

## Humanitarian impacts of El Niño-related drought and heat

### OVERVIEW

Timor-Leste has experienced above-average temperatures and low and unevenly distributed rainfall throughout the November 2023 to May 2024 rainy season. From October 2023 to January 2024, precipitation fell over 30% below average levels. By mid-February, drought was detected in 10 of Timor-Leste's 14 municipalities: Aileu, Ainaro, Atauro, Baucau, Bobonaro, Covalima, Dili, Manatuto, Oecusse, and Viqueque (WFP 23/04/2024; FAO 04/03/2024; WB accessed 26/04/2024). Both the drought and abnormally high temperatures are mainly attributed to the 2023–2024 El Niño, which began in June 2023 (WFP 23/04/2024; IPC 29/02/2024; ACAPS 25/07/2023).

Drought and heat have led to crop failure, livestock deaths, and water scarcity in many parts of the country, contributing to livelihood, food security, nutrition, and WASH needs (WFP 23/04/2024; FAO 04/03/2024; WB accessed 26/04/2024). This aggravates pre-existing high needs in Timor-Leste, where 360,000 people (27% of the population) faced Crisis (IPC Phase 3) or worse food insecurity levels from November 2023 to April 2024. Food security is projected to deteriorate between May–September 2024, with a projected increase of 3,500 people facing Emergency (IPC Phase 4) levels despite the end of the lean season, which occurs from around December–February when farmers have exhausted cereal stocks. El Niño-induced below-average maize and rice harvests and livestock losses, along with high food prices, are contributing to this deterioration (IPC 29/02/2024; WFP 12/2010; FAO 03/2011).

### KEY FIGURES AND MESSAGES

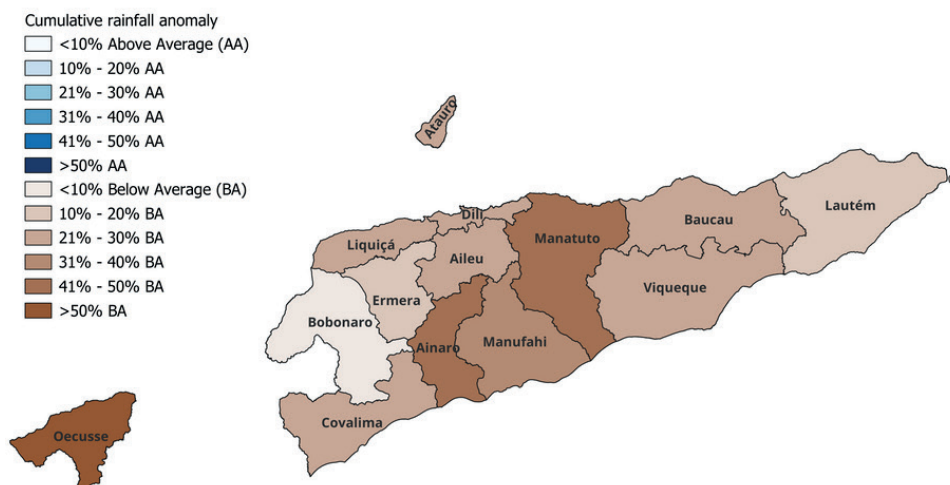
Key population demographics from the most recent census, October 2022

TOTAL POPULATION	1,341,737
Population under five	159,667 (11.9%)
Population under 30	866,762 (64.6%)
Population over 65	80,504 (6%)
Urban population	383,000 (28.6%)
Rural population	958,000 (71.4%)

Source: Govt. Timor-Leste (18/05/2023)

