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# Unequal bonds: social capital, equity and displacement outcomes in Nigeria

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With the growing intensity of climate change, alongside increasing conflicts, terrorism, and development-induced evictions, displacement has become more prevalent—particularly among vulnerable communities. Existing studies on displacement and social capital have examined how displacement affects social capital and how social cohesion can enhance resilience. However, few have explored how the impacts on social capital vary by displacement type and across equity dimensions. This brief report, part of a larger study investigating the drivers and impacts of displacement, examines the effects of social capital and equity dimensions on four types of displacement: environmental, political, economically driven, and conflict-driven. Using a multi-stage sampling method, 400 questionnaires were administered to displaced individuals across the six area councils of Abuja, Nigeria, proportionate to population size. Preliminary findings reveal that social capital has the most significant impact on economic-driven displacements and that social capital is negatively associated with environmental displacement. Across displacement types, men are more likely to be displaced, especially economic displacements. Homeownership, age, and education level show inconsistent associations with displacement type. The preliminary findings highlight the crucial role of social capital and equity-related socioeconomic variables in shaping exposure to different types of displacement. This preliminary report offers recommendations to inform the broader ongoing study and underscores the importance of resilience-building for both environmental- and non-environmental-related displacements.

## KEYWORDS

social capital, environmental displacement, political displacement, equity, Nigeria

## 1 Introduction

A growing body of evidence indicates that the effects of displacement can endure across generations, impacting household income, access to land and vital resources, community identity, and both physical and mental wellbeing (Tilt and Gerkey, 2016). Displaced individuals often face greater challenges than host populations in securing employment and are frequently marginalized from formal economic systems (Lucci et al., 2016). Moreover, families struggle to raise their children in accordance with cultural values and traditions, which are frequently undermined by environmental stressors and prolonged interactions with host communities (Joel, 2023). Displacement also brings significant socioeconomic burdens, disrupting educational continuity, threatening occupational stability, restricting access to essential infrastructure, and deteriorating health, social networks, and community cohesion. Vulnerable populations, including children, orphans,

and the elderly, are sometimes separated from extended family and community-based support systems (Joel, 2023). Additionally, displacement often results in the destruction or abandonment of cultural heritage sites, including temples, shrines, sacred landscapes, artifacts, and traditional buildings (Joel, 2023).

Human displacement stems from a variety of causes, broadly classified into three main categories: conflict-induced, disaster-induced, and development-induced (Brokerhoff and McDowell, 1998; Carlotti, 2021). These causes can be further understood through two conceptual frameworks: risk displacement and adaptation displacement (Carlotti, 2021; Robinson, 2003). Displacement of risk refers to forced migration in response to escalating threats such as conflict, disasters, or deportation (Zaman et al., 2020). In contrast, displacement of adaptation often involves more voluntary or strategic migration driven by environmental pressures or development policies (Wang et al., 2020). While conflict remains a predominant driver of forced displacement, the ongoing climate crisis is increasingly a sustained cause of population movement. Over the past 11 years, natural hazards have accounted for a greater proportion of internal displacement than armed conflict (Myers et al., 2024). Among climate-related hazards, flooding is the most prevalent, accounting for nearly one-third of all global geophysical disasters and contributing significantly to morbidity and mortality (Amoo et al., 2018; Kreibich et al., 2010; Ogunwumi and Ihinegbu, 2025; Okunola et al., 2024).

Social capital refers to the ties (formal and informal) between internal and external stakeholders within a given economic, social, geographical, and cultural context (Carrasco et al., 2024). In crisis contexts, such as disasters, conflicts, and displacement, social capital becomes pivotal to community connectedness, providing safety nets that help people cope with and adapt to the stresses of displacement (Carrasco et al., 2023; Woldehanna et al., 2024). Woolcock (2001) distinguishes between three types of social capital: bonding, bridging, and linking. Bonding capital refers to the connections between people with close ties, such as family members or those in tightly knit groups (Leonard, 2004). Bridging social capital refers to connections between individuals who do not share family or friendship ties but share similar socioeconomic conditions, perspectives, hardships, and context (Leonard, 2004). Linking social capital encompasses connections between people and external groups, organizations, authorities or government agencies (Akama et al., 2014). Key dimensions of social capital, including social interactions, networks, trust, reciprocity, perceived safety, and a shared sense of place, are particularly fragile in the face of large influxes of displaced populations (Dempsey et al., 2011). Initial encounters between host communities and displaced persons are often marked by distrust, and meaningful relationships tend to develop slowly over time. In many cases, an increase in social vices such as alcoholism, gambling, theft, and prostitution is observed. Displacement directly affects the social and psychological wellbeing of individuals, often through experiences of violence and trauma (Oyefara and Alabi, 2016). Displacement, whether driven by conflict, disasters, or development, disproportionately affects individuals based on key social equity indicators, including gender, income, age, education, settlement type, and health status. These forms of displacement tend to follow similar patterns of vulnerability, with natural hazards (e.g., floods) causing more

