# Exploring the Spillover Effects of Internally Displaced Settlements on the Wellbeing of Children of the Locales

**Efobi Uchenna**

University of Kent, United Kingdom and GLO Research Fellow

U.Efobi@kent.ac.uk

**Ajefu Joseph**

University of Bradford, United Kingdom

j.ajefu@bradford.ac.uk

## Abstract

This research examines the effect of internally displaced persons (IDPs) resettlement on the anthropometric outcomes of the host community's children in Nigeria. Our identification strategy characterizes affected children based on distance heterogeneities between the household and the closest IDP camp, as well as the child's birth year. We find that children residing within a 50-kilometer radius of the settlement with birth years after the IDP settlement in their community are less likely to be underweight, stunted, or wasted. Importantly, we contend that these findings arise because mothers benefited from changes in agricultural food prices, which led to increased agricultural productivity. Furthermore, the settlement resulted in a rise in donor-related activities in their community, namely immunization campaigns. In our data, we explore these mechanisms, demonstrating a significant likelihood of mothers participating in agricultural labor versus services or other professional employment and a significant increase in vaccination intake for affected children.

**Keywords:** Anthropometric Measures; Child Wellbeing; Forced Migration; IDPs; Nigeria; Vulnerability

**JEL Classification:** F35; J13; O15; R23

**Declarations of interest:** none

## 1. Introduction

The Sahel region of Africa, and Nigeria in particular, remains embroiled in violent conflict, which has resulted in significant economic and property loss, as well as a massive humanitarian toll in the form of displacements and forced migration. In 2022, for example, the escalating conflict and worsening security situation in the Sahel pushed the forcibly displaced population to 4.1 million – up from 3.6 million at the end of 2021 – including 1.1 million refugees and asylum-seekers and 3.0 million IDPs (UNHCR, 2023). In recent years, there has been a great deal of focus on the effects of this expanding trend of internal displacement, particularly its effect on host community households.

Some of the past work has suggested that the presence of forced migration or settlement of displaced populations impacts the economic and market system in host communities (Alix-Garcia and Saah, 2010; Verme, 2023), socio-relational and inter-group relations (Alesina and Tabellini, 2022; Zhou et al., 2023), food systems and agricultural production (George et al., 2021; George and Adelaja, 2021, 2022), among others. Yet, this literature has not yet explored the possible downstream effects of refugee presence on children of host communities. The closest study that have interrogated this issue include Baez (2011), who find adverse impacts over a year of refugee inflow on host community children's anthropometrics outcome and increase in the likelihood of contacting infectious diseases and infant mortality. This finding is consistent with a more recent argument, though contended by other studies[1], that the negative impact on the wellbeing of the host community residence is facilitated by the poor health conditions of forced migrants upon arrival at their hosting locations due to limited access to health services, insufficient rest, and insufficient supplies to meet their basic needs (Ibanez et al., 2021).

[1] Zhou et al., (2023) for example, find that refugee inflow could lead to improvement in the health system and public infrastructure, leading to positive health outcome of residents in the host community.

Using Nigeria as a case study, we investigate how the existence of these settlements impacts the well-being of host communities, with a particular emphasis on anthropometric indicators of host community children. A country confronted with the dual challenges of increasing forcibly displaced population and rising malnutrition among its most vulnerable. Nigeria is home to 41% of the region's IDP population (UNHCR, 2022), and it has seen a considerable increase in forced displacements owing to violent conflicts, among other factors, since 2011. This displaced population has been systematically incorporated into host communities through formal settlements established by the government, community leaders, or non-governmental organizations (NGOs), as well as through host community families (UNHCR, 2014). Similarly, there is an increase in food insecurity and malnutrition, particularly among children. Children under the age of five make up around a third of Nigeria's food-insecure population, and as a result, they face a significant risk of mortality owing to acute malnutrition (UNICEF, 2023).