- El Niño-induced drought and heat since mid-2023 has delayed, decreased, and destroyed rice, maize, and other staple food crops. This affects livelihoods and food security for over 900,000 people (70% of the population of Timor-Leste), whose primary income source is agriculture (WFP 23/04/2024; ADB/WB 18/11/2021).
- By May, El Niño's impact on agricultural output and high inflation had pushed 3,500 additional people into Emergency (IPC Phase 4) food insecurity (IPC 29/02/2024).
- Worsening food insecurity will increase malnutrition levels, which are already high among children. Nearly half of under-five children face chronic malnutrition in Timor-Leste (UNICEF et al. accessed 29/04/2024).
- Below-average precipitation threatens households' WASH access, which is already constrained in rural areas, where nearly 20% of households use unimproved drinking water sources and 25% use unimproved sanitation facilities (Govt. Timor-Leste 18/05/2023).
- Poor WASH access, along with drought and heat, is likely to force households to store water in unsafe ways and use contaminated water, increasing the risk of waterborne and vector-borne disease transmission.
- Needs are particularly high among women in Timor-Leste, who already have limited access to livelihoods and essential services, and often face exclusion from sociopolitical power structures (ADB/WB 18/11/2021; Grameen Foundation 12/2021).
- The livelihood impacts of drought and heat may be particularly severe for the many youth in Timor-Leste, where around 65% of the population is less than 30 years old. Youth experience economic exclusion, with double the unemployment rate among those aged 15–24 (9.6%) compared with the 25–64 age group (4.7%) (Govt. Timor-Leste 18/05/2023; HBS 29/11/2023; ILO et al. 09/2022).
- Children may attend school less and even drop out at a young age because of discomfort and illness from heat and drought, the decreased quality and quantity of food provided by schools, and increased household livelihood pressures requiring them to work. Child labour affected an estimated 12.3% of children aged 5–14 in Timor-Leste in 2016 (CFE-DM 03/03/2022; US DOL accessed 02/05/2024; UNICEF accessed 03/05/2024).

Figure 1. Cumulative precipitation anomaly in Timor-Leste, October 2023 to January 2024



Source: WFP (23/04/2024)

## ANTICIPATED SCOPE AND SCALE

By the beginning of March 2024, dry conditions were forecast to continue in Timor-Leste throughout the remainder of the wet season and into the first months of the May–November dry season (FAO/OCHA 05/03/2024). On 26 April, seasonal forecasts indicated a 40–50% likelihood of below-average precipitation and over an 80% chance of above-average temperatures across the country from May–July 2024 (WMO accessed 26/04/2024; IRI accessed 03/05/2024).

Recent El Niño–Southern Oscillation (ENSO) outlooks anticipate a transition from El Niño to a neutral phase between April–June, with a 60% chance of La Niña developing from June–August 2024 (CPC 06/05/2024). La Niña typically leads to increased precipitation and flash flooding risks in Timor-Leste (ADB/WB 18/11/2021). During the transition from El Niño to La Niña, Timor-Leste is likely to experience concurrent dry conditions and extreme rainfall events, as well as above-average temperatures. While increased rainfall may bring relief to some farmers, potential flash floods and landslides will aggravate livelihood and WASH challenges – for example, by destroying crops and contaminating water sources (WFP 23/04/2024; IPC 29/02/2024).

The previous El Niño-induced drought in 2015–2016 affected nearly 80% of Timor-Leste’s population and caused over 40% to experience severe food insecurity (WFP 10/2023). Some communities are still experiencing the effects of this drought, indicating the potentially far-reaching impact of the current El Niño. For example, until March 2024, municipalities including Atauro, Dili, and Ermera still faced reduced water access because of unrepaired damage to irrigation channels from the 2015–2016 drought (IPC 29/02/2024).

## HUMANITARIAN ACCESS AND RESPONSE CONSTRAINTS

Nearly the entire road network in Timor-Leste needs rehabilitation, with 92% of roads categorised to be in poor or very poor conditions. Rainfall during the wet season worsens the condition of primary and secondary roads and cuts off access to many rural areas (Logistics Cluster accessed 02/05/2024). By October 2022, almost 72% of the population lived in rural areas (Govt. Timor-Leste 18/05/2023). Given low precipitation during the 2023–2024 rainy season, roads may be less affected than usual. That said, if La Niña causes floods and landslides from June–August, physical access to many parts of Timor-Leste will deteriorate (IPC 29/02/2024).

Telecommunications coverage is weak in some rural areas; in the past, this has prevented the dissemination of early warning messages to communities, including during the April 2021 floods (CFE-DM 03/03/2022). Communities in Timor-Leste also have minimal access to reliable weather forecast information, primarily relying on radio and social media. This has undermined preparedness for El Niño and will continue to hamper preparedness for extreme weather events and natural hazards in the coming months (WFP 23/04/2024).

## CRISIS IMPACTS

### Livelihoods

Below-average precipitation and heat stress have damaged crops and killed livestock across the country. This has significant livelihood impacts for the over 900,000 people (70% of the population) who rely on agriculture as their primary income source (WFP 23/04/2024; ADB/WB 18/11/2021). While rainfall has increased in Atauro, Bobonaro, Dili, Ermera, Lautem, and Oecusse municipalities since February 2024, leading to some improvement in crop health, this has not reversed the overall effects of a delayed, inconsistent, and insufficient rainy season (WFP 23/04/2024; FAO 04/03/2024).



