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In May-June 2022, 130 people died in landslides and floods caused by heavy rain in the Metropolitan Region of Recife, northeastern Brazil Short report.

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1. General description

Recife (8° 04' 03" S and 34° 55' 00" W) is the capital of the state of Pernambuco, located in the Northeast Region of Brazil. This city is located on an alluvial plain along the Atlantic Ocean coast, with many islands, peninsulas and mangroves, and its mean altitude above sea level is 4 m.

Table 2 shows the number of human deaths and monthly rainfall in May and June of the municipalities that lost human lives. The municipality of Jaboatão dos Guararapes had the highest number of human deaths followed by Recife. Therefore, it is clearly noted that the border between these two municipalities, which is characterized by hills and cliffs, was more severely affected. Figure 1 shows the locality of the Metropolitan Region of Recife and its 14 municipalities.

Table 2 ï Numbers of human deaths and monthly rainfall of May and June for each municipality.

Municipality	**No. death**	**Monthly rain in May (mm)**		**Monthly rain in June (mm)**	
		2022	**Average**	**2022**	**Average**
Camaragibe	7	684.5	294.6	393.5	339.1
Jaboatão dos Guararapes	64	675.0	310.1		

Based on information presented by Aguiar (2022) that examined public data from various public agencies, the breakdown of fatalities data by category is briefly demonstrated in Table 3. It is clearly observed that this disaster in Recife in 2022 was predominantly characterized with shallow landslides which caused 121 deaths. Figure 2 shows the typical scene of shallow landslide (hillslope failure) which occurred at the border between the

2. Rainfall characteristics

The rainy season of the Metropolitan Region of Recife usually runs from April to July, with June and July being the rainiest months in the region. Accumulation of heavy rain during this period is natural. In other words, the rainy season had already started in this region at the moment the disaster struck. In addition to the onset of the rainy season, there were three other factors contributing to the intensification of the storm.

(i) The La Niña phenomenon: The anomalous cooling of the waters of the equatorial Pacific causes the intensification of the trade winds and, consequently, intensifies the rains in the Northeast region in 2022.

(ii) Easterly Waves (EWs): They form on the African coast, reach the Brazilian Northeast coast and meet warm waters. This meeting serves as if it were fuel to intensify these rain waves which are even more charged. It is considered as one of the most important weather systems to the total rainfall over many tropical regions. They can be defined as synoptic disturbances associated with troughs and warm sea surface temperature (Machado et al., 2012; Cheng et al., 2019; Silva et al., 2020; Enyew and Mekonnen, 2022). The EWs generate Eastern Wave Disturbances that advance through the tropical region of the African continent towards the Americas, often giving rise to tropical storms and hurrica41.92 r2 Tf1 0 0 1 520.54 501.07 Tm0 g0 G[(t)]TJ summoning more than 3,000 municipal civil servants to work on duty from the same day. In addition, this Agency sent the alert to over 32,000 families living in at-risk areas via Short Message Service (SMS). On the other hand, Madeiro (2022) reported the comments of community leaders:

At first, poorer people generally began to live in vulnerable areas, especially in coastal, wetlands and mangrove areas. These areas are naturally susceptible to (coastal) flood. Through such a population settlement history, inhabitants in Recife frequently suffered from large and strong floods. Two largest flood disasters occurred in 1966 and 1975 (Table 5). Alves (2022) reported that, in the past, poor people lived in wetlands or floodplains and many of them were evacuated and transported to hillslopes and cliffs. Carrying out interviews with various experts in Recife, this author

References