Using flexible difference-in-differences and relying on the timing of the IDP settlements for some analysis, as well as the variation in the timing of birth of the cohort child for our identification strategies with Demographic and Health Surveys (DHS) data, we find that the inflow is associated with improvement in the cohort child's anthropometric outcome. Specifically, cohort children who reside in 10km proximity to the IDP settlements record 10-percentage points significant decline in the likelihood of being underweight, stunted, or wasted. To show the potency of proximity to the IDP settlement, our result suggests that those cohort children who reside between 25km and 50km of the IDP camp have similar decline in this outcome, but the coefficients are smaller as the distance increases (i.e., 9.8 percentage points for those within 25km and 8.2 percentage points for those within 50km proximity). For other cohort children residing in locations above 50km proximity to the IDP settlements, the effect loses its significant values, suggesting that these effects are no longer in existence for those residing farther from the IDP settlement. When we employ an alternative measure of closeness

(i.e., relative proximity to IDP settlements) and assess the effect on the likelihood of the child being underweight and stunted, the results remain consistent. Furthermore, the results are not impacted by endogenous migration and are robust to a placebo test.

We also consider two mechanisms explaining these results, which include the changes in the labor market system and prevalence of donor-led activities. These two channels are the most plausible in this context given that the region hosting IDPs in Nigeria is predominantly agricultural producing, with fragile labor market system that is pressured by diverse dynamic factors, and due to the increasing number of displacements, there is increased aid-related activities in this region (UNICEF, 2013; UNICEF, 2018). We find that mothers residing in close proximity to IDP settlements intensify their agricultural engagement (unlike other skilled-based and professional jobs). This is most likely because the influx of IDPs may have increased demand for locally produced agricultural goods (Alix-Garcia and Saah, 2009) and may have caused changes in intra-household activity and labour allocation, resulting in a shift or intensification of household labour towards increased crop production for increased household income (Ruiz and Vargas-Silva, 2017). Furthermore, cohort children who reside closest to IDP settlements (10km away) had higher immunization availability than those who live farther away. As a result, the argument that expanding donor-related activities, notably vaccination outreach, is one important channel that explains the result is supported.

The validity of these estimates is based on two assumptions: i) the placement of IDP settlements was exogenous to locational trends, and ii) other policies and initiatives could not explain the observed effects. These assumptions are inherently untestable, although our identification attempts to demonstrate that these critical conditions hold in our design. First, if a systematic locational advantage exists in determining IDP settlement locations, it would be for conflict incidence. As a result, locations near to the sites are more peaceful than locations away from the site. In our design, we exclude locations that are 200 kilometers from the site, and we show that there is no systematic pattern in conflict by distance from the sites,

particularly within the 200-kilometer range. Additionally, based on the design we adopted, the site location does not appear to be systematically associated with pre-existing patterns in health outcomes. In addition, our testing for dynamic treatment effects supports this premise. Second, while there were numerous instances of policies in Nigeria in similar locations as our sample around the same time frame as the IDP settlements, our findings are robust to taking into consideration their possible impact on child wellbeing. Specifically, when we run a simulation-based placebo test, our results were not statistically significant, implying that once the precise locations of the IDP settlements are excluded from the analysis, the results no longer exist.

This paper makes two contributions to the existing literature on the impact of IDP settlements and the inflow of forcibly displaced populations on host communities. First, we add to the literature on the effect of proximity to IDP settlements on the wellbeing of children of host communities. Our study adds to the literature focusing on this outcome, including Baez (2011), by highlighting the downstream wellbeing effect of children in host community with the inflow of IDP population with formal settlement status in the host community. Hosting this population is different from refugees, particularly in the context of Nigeria, where there was an immediate public policy directive to support the integration of this group within the community they are hosted. As a result, while the literature concludes an adverse effect on host community children, however, we show in this study that there are generational benefits within host community with the inflow of IDPs particularly when considering structural changes in the labor market system and expansion of donor-led activities (vaccination) in the host community.