Specifically, the lack of rain delayed and decreased the October 2023 to March 2024 planting and growing of rice, a staple crop in Timor-Leste, which already imports 45% of rice because of low domestic production. This is expected to cause a poor April–July main rice harvest (ADB 29/02/2024; WFP 23/04/2024; ACAPS accessed 26/04/2024; FAO 04/03/2024 and 23/10/2023). Above-average temperatures and low precipitation also delayed and decreased the October 2023 to January 2024 planting and growing of maize, the second staple food in Timor-Leste. This led to poor yields in the main maize harvest from February–April. Drought and high temperatures have also contributed to an outbreak in most municipalities of fall armyworms, which primarily affects maize and can cause significant crop losses (WFP 23/04/2024; ICAR 01/2019). This outbreak, in combination with persisting dry conditions during the first half of 2024, is expected to lead to a poor August–November off-season maize harvest (WFP 23/04/2024; ACAPS accessed 26/04/2024; FAO 04/03/2024 and 23/10/2023).

Cassava, coffee, pumpkin, nut, and taro were also planted late, in lower quantities, or not at all in some municipalities, including Ermera and Lautem (WFP 23/04/2024). Damage to coffee crops, which are particularly vulnerable to extreme heat and are Timor-Leste's primary non-oil export, may have wider economic impacts (ADB/WB 18/11/2021; ADB 29/02/2024). The extent of the current drought's damage to coffee crops is unknown.

The post-harvest season provides a full year's worth of income for many farming families in Timor-Leste, indicating the significant economic pressure that failed or reduced harvests can place on households. This will aggravate existing pressure resulting from factors including reduced economic growth in 2022–2023 and continuously high food prices throughout 2023 and the beginning of 2024. Between March 2023 and March 2024, 44% of the households in Timor-Leste saw decreased income, with the highest rates of decline in Covalima and Oecusse municipalities (IPC 29/02/2024; FAO 04/03/2024).

Women are at heightened vulnerability to the livelihood impacts of natural hazards, including drought, because of their constrained access to assets and credit, limited socio-economic opportunities, and exclusion from formal decision-making in Timor-Leste (ADB/WB 18/11/2021; Grameen Foundation 12/2021). Women are also less likely than men to receive agricultural extension services, which provide information and support to farmers (CARE et al. 30/06/2023). Women-headed households, which comprised almost 18% (around 45,000) of all households in October 2022, may be at particular risk of severe livelihood impacts (Govt. Timor-Leste 18/05/2023). Drought-induced livelihood pressures and associated household stress may also increase intimate partner violence, which is widespread in Timor-Leste (The Asia Foundation 18/05/2016).

## Food security and nutrition

The livelihood and agricultural impacts of El Niño-related precipitation and temperature anomalies will increase food insecurity and malnutrition in Timor-Leste. As people primarily rely on agriculture for subsistence, damaged and delayed crops will diminish household food stocks and leave households with less income to replenish supplies (ADB 29/02/2024; GDS/MAF 12/2018). Households are also facing food inflation because of globally high rice prices since mid-2023. These will continue to affect Timor-Leste into 2024, as above-average rice imports are required to meet the growing demand and population size (FAO 04/03/2024; IPC 29/02/2024).

In April 2024, 360,000 people (27% of the population) faced Crisis (IPC Phase 3) or worse food insecurity levels. These included 18,000 people facing Emergency (IPC Phase 4) levels, primarily in Ainaro, Ermera, Oecusse, and Viqueque municipalities, where household wealth is particularly low. El Niño-related drought and heat will drive a projected deterioration in food security from May–December 2024, with an additional 3,500 people facing IPC 4 and 500 facing IPC 3 levels. These increases will occur during the harvest season, when food security normally improves (IPC 29/02/2024).

Aileu, Baucau, Bobonaro, Covalima, Lautem, Liquica, and Viqueque are the municipalities most likely to experience decreased food security in the coming months. Baucau, Covalima, and Viqueque, which have some of the highest numbers of people facing IPC 3 or 4 food insecurity levels, also have the largest older rural populations, indicating a particular vulnerability to food insecurity among this demographic (IPC 29/02/2024).

