Drought years in North Kano, Nigeria

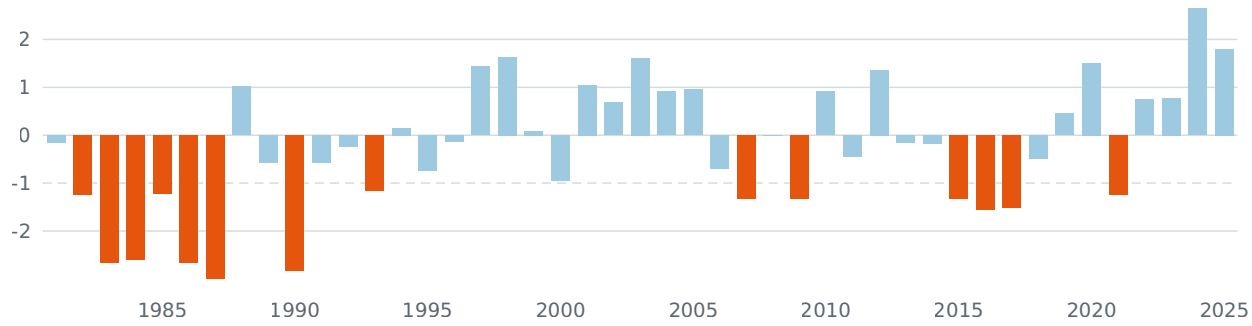
The drought Baseline's rainfall step (D1, SPI from CHIRPS v3) on seven rural LGAs north of Kano, against the drought years named in published studies of the region.

> **Draft, not yet independently reviewed (2026-11-22).** Numbers come from `case_study_nigeria.json` (`manage.py case_study_drought`, code 7084162). The comparison was written down before any drought number was computed: docs/drought-validation/plan.md (commit 9961834). It is descriptive, with no pass mark: the references are station-based or region-wide, and only their abstracts could be read.

What was compared

- **Ours:** North Kano (3,798 km²), 1981 to 2025. A drought year is a year with December SPI-12 at or below −1 (a dry year), or June-September SPI-4 at or below −1 (a dry rainy season).
- **Olasore et al. (2021):** eight Sudano-Sahelian stations including Kano, 1981-2015; drought periods 1982-1989, 1992-2002 and 2008-2011.
- **Ekundayo et al. (2020):** Sudano-Sahelian Nigeria, 2000-2010; extreme drought by the vegetation health index in 2003 and 2010, none by SPI-12.
- **Salami et al. (2026):** 48 stations including Kano, CHIRPS SPI 1981-2019; severe droughts clustered in the 1980s, 2000s and 2010s.

Results



North Kano, December SPI-12 per year. Orange: at or below −1 (dashed line).

Our drought years: 1982, 1983, 1984, 1985, 1986, 1987, 1990, 1991, 1993, 2007, 2009, 2015, 2016, 2017, 2021 (dry year: 1982, 1983, 1984, 1985, 1986, 1987, 1990, 1993, 2007, 2009, 2015, 2016, 2017, 2021; dry rainy season: 1982, 1983, 1984, 1985, 1986, 1987, 1990, 1991, 2007, 2009, 2016, 2017).

Reference	Agrees	Differs
Olasore et al. (2021), eight Sudano-Sahelian stations incl. Kano, 1981-2015	1982, 1983, 1984, 1985, 1986, 1987, 1993, 2009 fall in their drought periods, but no more often than chance: their periods cover 66 % of the years 1981-2015, and 67 % of our drought years fall in them	1990, 1991, 2007, 2015 are ours only
Ekundayo et al. (2020), Sudano-Sahelian Nigeria 2000-2010	Like their SPI-12, ours finds no extreme year (SPI-12 ≤ −2) in 2000-2010	Their vegetation index named 2003 and 2010; our rainfall years in 2000-2010 are 2007 and 2009

Salami et al. (2026), 48 stations incl. Kano, CHIRPS SPI 1981-2019	Our years by decade: 1980s: 6; 1990s: 3; 2000s: 2; 2010s: 3; 2020s: 1	Ours also has years in the 1990s and the 2020s

What it shows

- **One clear result: the long Sahel drought of the 1980s.** Every year from 1982 to 1987 is a drought year here, as in all three references.
- **Beyond that, the match with Olasore et al. is no better than chance.** Their drought periods cover 23 of the 35 years 1981-2015 (66 %), and 8 of our 12 drought years in that span fall inside them (67 %). With a third of all years counted as drought, "each of their periods holds one of our years" was almost certain.
- Ekundayo et al.'s 2003 and 2010 droughts (from vegetation) don't show in our rainfall, matching their own finding that SPI-12 showed none.
- A drought year here is a year that meets *either* criterion (December SPI-12 or rainy-season SPI-4 at -1 or less), which raises the count.
- The 1991-2020 normal is wetter than the 1980s, because Sahel rain recovered after the droughts of the 1970s and 1980s, so the early years read drier partly for that reason. CHIRPS also has fewer rain gauges before about 2000.

Limits

- Only the abstracts of the references could be read; their full texts are paywalled or the link is broken. The comparison uses the years and periods the abstracts name.
- The references use stations or the whole region; ours is the area's average of 0.05° CHIRPS cells.
- The vegetation step (D2) is not compared here: no published monthly vegetation series for this area was found.