Second, we contribute to the growing literature on the socioeconomic effects of hosting IDP populations, which has generally revealed a mixed effect. On the one hand, IDPs can have a negative impact on the host communities' housing conditions, wellbeing, security, livelihoods and food production, and education, leading to further repercussions on the wellbeing of host community residents (Alix-Garcia and Saah, 2010; Baez, 2011; George and

Adelaja, 2021; George and Adelaja, 2022; Alesina and Tabellini, 2022). On the other hand, IDPs can also contribute to the local economy by creating new markets and demand for goods and services, as well as by bringing new skills, knowledge, aid flow, and changes in social norms to the host communities (Fajth et al., 2019; Verme, 2023; Zhou et al., 2023). Therefore, it is evident that the specific effects of hosting IDPs can vary widely depending on the context and location, and it is important to conduct further research to better understand the factors that contribute to these effects.

## 2. Background

### *2.1. IDP Settlements*

Prior to 2008, IDP settlements in Nigeria were effectively non-existent. In 2011, the number of IDPs displaced by conflict considerably significantly increased and since then, the number of internally displaced persons (IDPs) in Nigeria has steadily increased[2], primarily as a result of conflict and violence incidents caused by Boko Haram, farmers-herders conflicts, and other non-state armed groups.

The migration pattern of IDPs in search of a new settlement consists of camps and camp-like settings, primarily public-school buildings, government buildings, and community centers, while others move in with host families within communities (UNHCR, 2014)[3]. Once these IDPs move into the communities, there are mechanisms to track IDP settlements in the host communities due to limited resources to manage their settlements. In some cases, new arrivals are screened before they are relocated to host villages. Once in the village, they are registered and admitted to camps or specific settlements, and then public infrastructure are organized to mitigate the population's vulnerability. For example, within the IDP settlement, reports from donor agencies indicate that support for the existing health center in the displacement area has increased through the provision of equipment, material, and drugs,

[2] This fact is further buttressed by the anecdotal evidence by UNHCR (2014)
[3] These are clearly identified locations where IDPs, who are nationals, resides with host communities.

training of health staff, and the improvement of referral systems for new IDP arrivals with pre-existing health concerns (UNHCR, 2014; IOM, 2018)[4].

**Figure 1 Here**

IDP settlements in Nigeria are primarily located in Northern Nigeria (see Figure 2), away from conflict hotspots to limit exposure to violence, but accessible to the relocation and resettlement of vulnerable individuals affected by the conflict (Mohammed, 2017; Kamta and Scheffran, 2022). Figure 3 depicts the locations of IDP settlements since 2011 in relation to conflict zones. Notably, the majority of IDP settlements are not located in the same administrative region as areas of intense battle and conflict. Clearly, there is little overlap between IDP locations and conflict occurrences during these time periods, supporting the argument that these settlements are distant from conflict zones. In later sections that discuss our design, we elaborate on the conflict threats to our identification and the strategies by which we mitigate them.

**Figure 2 Here**

**Figure 3 Here**

### *2.2. Policy Framework for IDP Settlements in Nigeria*

The National Policy on Internally Displaced Persons, issued in 2012 and amended in 2021, is the policy framework that guides IDP settlements, their rights and responsibilities, and institutional obligations to this group. The policy strives to develop institutional processes and frameworks for the realization of the vulnerable population's rights, dignity, and well-being by focusing on a variety of concerns, including reducing the negative impact of settlements on host communities. The policy, for example, mentions the following responsibilities towards host communities: providing support to host communities in addressing the impact of displacement on their community, including ensuring host communities' access to basic

[4] This report is without prejudice to the many challenges faced by IDPs, including limited or outright lack of access to basic needs and amenities such as potable water, food, clothing, healthcare, education, and security (International Organization on Migration, 2018).

services such as health care, education, and livelihood opportunities. The policy establishes a coordinating process that takes into account the community and IDP settlements' grassroots level needs, including short- and long-term projects, and then a comprehensive approach to soliciting resources through humanitarian appeal to meet such needs and engage in targeted interventions (FMHDS, 2021). Our contention is that these focused humanitarian actions, in addition to other changes in the economic system caused by the influx of IDP settlements, could have an impact on other outcomes, such as infant wellbeing, which is the focus of this study.