Increased food insecurity will also have a disproportionate impact on children, who already experience high malnutrition rates. In 2020, almost 50% of under-five children experienced chronic malnutrition, with higher rates in rural (around 53%) than urban areas (around 36%) and the highest rates in Ermera (63%), Ainaro (60%), and Oecusse (57%) municipalities (UNICEF et al. accessed 29/04/2024).

Figure 2. November 2023 to April 2024 food insecurity in Timor-Leste

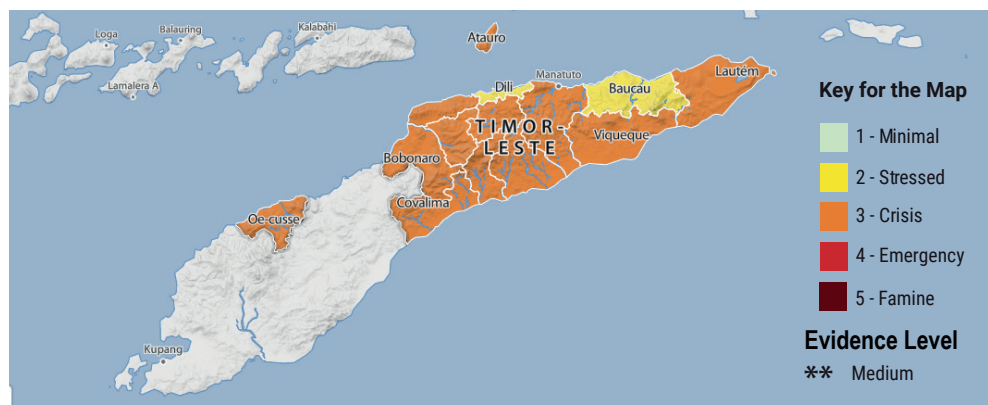
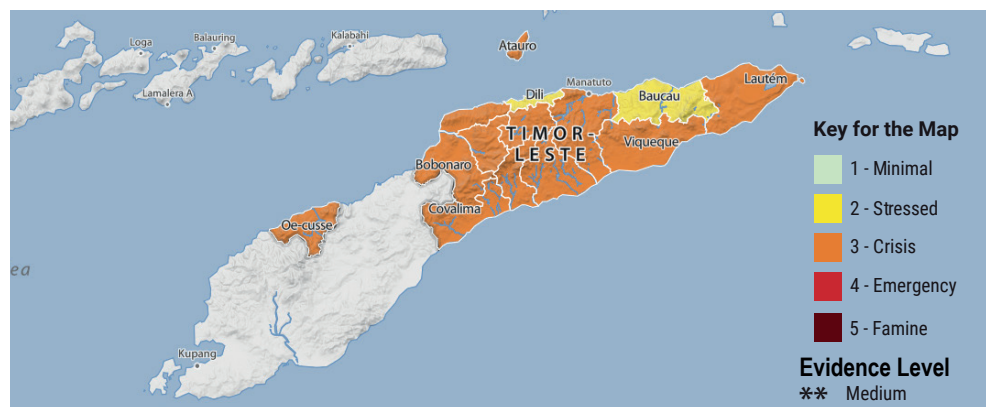


Figure 3. Projected food insecurity in Timor Leste (May–November 2024)



Source: IPC (29/02/2024)

## WASH

The drought has decreased water availability in many parts of Timor-Leste. By November 2023, communities in several municipalities, including Atauro, Dili, Ermera, and Oecusse, already lacked water suitable for washing, drinking, and sanitation. Some communities have had to purchase water, aggravating the drought's economic impact (WFP 23/04/2024).

Timor-Leste already faced limited drinking water access prior to the drought's onset. Coastal settlements rely on groundwater, which accounts for over 60% of the agricultural, industrial, and domestic water supply in the capital city of Dili, where nearly 25% of the Timorese population is concentrated (ADB/WB 18/11/2021; Govt. Timor-Leste 18/05/2023). Rising sea levels have contributed to saltwater intrusion in groundwater sources near the coastlines, threatening saline contamination (SPREP 04/03/2024). Poor water resource management and significant precipitation variability have also contributed to water scarcity throughout the country (CFE-DM 03/03/2022).