immediate damage to lives and property (Myers et al., 2024). Studies have shown that women are the most affected by displacement from a health perspective (Adejumo et al., 2021; Joel, 2023; Tadesse et al., 2024). Men, on the other hand, suffer more from infrastructural damage, a reduction in income, and are most likely to be displaced from place to place (Adejumo et al., 2021). Displaced men may also suffer from feelings of powerlessness and insecurity, which can lead to anxiety, idleness, domestic violence, and alcohol abuse (Oyefara and Alabi, 2016), in some instances, sexual molestation and rape (Best, 2007; Bonkat, 2014). Meanwhile, rural/last-mile settlements are more affected by displacement than urban centers (Ogunwumi and Ihinegbu, 2025). Accordingly, displacement exhibits differential impacts across socioeconomic groups, and addressing displacement should prioritize equity.

In Nigeria, research has consistently identified the primary drivers of displacement as both political—namely conflict and development-related activities—and environmental, such as floods and droughts (Joel, 2023; Madu and Nwankwo, 2020; Nwankwo, 2022; Ogunwumi and Ihinegbu, 2025; Week and Wizor, 2020). Over the past decade, conflict and flooding have emerged as the most significant causes of large-scale displacement, often reinforcing one another in a cyclical cause-and-effect relationship. Prolonged conflict has heightened communities' vulnerability to natural hazards, while the occurrence of natural disasters has, in turn, intensified conflict in various parts of the country (Basheer and Elagib, 2024; Ide et al., 2020; Madu and Nwankwo, 2020; Olagunju et al., 2021). Flooding has been particularly catastrophic over the last two decades. In 2012, floods affected 32 of Nigeria's 36 states and displaced over 2.4 million people. A decade later, in 2022, 34 states were impacted, displacing more than 1.3 million individuals (Ejem et al., 2025; UNICEF, 2022). Conflicts have also had a persistent and profound impact, with over 3 million people displaced since 2009 (UNICEF, 2022). Conflict in Nigeria's northern region, in particular, has been significantly exacerbated by violent clashes between farmers and herders (Nwankwo, 2022, 2025; Obasanmi et al., 2022). While there is a substantial body of literature on the causes and consequences of displacement (Carrasco et al., 2024), there remains a critical gap in understanding whether and how social capital influences displacement.

Since 1976, the Abuja Federal Capital Development Authority (FCDA) has forcibly displaced millions of people, particularly indigenous inhabitants, without sufficient notice, consultation, or compensation (Jonas and Matthias, 2022). Environmental disasters such as flooding and windstorms have resulted in significant rises in water levels, leading to widespread property destruction, loss of life, and population displacement in the FCT (Akande et al., 2023; Daily, 2025). Conflicts in markets or local communities have led to the displacement of people, destruction of property, loss of life, and loss of livelihoods (Nwankwo, 2025). Presently, the Federal Capital Territory (FCT) ranks second only to Lagos in the number of displaced persons in Nigeria (Anwana et al., 2021). Market demolitions and redevelopment initiatives have followed a predictable pattern over the past two decades in the Federal Capital Territory, with buildings razed under the pretext of inadequate public infrastructure, such as roads, water supply, parking, or sanitation, affecting people across various socioeconomic groups (Anwana et al., 2021).