### *2.3. Anecdotal Evidence from Nigeria*

There are anecdotal evidence pointing to the increase in humanitarian activities in IDP host communities. In 2012-2013 period, the region saw an expansion of localized NGO activities that engaged community residents, including religious and traditional leaders, to encourage the uptake of infant vaccinations/immunization and other health interventions. For example, the Nutrition budget for UNICEF multiplied tenfold, to US$35 million, to address acute malnutrition problems for 236,100 children, distribution of prophylactic vitamin A supplementation for 20 million children under five years of age, and provision of Iron-folate supplements for 2.8 million pregnant women (UNICEF, 2013).

The majority of foreign aid directed towards these locations in Nigeria was focused on health-related and nutritional initiatives. This aid specifically aimed to assist approximately 160,000 children suffering from severe acute malnutrition, effectively engaging with communities that had internally displaced persons (UNICEF, 2018). Furthermore, the aid was specifically directed towards providing hygiene facilities in institutions and maintaining water facilities in host communities. Additionally, it helped approximately 3.6 million individuals access emergency primary health care services, provided measles immunization to 4.1 million children, and supported 49 health centers with medicine (UNICEF, 2018).

### *2.4. Public Health Situation in Nigeria*

Related to public health condition in Nigeria, rising malnutrition among children remains a critical challenge. Children under the age of five make up around a third of Nigeria's food-insecure population (UNICEF, 2023). Relatively, Nigeria has the highest number of children under 5 years with chronic malnutrition (stunting or low height-for-age) in sub-Saharan Africa and the second highest burden of stunted children in the world, with a national prevalence rate of 32 percent of children under five[5] (USAID, 2018). This crisis is further exacerbated by complex and dynamic factors, including continued conflict, which have led to displacements and further shock on the food and market systems in Nigeria (UNICEF, 2023).

## 3. Data

### *3.1. Demographic and Health Surveys*

We utilize data from the Demographic and Health Surveys (DHS) for Nigeria, which captures demographic information such as fertility, infant mortality, healthcare facility utilization, and nutritional status of mothers and children. These cross-sectional data are nationally representative of individuals and households and have been geolocated to facilitate the spatial analysis of socioeconomic issues. The DHS rounds of 2008 and 2013 collected comprehensive data on each child (under five years old) of the sampled woman (mother), including the date of birth, height, weight, size at birth, and other health and nutrition data pertinent to our research.

These rounds collected comprehensive information on approximately 43,000 children under the age of five whose birth years coincided with periods preceding and following the IDPs' relocation in their community. The identification of birth years permits a quasi-experimental analysis of the health outcomes of children under the age of five in communities experiencing the inflow of IDPs. Our analyses rely on DHS data for information on health outcomes (described below) and other individual and household characteristics of mothers, such as their residence location at the time of the survey.

[5] See UNICEF report here https://www.unicef.org/nigeria/nutrition

The DHS has a more recent wave (round 2018), but we did not include data from this round in our analyses because IDP data only accurately reflect displacement years for earlier rounds, which correspond to the DHS rounds utilized in the analysis of this study. Since IDP displacement periods did not occur prior to 2011, the 2008 DHS rounds capture "pre-treatment" periods precisely for our analytical design.

*Anthropometric Measure*

Our analysis is predicated on anthropometric measures of children derived from DHS data on the standard deviations of the child's weight-for-age, height-for-age, and weight-for-height. This anthropometric measurement indicates the child's long-term health condition and is commonly used in the pediatric population to assess the child's general health status, nutritional adequacy, and growth and development pattern (Fryar et al., 2016). Moreover, because child height is sensitive to past growth failures due to malnutrition or illness, it is generally regarded as a reliable method for measuring long-term health outcomes (Akresh et al., 2022). Consequently, based on the anthropometric information contained in the DHS for children 0-60 months of age, we compute a binary indicator for health outcome if the child is underweight, stunted, or wasted. In other words, the z-score for weight-for-age (underweight), height-for-age (stunted), or weight-for-height (overweight) is less than minus two standard deviations and not greater than plus two standard deviations. We also considered the individual level anthropometric measures – underweight and stunted – two malnutrition conditions prevalent among children under the age of five in Nigeria, particularly in northern Nigeria (UNICEF, 2017).