According to the October 2022 census, 13% of all households and nearly 20% of rural households used unimproved water sources, including rivers, streams, and unprotected wells. The drought has likely decreased the quality and quantity of water available in these sources. At the same time, nearly 20% of houses have unimproved sanitation facilities (around 25% in rural and 5% in urban areas), including almost 10% that practice open defecation (Govt. Timor-Leste 18/05/2023). Lack of water for hygiene practices, including flushing, may increase disease transmission, as discussed in the section on health below.

## Physical and mental health and psychosocial wellbeing

By the end of February 2024, Timor-Leste faced a triple outbreak of mosquito-borne diseases: dengue, Zika virus, and chikungunya (de Neri Machado et al. 10/04/2024; Tatoli 27/02/2024). There is no information on the status of these diseases by May 2024, but the current drought and heat may aggravate disease transmission. While mosquito-borne diseases often spike during the rainy season, with water accumulation facilitating mosquito breeding, the accumulation and storage of warm, stagnant water during droughts also increase breeding (Lowe et al. 04/2021). Children are at particularly high risk of developing severe dengue disease (UNICEF 01/09/2023).

While no information is available on whether heat and water scarcity has led to increased dehydration and diarrhoea in Timor-Leste, these health problems are common during drought, particularly among children and pregnant women (UNICEF accessed 03/05/2024; UNICEF 09/04/2024). Poor WASH access, aggravated by drought, can also increase the occurrence of these conditions.

Timor-Leste's healthcare system, which has limited capacity and is inaccessible to many rural communities, may struggle to cope with the health effects of drought. Poor road conditions prevent people from accessing Timor-Leste's national hospital in Dili or the five regional referral hospitals (CFE-DM 03/03/2022). During past dengue outbreaks, limited healthcare access has contributed to a high fatality rate (CFE-DM 03/03/2022; UN accessed 03/05/2024).

Drought and associated livelihood pressures may also increase mental health and psychosocial support (MHPSS) needs in affected communities. Extreme heat can cause irritability, depression symptoms, and other mental health and psychosocial problems (Thompson et al. 07/2023). Drought-induced livelihood impacts also increase problems such as stress and anxiety, which are already common because of economic pressures. A 2016 Asia Foundation study found that around 85% of the 840 men surveyed across the country felt frequent stress and distress because of insufficient work and income (The Asia Foundation 18/05/2016). The combined effect of the COVID-19 pandemic and the April 2021 floods increased employment- and income-related stress (CFE-DM 03/03/2022). MHPSS services are limited, with only two psychologists and one psychiatrist in the country by September 2022 (WHO 06/09/2022).

## Education

Heatwaves and water scarcity are associated with lower school attendance and lower concentration among children (UNICEF accessed 03/05/2024). Education outcomes in Timor-Leste are already poor, and attendance is not universal. According to the October 2022 census, around 21% of boys and 19% of girls aged 6–11, as well as 19% of boys and 15% of girls aged 12–17, did not attend school, with higher rates of boys not attending across both age groups (Govt. Timor-Leste 18/05/2023; CARE et al. 30/06/2023).

The drought's economic and agricultural impact may also decrease school attendance because of increased child labour, which is a common coping mechanism in response to livelihood stress. In 2016, it affected over 40,000 children aged 5–14 (12.3% of this population) in Timor-Leste. Partly in response to livelihood pressures, some rural families send their children to Dili and other cities for work, leading to some working as street vendors or carrying out other forms of hazardous work (CFE-DM 03/03/2022; US DOL accessed 02/05/2024).

The drought's agricultural impact may also disrupt the national school feeding programme, which already experiences frequent gaps and delays and provides poor-quality food, partly because of limited local agricultural production (CARE et al. 30/06/2023). This will aggravate food insecurity and child malnutrition. It may also affect school attendance if parents keep their children at home because of the lack of food in schools.

## DRIVERS

### El Niño-Southern Oscillation

ENSO heavily influences Timor-Leste's climate and can cause up to 50% variation in the timing and extent of precipitation from year to year (ADB/WB 18/11/2021). The two extreme phases of ENSO, La Niña and El Niño, are both associated with precipitation anomalies in the country. El Niño, which particularly affects northern municipalities, typically triggers a reduction in annual precipitation and a contracted rainy season, usually from December–February rather than November–March. La Niña typically brings above-average annual precipitation, an extended wet season, and higher rainfall during the dry season (Bacon et al. 10/10/2013).