Previous research on displacement has primarily focused on development- and disaster-induced displacement, the socioeconomic impacts of displacement, conflict-related displacement, and urban displacement (Adegbe et al., 2024; Badamosi et al., 2023; Jonas and Matthias, 2022; Ukandu and Obodo, 2024). Studies examining the intersection of social capital and displacement have primarily approached the topic from either politically motivated displacement (Abu Hamad et al., 2025; Jayakody et al., 2022; Kamta and Scheffran, 2022) or disaster-induced displacement (Carrasco et al., 2024; Parvin et al., 2023). However, these studies often address these dimensions in isolation, contributing to the limited comparative understanding of how social capital influences different types of displacement. This brief research report examines the effects of social capital and equity-related socioeconomic variables on four displacement types in Nigeria, thereby contributing to the growing literature at the intersection of social capital and displacement. It forms part of a broader study investigating the drivers and impacts of displacement. The paper is structured as follows: the next section outlines the methodological approach, followed by the presentation and discussion of preliminary findings. The final section concludes the report.

## 2 Material and methods

### 2.1 Study area

The study area is the Federal Capital Territory of Nigeria, Abuja (hereafter referred to as Abuja). It is located in the geographical center of Nigeria and is found on latitudes  $8^{\circ} 25'$  and  $9^{\circ} 25'$  North of the Equator and longitudes  $6^{\circ} 45'$  and  $7^{\circ} 45'$  East of the Greenwich Meridian. It is bordered to the North by Kaduna state, to the east by Nasarawa state, to the west by Niger state and to the south by Kogi state (Figure 1). Abuja lies 1,180 feet (360 meters) above sea level and has a land area of 8,000 square kilometers (Anwana et al., 2021). Abuja has six area councils, namely Abaji, Abuja Municipal Area Council (AMAC), Bwari, Gwagwalada, Kuje, and Kwali. The savannah grasslands of the North and the Middle Belt, the richness of the tropical rainforests of the south, and an equable climate all combined to make the FCT a soil-rich agricultural haven (Anwana et al., 2021). At the 2006 census, the city of Abuja had a population of 776,298, making it one of the 10 most populous cities in Nigeria and ranking eighth. According to the United Nations, Abuja experienced a 139.7% growth rate between 2000 and 2010, making it the fastest-growing city in the world. In 2015, Abuja had an annual growth rate of at least 35%, maintaining its position as the fastest-growing city on the African continent and one of the fastest-growing in the world (Anwana et al., 2021).

### 2.2 Research design

This study examines the impact of social capital on displacement from an equity perspective. This article is an output of an ongoing study that investigates the drivers and impacts of displacement in Abuja, Nigeria. As this study is ongoing, this brief

research report presents the preliminary findings on social capital. The sampling method used in this research was a multistage approach. The snowball method helped the research assistants reach the target persons affected by displacement and administer the printed questionnaire to them. Each person affected either knew the address of another fellow with a shared experience or a contact detail used to locate other displaced persons. Then, questionnaires were distributed randomly to them. Given prior knowledge of where displacement had occurred, the research employed purposive and cluster sampling to visit locations with a high incidence of displacement and a relatively large number of displaced persons in the study area. This method was adopted by several scholars (Kolapo et al., 2022; Olawepo et al., 2021; Onuoha et al., 2025). Using Taro Yamane's formula (Yamane, 1967), the sample size (400) was determined. The sample size of 400 was proportionally distributed among the six area councils of Abuja (see Table 1) using their 2019 population size retrieved from the National Population Commission (Oyetunji et al., 2021).

The Taro Yamane formula ( $n = \frac{N}{1+N(e)^2}$ ), and proportional sampling formula ( $n_i = \frac{Ni}{N} \times n$ ) were then employed to calculate and distribute the sample sizes among the 6 Area councils in the study area.

Calculating total sample size using Taro Yamane formula ( $n = \frac{N}{1+N(e)^2}$ )

Where:

$n$  = Sample size to be selected = Unknown

$N$  = Target population under investigation = Abuja total population for 2022 is (2,179,495)

$1$  = Unit (a constant)

$e$  = Level of significance 0.05 or 5%

$$n = \frac{2,179,495}{1 + 2,179,495(0.05)^2} = \frac{2,179,495}{1 + 5,448.7375} = \frac{2,179,495}{5,449.7375}$$

$n = 400$

Distributing the 400 samples using Proportional sampling formula ( $n_i = \frac{Ni}{N} \times n$ )