### *3.2. Measuring Internally Displaced Persons*

The information on Internally Displaced Persons (IDPs) is derived from the International Organization for Migration Displacement Tracking Matrix (IOM-DTM), which collects multi-layered data on the mobility, vulnerabilities, and requirements of displaced and mobile populations in respective countries. The IOM-DTM data collection began in 2004 to provide humanitarian interventions in Iraq with essential data on displacement. Since then, populations

displaced by conflict, climate disruptions, and other complex emergencies have been monitored in over 80 countries, including Nigeria. IOM's global operational footprint, which generates regularly updated displacement data for policy and research analysis, has facilitated this effort.

One aspect of the IOM-DTM[6] is the mobility tracking component, which quantifies the presence of IDPs and refugees, including information about the causes of displacement, duration of displacement, and assessment of needs within host communities or a defined large administrative area where these populations reside. There are two data collection methods for this population. The first is a desk review, which entails gathering information on the presence of IDPs or displaced migrants from government officials or other institutions who are familiar with the community. The information gathered in this form comprises the number of individuals and households (i.e. IDPs, migrants, or returnees), the cause and date of displacement/return, and further information concerning the shelter/accommodation provisions for this group.

The second approach combines direct observation, group interviews, measurements, and physical counts with key informant stakeholders, government officials, and linked parties in interviews. To assure data accuracy, information acquired using this method is cross-referenced with any available secondary sources and triangulated with any supplementary data. In order to collect accurate data on the living conditions and needs of displaced people in specific locations, a multilevel quality control check is incorporated into the data collection process, which includes area assessment, sub-area assessment, and multi-sectoral site assessment (IOM, 2018).

This data source offers geolocation information about the presence of IDPs in a specific administrative area (ward). It also contains the year of displacement and settlement of the

[6] Relative to other displacement datasets, such as the Africa Refugee Dataset, the IOM-DTM data has more complete information about IDPs settlements for the periods 2011 to 2013.

majority of IDPs in a certain Ward. Up to round five of IOM-DTM data collection, the year of relocation of IDP people in the examined ward is clearly documented. This information, which is critical to our identification, is not collected in subsequent rounds, round six and beyond, which correlate to the later DHS period. Using this data, we link each household and their child's birth year to the year of IDP settlement in their community for our research. We next determine the distance between each household and the nearest IDP settlement.

We construct a measure of exposure to IDPs inflow - i.e., "IDP-exposure" – by defining exposure based on categorical distance bands of less than 10km (the primary measure), 11 to 25 km, 26 to 50 km, and over 50km[7]. These bands measure the distance of the sampled children's household residence cluster to the nearest IDPs population settlement. To improve comparability of sampled children based on exposure to IDPs by proximity to the IDPs population and to maintain statistical power, we capped the maximum distance band at 200km. Inferentially, the reference group consists of children whose families reside in other locations outside of the treatment bands[8]. This measure provides the effect of IDP exposure for children in each distance band relative to the distances to the IDP settlement site that were omitted. To the best of our knowledge, these distance bands are sufficiently conservative to encompass locations closer to IDP sites, and the reference band is set to locations no further than 200km away, as the likelihood of confounding events increases with a wider band. Consequently, this band selection reduces the likelihood that we are identifying compound treatment effects, in which the estimates may confound the effects of IDPs' presence with those of other factors, such as conflict and environmental hazard.

In Nigeria, the distance bands is reasonable, as households travel distances of about 50km to access public services, similar to the situation in rural Zimbabwe (Adedokun, 2013;

[7] For this specific band, we consider distance above 50 and below 200 km to enable us examine effects over a longer distance band and include it in the regression estimation without the issue of multicollinearity.
[8] In a robustness check we expand the control group to include those households that are resident in locations of 200 km proximity to the closest IDPs settlements.

