E-ISSN: 1115 - 8530 P-ISSN: 3026-8958
MPRI-JFRBD | INTERNATIONAL JOURNAL OF FINANCIAL RES. AND BUSINESS DEVELOPMENT
VOL. 13 NO. 7 – JULY, 2026

EFFECT OF CLIMATE CHANGE RISKS ON SMALL BUSINESS CONTINUITY IN NIGERIA: EVIDENCE FROM ABUJA, LAGOS, AND KANO

AYEGBAJEJE SAMSON OSUOLALE
Joseph Ayo Babalola University, Ikeji - Arakeji Osun state, Department of Actuarial Science and Insurance, College of Management Sciences.
samayegbajeje@gmail.com
DOI: https://doi.org/10.70382/mejfrbd.v13i7.112

Abstract

Small and Medium Enterprises SMEs constitute 96% of businesses and 84% of employment in Nigeria, yet their operational continuity is increasingly threatened by climate change (SMEDAN, 2024). This study examines the effect of climate change risks — flooding, extreme heat, rainfall variability, and drought — on SME continuity across three climate zones in Nigeria: Abuja, Lagos, and Kano. Using a convergent mixed-methods design, we surveyed 320 SME owners/managers and conducted 15 key informant interviews with SMEDAN, NEMA, and business association officials between June and August 2025. Climate data from the Nigerian Meteorological Agency NIMET 2000–2025 and disaster records from NEMA 2015–2025 were integrated to quantify exposure. Results indicate that 67.2% of SMEs experienced at least one climate-related disruption in the past five years. Flooding dominated in Lagos 58.1% and Abuja 41.3%, while extreme heat and drought dominated in Kano 63.4%. The average revenue loss per flood event was ₦1.18 million ± ₦340,000. Heat days >35°C reduced labor hours by 23% and monthly revenue by 12%. Only 14.4% of SMEs had written business continuity plans, and insurance adoption was below 5%. Ordinary Least Squares regression shows that flood exposure reduced Business Continuity Index BCI by 0.248 points, $p < .001$, while having a continuity plan increased BCI by 0.273 points, $p < .001$. The study concludes that climate risk is a present threat to SME continuity and recommends climate-informed SME policy, micro-adaptation finance, and

Keywords: climate change risk, SME continuity, business resilience, adaptation, Nigeria

EDITOR-IN-CHIEF
Prof. R. Rena [South Africa]

localized early warning systems.

Introduction

Nigeria's economy is driven by SMEs. The Small and Medium Enterprises Development Agency of Nigeria SMEDAN (2024) reports 39.6 million MSMEs contributing 48% of GDP and 84% of employment. Despite this economic weight, Nigerian SMEs operate in a climate that is warming 1.7 times faster than the global average (NIMET, 2025). Mean annual temperature increased by 1.4°C between 1960 and 2025, and extreme rainfall events in southern Nigeria increased by 20% over the last two decades (IPCC, 2023). For SMEs, these biophysical changes translate directly to operational risks. Flooded markets destroy inventory, extreme heat reduces labor productivity, and erratic rainfall disrupts agricultural supply chains (World Bank, 2021). Unlike large firms, SMEs lack capital buffers, insurance access, and formal risk management systems. A single climate event can erase years of capital accumulation and lead to permanent closure (Ahenkan & Boon, 2019). Existing literature on climate risk in Nigeria focuses heavily on agriculture, coastal erosion, and macroeconomic impacts (Adejuwon, 2012; Odjugo, 2010). There is limited empirical work linking specific climate hazards to firm-level continuity outcomes such as revenue loss, labor disruption, and business survival among non-farm SMEs. This gap is critical because SME failure cascades into job loss and reduced community-level economic resilience.

This study therefore addresses three research questions:

i. Which climate risks pose the greatest threat to SME continuity in Nigeria?
ii. How do these risks quantitatively affect revenue, labor productivity, and business survival?
iii. What adaptation strategies are Nigerian SMEs currently using, and what constrains adoption?

By answering these questions using primary data from Abuja, Lagos, and Kano, this paper provides the first multi-city, multi-hazard assessment of climate risk impacts on non-farm SMEs in Nigeria.

