This study examines whether Non-Performing Finance (NPF) functions as an early-warning indicator of operational stress in Islamic banks operating in SSA. Departing from conventional efficiency-determinant approaches, the study conceptualises operational efficiency as a diagnostic manifestation of internal stress transmission rather than a measure of managerial performance. The analysis employs a Simar–Wilson two-stage Data Envelopment Analysis framework to generate bias-corrected efficiency scores for a balanced panel of fully-fledged Islamic banks over the period 2010–2024, followed by two-way fixed-effects panel regression to assess the early-warning role of lagged NPF. The results show that increases in NPF systematically precede subsequent declines in operational efficiency, indicating that asset quality deterioration is transmitted internally through higher monitoring, restructuring, and Sharīʿah governance costs. The findings further reveal that such asset-quality-induced operational stress is persistent and more pronounced in structurally constrained banking environments. By reframing NPF as a forward-looking supervisory trigger and efficiency as a stress indicator, the study provides novel evidence for regulators and monetary authorities seeking to enhance early-warning frameworks in Islamic banking systems globally today.