## COMPOUNDING FACTORS

### Climate change and natural hazards

Timor-Leste ranks 122nd among the 181 countries in the Notre Dame Global Adaptation Initiative Index, with a score of 43.7/100. This indicates a high degree of climate vulnerability and limited readiness to enhance resilience. The country's agricultural capacity to face climate shocks is particularly low (ND-GAIN accessed 05/05/2024).

Climate change is contributing to increasingly erratic precipitation, more extreme rainfall events, and higher temperatures. It is projected that, even in lower-emission scenarios, Timor-Leste will have up to 100 additional days per year with the temperature measuring over 35° C by 2099 (ADB/WB 18/11/2021; CFE-DM 03/03/2022). Climate change is also increasing the likelihood of extreme weather events associated with ENSO, with strong El Niño and La Niña events occurring more frequently than the pre-1960 average (Cai et al. 18/05/2023). At the same time, it is enhancing ENSO variability, and more frequent swings from a strong El Niño to a strong La Niña are anticipated in the future (NOAA 27/07/2023).

The population's socioeconomic vulnerability to natural hazards also increases the risk of severe impacts from cyclones, earthquakes, tsunamis, heatwaves, and heavy rainfall (ADB/WB 18/11/2021). Floods are the most frequent hazards and generally result in the most severe humanitarian impacts (CFE-DM 03/03/2022).

Heavy rainfall from 29 March to 4 April 2021 caused flash floods and landslides across Timor-Leste, with the worst impact in Dili. The disaster affected over 151,000 people in over 30,000 households, more than 80% of which were in Dili, and damaged over 4,200 homes. Effects were also intense in Covalima, Liquica, and Manatuto municipalities (UN RC Timor-Leste 16/07/2021; CVTL 07/01/2022). Communities affected by these floods continue to face high WASH, nutrition, and education needs, decreasing their capacity to cope with additional disasters, including El Niño-related drought (UNICEF 20/02/2024).

### Fragile economic situation and high poverty rates

Timor-Leste's fragile economic situation and high poverty rates aggravate the impact of disasters and undermine effective state response. Following a period of constrained growth because of climate shocks, political instability, and COVID-19, Timor-Leste's economy has strengthened since 2022 and is expected to continue growing. That said, frequent climate hazards and the impacts of El Niño threaten to disrupt this growth (ADB 11/04/2024).

The economy depends on oil, which provides around 90% of government revenue (ADB/WB 18/11/2021). This industry contributes little to domestic job creation, as oil is processed abroad (CFE-DM 03/03/2022). Overall labour force participation is low at 42% for men and 30% for women in October 2022 (Govt. Timor-Leste 18/05/2023). By April 2024, 42% of the people in Timor-Leste lived below the poverty line (UNDP accessed 03/05/2024).

High inflation and an import-dependent economy aggravate economic pressures on households. Around 60% of Timor-Leste's cereal supplies are imported, primarily from mainland China, India, and Vietnam (FAO 04/03/2024). In December 2023, Timor-Leste saw the highest inflation levels within a decade as a result of globally high rice prices throughout the second half of the year (IPC 29/02/2024). High rice prices are likely to continue affecting Timor-Leste into 2024 because of above-average rice imports required to meet the growing demand and population size (FAO 04/03/2024).

## HUMANITARIAN RESPONSE AND FUNDING SITUATION

In January 2024, the Government of Australia provided close to USD 3.3 million to preposition NFIs, support water storage, and enhance food security in response to El Niño-induced drought in Timor-Leste (Govt. Australia 30/01/2024).

In February 2024, the UN launched a USD 2 million emergency grant to fund food, water, nutrition, and agricultural assistance to the people affected by El Niño in Bobonaro, Covalima, Ermera, Liquica, and Manufahi municipalities. FAO, UNICEF, and WFP are implementing the grant (FAO et al. 02/02/2024).

In October 2023, Timor-Leste's Civil Protection Authority and FAO began drought management training sessions in various municipalities (WFP 31/10/2023).

In Dili, mutual community aid is a prevalent coping strategy (WFP 23/04/2024).

Insufficient coordination, early warning, and resources have characterised the response to past disasters, including the April 2021 floods. Institutional frameworks for disaster risk management and information management by the Ministry of the Interior's Secretary of State for Civil Protection are lacking (CFE-DM 03/03/2022; UNDRR 29/01/2022; GFDRR/WB 23/01/2022). These gaps may contribute to weaknesses in the response to the current drought.