Where:

$n_i$  = Sample size for each Area Council

$Ni$  = Population of each area Council

$N$  = Total population of all Area Council combined = 2,179,495

$n$  = Total sample size = 400

### 2.3 Measures and data analysis

To measure the causes of displacements, respondents were asked to state their level of agreement with whether their displacement was a result of floods, policies imposed by the government, reclamation of land by the government, the attractiveness of the area, their state of origin was the reason for their displacement, environmental pollution, and conflicts. These questions were captured on a 5-point Likert scale (strongly agree=5, Agree=4, undetermined=3, Disagree=2, and strongly disagree=1). To better understand displacement types, these questions informed four displacement types: environmental displacement (flood and environmental pollution), political

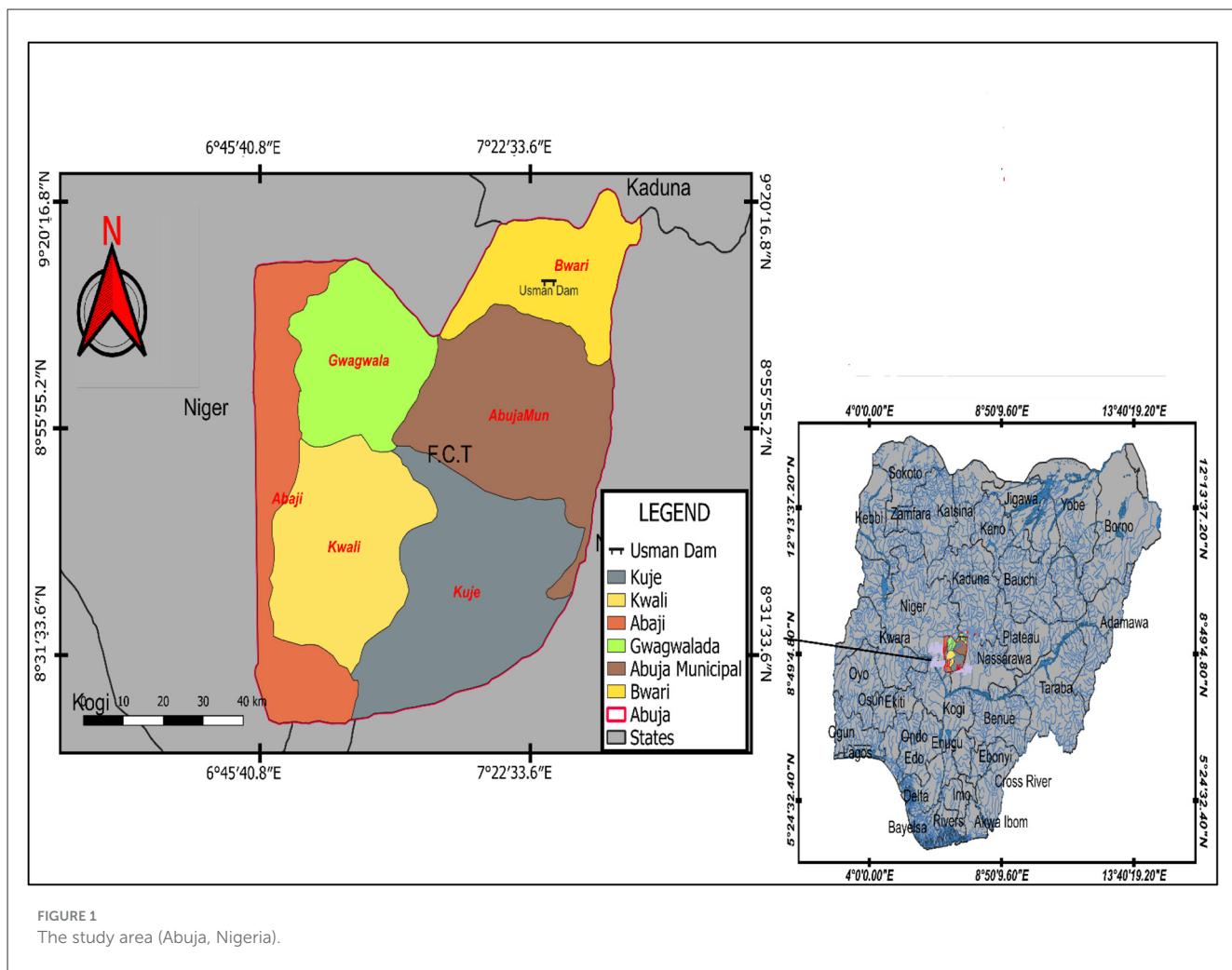


TABLE 1 Distribution of sample size in the six area councils.