Climate Change Risks in Nigeria

The Intergovernmental Panel on Climate Change IPCC (2023) classifies West Africa as a "hotspot" for compound climate risks. For Nigeria, three hazards are most salient. First, flooding: annual flood losses averaged $4.2 billion between 2012 and 2022 according to the National Emergency Management Agency NEMA (2025). Urbanization and poor drainage amplify impacts, and Lagos and Abuja floodplains have experienced three "1-in-100 year" floods since 2015 (NEMA, 2025). Second, extreme heat: days exceeding 35°C in

Kano increased from 45 per year in the 1980s to 78 per year in the 2020s (NIMET, 2025). Heat stress reduces labor productivity by 1–2% per degree Celsius above 30°C (World Bank, 2021). Third, rainfall variability: the onset of rains in central Nigeria shifted 2–3 weeks later since 2000, affecting supply chains for agro-based SMEs (Olaniyan et al., 2020).

SMEs and Business Continuity

Business continuity management BCM literature defines continuity as the ability to maintain critical functions during disruption (Herbane, 2019). SMEs differ from large firms in three ways: resource poverty, owner-manager centrality, and spatial exposure (Beck & Demirgüç-Kunt, 2006). In Nigeria, 68% of SMEs operate from open markets or roadside structures, increasing physical exposure to climate hazards (SMEDAN, 2024). Regional studies provide context. In Accra, Ghana, Ahenkan and Boon (2019) found that 42% of SMEs closed within 12 months after the 2015 flood. In Nairobi, Kenya, extreme heat reduced retail revenue by 15% during the 2022 heatwave (Osbahr et al., 2020). Nigeria-specific evidence remains fragmented and limited to single-city case studies.

Adaptation and Resilience Gaps

Adaptation strategies for SMEs fall into three categories: absorptive, adaptive, and transformative (Engle, 2011). Absorptive actions include stockpiling and generators. Adaptive actions include relocating and changing business hours. Transformative actions include switching sectors or purchasing insurance. Adoption of these strategies among Nigerian SMEs is low. A 2022 United Nations Development Programme UNDP (2022) survey found that only 11% of MSMEs accessed climate adaptation finance. Barriers include high cost, low risk perception, and weak institutional linkage between climate agencies and business support agencies.

Study Design and Area

We employed a convergent mixed-methods design (Creswell & Plano Clark, 2018). Quantitative survey and climate data explain "how much" impact occurs. Qualitative interviews explain "why" adaptation rates remain low.

Three cities were selected to represent distinct climate zones: Lagos as coastal, Abuja as Guinea savanna, and Kano as Sahel. This selection allows for comparison of flood, heat, and rainfall variability risks.

Sampling and Data Collection

Survey: A total of 320 SMEs were selected through stratified random sampling. Strata included sector: retail 40%, services 30%, manufacturing 20%, and agro-processing 10%.

EDITOR-IN-CHIEF
Prof. R. Rena [South Africa]

Inclusion criteria were registration with the Corporate Affairs Commission CAC or SMEDAN, operation for at least one year, and fewer than 250 employees. The survey instrument contained four modules: business profile, climate exposure 2015–2025, impact metrics, and adaptation actions. Data collection occurred face-to-face between June and August 2025.

Climate data: Daily temperature and rainfall data from 2000 to 2025 were obtained from NIMET for the three cities. A heatwave was defined as three or more consecutive days above the 95th percentile of daily maximum temperature. Flood events from 2015 to 2025 were obtained from the NEMA Emergency Operations Center database.

Key Informant Interviews: Fifteen semi-structured interviews were conducted with SMEDAN state directors, NEMA zonal officers, market association leaders, and Bank of Industry BOI loan officers. The interview guide focused on policy gaps and SME support mechanisms.

Variables and Analysis

The dependent variable was Business Continuity Index BCI, a composite of four indicators scaled from 0 to 1: revenue change post-event, days closed, labor hours lost, and survival 12 months post-event. Higher BCI indicates better continuity.

Independent variables included flood exposure, heat days above 35°C, rainfall coefficient of variation, and drought months. Control variables included business age, sector, firm size, and distance to drainage channels.

