Highlands Province was affected by both tribal conflict [\[IOM 10/2016\]](#).

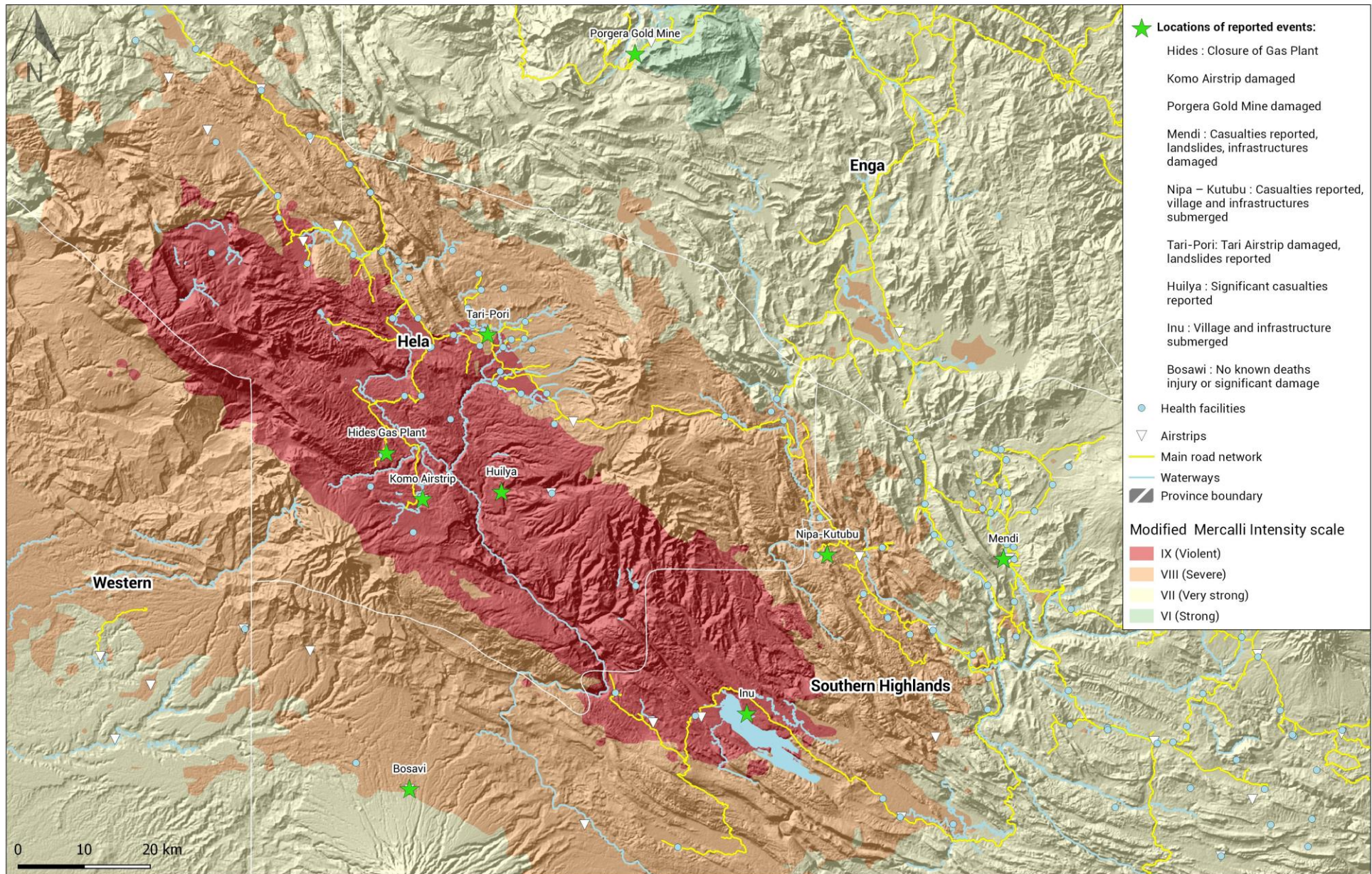
Bush fires have also triggered evacuations and displacement, for example in Southern Highlands in 2016 [\[IOM 10/2016\]](#).

Key characteristics

Key indicators	Southern Highlands	Western Highlands	Hela	Western Province
Total population	510,245	362,850	249,449	201,351
Females	246,449	179,059	120,554	97,589
Males	263,523	183,791	128,895	103,762
Average Household size	5.8	4.3	3.8	6.4
Number of airstrips/airports	13 (unknown status; Komo airport not functional; Mendi airport undamaged; Moro airport functional)	10 (unknown status)	2 (closed and/or damaged; Tari airport partly functional)	8 (unknown status)
Health facilities	Total number: 112 Mendi General Hospital (equipment broken, power and water restored) Marara Health Post (5°50'46.8"S 142°57'01.7"E – unknown status) Inu Sub-Health Centre (submerged)	Total number: 5 No information reported	Total number: 75 Hela Provincial Hospital (damaged)	Total number: 67 3 medium size
Capital City	Mendi (distance from the epicenter 98.5 km – population 26,252)	Mount Hagen (distance from the epicenter 165.3 km – population 33,623)	Tari (distance from epicenter 33.1 km – population 8,186)	Daru (population 7,339)
Other populated nearby places	n/a	Goroka (distance from the epicenter 290.2 km – population 18,503)	n/a	-
Most affected LLGs (according to UN estimates drawing on population data based on Census 2011)	In priority 1 area (near epicenter): Nipa Rural (pop 48,573) Lake Kutubu Rural (pop 16,070) In priority 2 area (further away): Mt Bosavi Rural (pop 15,136) Poroma Rural (pop 42,010)	Not reported	In priority 1 area (near epicenter): North Koroba Rural (pop 13,631) South Koroba Rural (pop 20,938) Tebi Rural (pop 11,443) Hayapuga Rural (pop 18,047) Komo Rural (pop 18,907) Huilya Rural (pop 41,642) In priority 2 area (further away): Awi/Pori Rural (pop 21,198) Tagali Rural (pop 10,672) Upper Wage (pop 14,950) Lower Wage (pop 20,654)	Priority 2 (in need of assistance): Nomad Rural (pop 14,080)

Sources: CENSUS 2011, THE WATCHERS 25/02/2018, USGS 27/02/2018, HUMANITY ROAD 27/02/2018, HDX 11/2015, UN PNG 28/02/2018

PAPUA NEW GUINEA - HIGHLANDS EARTHQUAKE



Sources: OSM,OCHA ROAP, USGS, CIAT CGIAR-CSI, UNDP, and local and international media reports.
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The boundaries and names shown and the designations used on this map do not imply official endorsement or acceptance by ACAPS.

The map is based on review of collated secondary data sources. It is designed for reference purposes only and data should be further verified before planning operational response.