S/N	Sampled locations	Population (2022)	Sample size	Calculations
1	Abaji	90,888	17	$(n_i = \frac{90,888}{2,179,495} \times 400)$
2	Abuja Municipal Area Council (AMAC)	1,203,165	221	$(n_i = \frac{1,203,165}{2,179,495} \times 400)$
3	Bwari	355,346	65	$(n_i = \frac{355,346}{2,179,495} \times 400)$
4	Gwagwalada	245,838	45	$(n_i = \frac{245,838}{2,179,495} \times 400)$
5	Kuje	150,699	28	$(n_i = \frac{150,699}{2,179,495} \times 400)$
6	Kwali	133,559	24	$(n_i = \frac{133,559}{2,179,495} \times 400)$
<b>Total</b>		<b>2,179,495</b>	<b>400</b>	

displacement (land reclamation, government policies, and state of origin), economic displacement (economic lucrativeness) and conflict-induced displacement.

For social capital, we adopted Chan et al.'s (2006) measure of social cohesion and operationalized it to align with the study area based on our preliminary field studies. We asked respondents to indicate their level of agreement with six measures of social cohesion. These questions are "how would you rate shared values with people in your

community?," "How would you rate your acceptance by your community?," "How would you rate your sense of belonging in your community?," "How well do you identify with your community?," "How would you rate your community as a place for doing the things you enjoy?" and "Rate how special your community feels to you." On a 4-point Likert scale (good -3, fair-2, poor-1, and unsure-0), respondents were asked to state their agreement to these questions before and after displacement occurred.

TABLE 2 Estimated Cronbach's alpha values for variables.

Constructs	Number of survey items	Cronbach alpha ( $\alpha$ )
Environmental displacement	2	0.79
Political displacement	3	0.77
Social capital (all)	12	0.97
Social capital before displacement	6	0.98
Social capital after displacement	6	0.98

Further, multivariate ordinary least squares (OLS) regression models were conducted to determine the factors that drive four displacement types, with particular focus on social capital and equity-related socioeconomic variables. For analytical purposes, the socioeconomic characteristics of respondents were binary-coded: gender (female), marital status (single), age (elderly), tenancy status (landlord), household size (large), income (low-income), educational status (tertiary education), and rent (high rent).

## 2.4 Reliability and validity

The questionnaire was reviewed by displacement experts with practical knowledge of the study area, and based on their feedback, it was revised. Cronbach's alpha coefficient was utilized to determine the reliability and internal consistency of the survey instrument and research constructs. Cronbach's alpha needs to be above 0.7 for survey items to be considered reliable (Askari et al., 2025). Table 2 revealed that the alpha values for all constructs exceeded 0.7, confirming that the survey instrument was reliable for this study and that the observed variables were accurately measuring the research constructs.

## 3 Results and discussion

### 3.1 Socioeconomic characteristics of respondents

Questionnaire analysis revealed that male respondents were sampled more frequently than female respondents (60% vs. 40%), that most respondents were married (62% vs. 48% who were single), and that 73% of respondents had a household size of 1 to 5. Furthermore, the majority of respondents (66%) received secondary education, while a few received either primary (19%) or tertiary (15%) education. The respondents' educational status may indicate that residents of fragile areas vulnerable to disasters and political displacement are less educated. Studies agree that less educated people earn lower wages and live in neighborhoods prone to environmental, social, and economic risks (Orimoogunje and Aniramu, 2025). Nearly three-quarters of respondents are traders (70%), and tenancy (67%) was the popular housing status among respondents. See Table 3.

TABLE 3 Summary of respondents by socioeconomic characteristics.