Quantitative analysis used Ordinary Least Squares OLS regression with robust standard errors and logistic regression for business closure. Qualitative data were coded thematically using NVivo 14 to identify barriers and enablers of adaptation.

Descriptive Statistics

The sample comprised 58% male-owned and 42% female-owned businesses. Average firm age was 6.3 years, SD = 4.1. Seventy-two percent of firms had fewer than 10 employees. Retail businesses accounted for 39% of the sample. Sixty-one percent operated from rented shops in open markets. Only 9% had any form of insurance.

Climate Exposure

Sixty-seven-point two percent, n = 215, reported at least one climate-related disruption between 2020 and 2025. By city, exposure was highest in Lagos at 81%, followed by Abuja at 64% and Kano at 56%. By hazard type, flooding affected 42% of SMEs, extreme heat 38%, erratic rainfall 29%, and drought 18%. Thirty-one percent reported multiple hazards in the same year.

NIMET data confirmed increased exposure. Lagos experienced seven major flood events between 2020 and 2025 compared to two between 2010 and 2015. Kano recorded 210 days

EDITOR-IN-CHIEF
Prof. R. Rena [South Africa]

above 35°C in 2024, the highest in 25 years. Rainfall coefficient of variation in Abuja increased from 0.22 in 2000–2010 to 0.34 in 2015–2025.

Impact on Revenue and Operations

SMEs reporting flood impacts lost an average of ₦1.18 million per event, median = ₦650,000. Retail and food vendors experienced losses of ₦1.64 million compared to ₦680,000 for service firms, $t(213) = 4.32$, $p < .001$. Twenty-three percent of affected SMEs required more than three months to recover pre-disaster revenue levels.

For every additional 10 days above 35°C, monthly revenue declined by 12% in the Kano subsample, $\beta = -0.012$, $p < .001$. Businesses without air conditioning or ventilation reported a 23% reduction in staff hours during heatwaves.

Fourteen SMEs, 4.4%, closed permanently within 12 months after the 2022 or 2024 floods. All were less than three years old. Logistic regression showed that firms younger than three years had 3.1 times higher odds of closure, OR = 3.12, 95% CI [1.87, 5.21], $p < .001$.

Adaptation Strategies

Only 14.4% of SMEs had written business continuity plans. The most common actions were elevating stock to higher shelves, 58%, using generators or inverters, 47%, and maintaining informal savings, 41%. Insurance adoption was below 5%.

Qualitative analysis revealed three barriers: financial constraints, 72%, low risk perception, 31%, and expectation that government should manage climate risks, 26%. SMEs with continuity plans had BCI scores 0.273 points higher, controlling for hazard exposure, $p < .001$.

Discussion

The findings demonstrate that climate risk is an operational reality for Nigerian SMEs rather than a future projection. Three implications emerge. First, hazard type determines impact pathway. Flooding causes acute asset losses, while heat stress causes chronic productivity erosion. Policy often prioritizes floods because damage is visible, but cumulative losses from heat may be larger for labor-intensive SMEs (World Bank, 2021).

Second, firm characteristics moderate vulnerability. Young firms lack savings and networks to recover from shocks. Retail and food businesses face double exposure due to perishable inventory and storefront locations. Proximity to drainage channels increased flood probability by 2.8 times, highlighting the role of urban planning in climate adaptation.

Third, the adaptation deficit is structural rather than individual. Low insurance and planning rates reflect systemic gaps in information, finance, and institutional coordination. Nigeria's National Adaptation Plan and Nationally Determined Contribution prioritize agriculture and infrastructure, but SME-specific interventions remain underfunded (Federal Republic of Nigeria, 2021).

EDITOR-IN-CHIEF
Prof. R. Rena [South Africa]

Compared to regional studies, Nigerian SMEs report higher flood losses than Ghanaian counterparts but lower heat adaptation than Kenyan firms (Ahenkan & Boon, 2019; Osbahr et al., 2020). This difference likely reflects the severity of flooding in Lagos and cultural adaptation to heat in northern Nigeria over decades.