Socioeconomic characteristics	Frequency	Percent
<b>Gender</b>		
Female	160	40
Male	240	60
Total	400	100
<b>Marital status</b>		
Married	248	62
Single	152	48
Total	400	100
<b>Household size</b>		
1–5	291	73
5–10	75	19
10–15	34	8
Total	400	100
<b>Educational status</b>		
Primary school	75	19
Secondary school	264	66
Tertiary	61	15
Total	400	100
<b>Occupation</b>		
Trader	279	70
Banker	–	–
Civil servant	23	6
Artisans/farmers	50	13
Unemployed	48	11
Total	400	100
<b>Housing status</b>		
Landlord	58	15
Tenant	270	67
Squatter	72	18
Total	400	100

### 3.2 Social capital and displacement: drivers and influences

The results (Table 4) show key differences between displacement types across social capital, socioeconomic, and equity variables. Statistically, social capital was negatively associated with environmental displacement, showing that respondents with higher social capital ratings are less likely to experience environmental displacements. Political and economic-driven displacements were positively associated with social capital, indicating that as ratings of social capital increase, so do political and economic-driven displacements. One possible justification for this pattern in the literature is that communities

TABLE 4 Multivariate OLS: drivers of displacements.

Explanatory variables	Environmental displacement	Political displacement	Economic-driven displacement	Conflict-driven displacement
Social capital before displacement	-0.322***	0.183**	0.469***	-0.0291
Female	-0.216	-0.339**	-1.085***	-0.592**
Single	-0.131	-0.000784	-0.0458	0.764**
Aged	-0.0669	0.297	-0.331	1.963***
Landlord	-0.846***	0.102	0.375*	0.422
Large household	1.093***	-0.0351	0.223	-0.916***
Low income	-0.0785	-0.846***	-0.641***	0.738**
Tertiary education	-0.714***	0.163	0.379*	0.228
High rent	-0.295*	0.349**	0.599***	-0.204
Constant	3.059***	2.753***	2.519***	2.204***
N	400	400	400	400
R-squared	0.27	0.51	0.73	0.22

\*p < 0.05, \*\*p < 0.01, \*\*\*p < 0.001.

and neighborhoods that are prone to displacement by political and economic drivers often inhabit neglected or informal settings that lack avenues for peer-to-peer trust and community action (Carrasco et al., 2024). Zeballos-Velarde et al. (2023) and Carrasco et al. (2023) acknowledge that vulnerable groups, such as inhabitants of informal or underserved communities, often neglect traditional risk knowledge, thereby impeding the gains from established social capital. In disaster contexts (environmental displacements), social capital is argued to operate on a continuum, whereby it peaks immediately after hazards when communities are most in need and subsequently fades out (Sobhaninia, 2023). Environmental displacements can be rapid-onset, and it is possible that affected families temporarily move together; however, further studies through triangulation in the study area are needed to provide context for these dynamics. Regarding how social capital builds resilience to disasters and displacement, it is acknowledged that placemaking and people-driven initiatives address the spatial, social, and temporal gaps created by disasters and displacement and strengthen connections that promote community resilience (Ghezelloo et al., 2024). This finding is consistent with previous studies that show that political and conflict-driven displacement outcomes are more pronounced than environmental displacement (Saldaña-Zorrilla and Sandberg, 2009). A justification could be that environmental displacements are temporal and short-term (Black et al., 2013).

Regarding socioeconomic and equity perspectives, female respondents were negatively associated with political, economic, and conflict-driven displacements, confirming that female respondents had lower ratings for these displacement types than male respondents. In contrast, previous studies attest to heightened inequality faced by women during forced displacements (Dube and Mhembwe, 2019; Ullah et al., 2024), and as a result, often make up the majority of displaced people (Dube and Mhembwe, 2019). Because women's participation in local decision-making remains constrained by many barriers, they have limited agency over the policies that affect them (Ullah et al., 2024). Being

single was not significantly associated with any displacement type, except conflict-driven displacements. Being aged was not significantly associated with any displacement type, except conflict displacements, which confirmed that aged individuals had higher ratings for conflict displacement than young individuals. This contradicts previous findings that assert children and older adults are more vulnerable to displacement and its associated impacts (Mort et al., 2018).