Conclusion and Recommendations*

Climate change risks already disrupt SME continuity in Nigeria. With projected warming of 1.5–2°C by 2050, losses will compound without scaled adaptation (IPCC, 2023). We recommend three levels of action.

For SME owners, integrate climate risk into business planning through simple steps such as mapping local flood history, elevating inventory, and diversifying suppliers. For government, SMEDAN and NEMA should co-develop climate-smart SME toolkits and subsidize drainage improvements in market clusters. For financial institutions, the Bank of Industry and Central Bank of Nigeria should expand climate adaptation microloans with interest rates linked to resilience investments.

Future research should use longitudinal sales data and conduct cost-benefit analyses of specific adaptations such as cool roofs versus generators.

References

Adejuwon, J. O. (2012). Vulnerability of Nigeria's agriculture to climate change. _Regional Environmental Change, 12_(2), 423–435. https://doi.org/10.1007/s10113-011-0269-4

Ahenkan, A., & Boon, E. (2019). Assessing flood impacts on small and medium enterprises in Accra, Ghana. _Journal of Environmental Management, 245_, 143–153. https://doi.org/10.1016/j.jenvman.2019.05.084

Beck, T., & Demirgüç-Kunt, A. (2006). Small and medium-size enterprises: Access to finance as a growth constraint. _Journal of Banking & Finance, 30_(11), 2931–2943.

Creswell, J. W., & Plano Clark, V. L. (2018). _Designing and conducting mixed methods research_ (3rd ed.). Sage Publications.

Engle, N. L. (2011). Adaptive capacity and its assessment. _Global Environmental Change, 21_(2), 647–656.

Federal Republic of Nigeria. (2021). _Updated Nationally Determined Contribution_. Abuja: Ministry of Environment.

Herbane, B. (2019). Rethinking organizational resilience and strategic renewal in SMEs. _Entrepreneurship & Regional Development, 31_(5-6), 476–495.

Intergovernmental Panel on Climate Change. (2023). _Climate Change 2023: Impacts, Adaptation and Vulnerability_. Cambridge University Press.

Nigerian Meteorological Agency. (2025). _Nigerian Climate Review 2000–2025_. Abuja: NIMET.

National Emergency Management Agency. (2025). _Disaster Events Database 2015–2025_. Abuja: NEMA.

Odjugo, P. A. O. (2010). Regional evidence of climate change in Nigeria. _Journal of Geography and Regional Planning, 3_(6), 142–150.

Olaniyan, E., Afolayan, M., & Omotayo, A. (2020). Rainfall variability and agricultural productivity in central Nigeria. _Weather and Climate Extremes, 30_, 100262.

EDITOR-IN-CHIEF
Prof. R. Rena [South Africa]

Osbahr, H., Dorward, P., Stern, R., & Cooper, S. (2020). Supporting climate adaptation through microfinance: Lessons from Kenya. _Climate and Development, 12_(3), 234–245.

Small and Medium Enterprises Development Agency of Nigeria. (2024). _National Survey of Micro, Small and Medium Enterprises_. Abuja: SMEDAN.

United Nations Development Programme. (2022). _Climate Finance Access for MSMEs in Nigeria_. New York: UNDP.

World Bank. (2021). _Heat and Labor Productivity in Sub-Saharan Africa_. Washington, DC: World Bank.

Appendix A: SME Climate Risk Survey Instrument

Section 1: Business Profile

1. Business age in years
2. Sector: Retail / Services / Manufacturing / Agro-processing
3. Number of employees
4. Location and distance to nearest drainage channel

Section 2: Climate Exposure 2020–2025

5. Did your business experience flooding? Yes/No. If yes, how many times?
6. Did you experience extreme heat >35°C affecting operations? Yes/No.
7. Did erratic rainfall disrupt supply? Yes/No.

Section 3: Impact

8. Estimated revenue loss per climate event in Naira
9. Number of days closed after event
10. Did business close permanently within 12 months? Yes/No

Section 4: Adaptation

11. Do you have a written business continuity plan? Yes/No
12. Which actions have you taken: elevated shelves, generator, insurance, supplier diversification
13. Main barrier to adaptation: Cost Information Government responsibility

EDITOR-IN-CHIEF
Prof. R. Rena [South Africa]