Further, results show that individuals with tertiary education were less likely to be displaced by environmental hazards and more likely to experience economic displacement. Respondents with low income are less likely than high-income respondents to experience politically or economically driven displacements. Respondents with low-income also had higher ratings for conflict driven displacements than high income respondents. While previous studies primarily attributed displacements to poor household conditions (Ronco et al., 2023), evidence from the study area indicates that economically driven displacement, in which the government reclaims economically viable land, remains unaddressed (Pillah and Edwin, 2025).

Regarding homeownership status, landlords and tenants/squatters do not differ for political or conflict-driven displacement types. However, landlords are less likely to experience environmental displacements and more likely to experience economic-driven displacements. When juxtaposed with previous studies, this finding has practical implications. Because environmental displacements are mainly short-term (Ghezelloo et al., 2024), it is common for homeowners (landlords) to return to their property after environmental hazards, such as flood subsides (Komatsuzaki et al., 2022). While there is no consensus in the literature on homeownership and displacement, it is well established that homeowners are better prepared for disasters (Borate et al., 2025).

Compared with low-rent respondents, respondents with high rent rates had lower ratings for environmental displacement and higher ratings for politically and economically

driven displacement. By virtue of their income status, low-rent-paying individuals are likely to live in substandard neighborhoods, exposing them to forced evacuations (Orimoogunje and Aniramu, 2025). In contrast to our findings, studies have shown that high-income individuals are more likely to live in high-rent apartments and are therefore less likely to be situated in illegal, insecure, or contentious neighborhoods (Orimoogunje and Aniramu, 2025), thereby limiting the likelihood of political, conflict, or development-related displacements.

### 3.3 Policy implications and future research

In the wake of displacements, the role of social capital in building resilience cannot be overemphasized. Studies have confirmed that social capital cushions the impacts of displacement by reducing poverty, building assets, and empowering displaced persons (Parvin et al., 2023). Based on the preliminary findings of this report, three policies were proposed: First, because displaced individuals generally report high levels of social capital, policies that address the root causes of displacement types experienced in Abuja, especially government- and economically driven land reclamation, should be regulated. Second, in cases where reclamation or eviction is inevitable, the government should adequately compensate homeowners to ensure they can move with their families to decent apartments. Third, because high-income individuals are more exposed to politically and economically driven displacements, regulations prohibiting the real estate industry from developing unapproved areas should be enacted to protect unsuspecting buyers.

Although the preliminary findings from this study provide useful insights into the drivers of displacement, it has some limitations. First, the measures of social capital emphasized respondents' sense of belonging and identity, with little or no reference to its linking and bridging dimensions. As a result, the final report and/or future research should integrate these dimensions, using community-engaged research. Second, future studies in this area should use interviews or focus groups to understand gendered patterns of displacement and how social capital shapes them. Third, this study explores only a limited set of equity dimensions related to income, gender, educational status and other socioeconomic status. The final report and future studies should explicitly consider other equity dimensions of social capital and displacements.

## 4 Conclusion

This study, which contributes to the literature on social capital, highlights the impacts of social capital and equity-related socioeconomic variables on different types of displacement. This brief research report highlights five key preliminary messages that are central to building equity and resilience against displacement. First, social capital had the most significant impact on economically driven displacement. Second, males are more

likely than females to experience political, economic, and conflict-driven displacements. This might be a leverage point to be optimized in disaster resilience building. Third, the impacts of social capital and equity-related socioeconomic variables, such as income, homeownership, and educational status, on displacement types show inconsistent findings, indicating the importance of local contexts. Based on these findings, it is recommended that this ongoing study employ triangulation to understand the dynamic relationship between social capital and displacement types, including how equity considerations can enhance resilience to displacement. As a result, this ongoing study will conduct key interviews and focus groups with individuals who were displaced by the same drivers to explore these concerns.

## Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

## Ethics statement

The studies involving humans were approved by the University of Nigeria, Nsukka Institutional Review Board, chaired by Professor Obinna Onwujekwe, Director of Research, University of Nigeria, Nsukka. The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study. Written informed consent was obtained from the individual(s) for the publication of any potentially identifiable images or data included in this article.

## Author contributions

JO: Methodology, Writing – original draft, Conceptualization, Investigation, Formal analysis. CI: Writing – original draft, Supervision, Formal analysis, Methodology, Conceptualization, Investigation, Writing – review & editing. RI: Formal analysis, Writing – original draft, Methodology. DO: Writing – original draft.

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