Mangudu et al., 2020). Furthermore, these distances are equivalent to small communities, as the smallest local government in Nigeria is about 9 $km^2$, while the largest in the northern region of Nigeria (Niger state) is about 11, 267 $km^2$. Since the IDP camps are predominantly located in northern Nigeria, with sparsely populated area and expensive and long travel time across locations, we predict that the effect of IDP population presence on the children of local residents will dissipate with distance.

In a supplementary analysis, "relative proximity" of the household to the IDPs population location is employed as a second measure of exposure, following the approach of Akresh et al. (2022). This new measure considers the sampled households' closeness to the IDP site in contrast to other sampled households. This proximity is calculated as a continuous measure from each survey cluster to the nearest IDP location. This indicator is computed as the maximum distance in the country from the IDP site minus the actual distance from the household to the nearest IDP site divided by 100. The survey cluster nearest to the IDPs is 0.192 kilometers away, and the farthest is around 1,320 kilometers distant.

Moving forward, it is imperative to acknowledge that alternative indicators of internally displaced persons (IDPs) presence, such as the intensity of IDPs measured by the IDP population in the community, as employed by Akresh et al (2012), were not suitable for our specific circumstances due to the following rationales. The data utilized in this study mostly consists of official information pertaining to a particular internally displaced persons (IDP) settlement, which represents the bulk of IDPs within the community of the respondent. Consequently, the dataset includes the year in which the majority of internally displaced persons (IDPs) relocated to the community. This serves as a dependable approach for evaluating the impact by variations in birth cohorts among the children of community members. The utilization of the internally displaced persons (IDPs) population as a basis for analysis may introduce a measure of bias as a result of the frequent relocations of IDPs between different locations. Nevertheless, our approach accounts for this issue by only relying on the

official reported period when the majority of the population of IDP moved into the community. Second, our analysis focuses on the formal resettlement of IDPs in the respondent's community, which can be captured precisely by the average displacement year of the majority of IDPs in the community. Thirdly, the mechanisms we test to explain the relationship are only observable due to the institutionalization of the IDP's presence in the households' community, which we captured using the indicator of the formal resettlement of the IDP population in such community.

## 4. Identification Strategy and Conceptual Framework

### *4.1. Identification Strategy*

We examine how host community children's anthropometric parameters are affected by proximity to IDP settlements. The treatment groups are those children whose birth year coincide with periods when the IDP resettled in their community (*Cohort*) and who reside in close proximity to the IDP settlement (*IDP exposure*). On the other hand, the primary control group are those children whose birth year coincide with other periods before the IDP inflow, those who reside in distances outside close proximity to the IDP settlement, or those cohort children who reside in distances outside close proximity to the IDP settlement. We estimate the IDPs effect by adjusting for the variation in birth cohort and distance to the IDP settlements based on the following regression equation:

$$Anthropometric_{ibmrst} = \beta_1 IDP\ exposure_{mrst} + \beta_2 Cohort_{\boldsymbol{ib}} + \beta_3 IDP\ exposure \times Cohort_{\boldsymbol{ibmrst}} + \delta X_{mrst} + \zeta_r + \delta_t + \pi_t + \gamma_s + \varpi_m + \gamma_{sb} + \varepsilon_{mrdt} \quad (1)$$

$Anthropometric_{ibmrt}$ is the measure of anthropometric outcome for a child *i* with a birth year *b* of mother *m* that resides in cluster *r* in state *s*, and was surveyed in year *t*. $IDP\ exposure_{mrst}$ is a binary indicator taking the value of 1 for mother *m* who resides in cluster *r* that is within a specific distance radius. 10km is the primary distance radius. We also consider other distance thresholds at 11 to 25km, 26 to 50km, and over 50km radius of the IDP settlement, to underscore that as the distance increases, the effect declines. More so, the

supplementary analysis considers relative proximity to the IDP population as a second indicator of IDP exposure. $Cohort_{ib}$ indicates children *b* whose birth year *i* coincides with periods after IDP settlement.

Also included in equation (1) is the standard control variable ($X_{mrst}$), which is a set of household and individual level characteristics of woman *m* residing in cluster *r* in state *s*, surveyed in period *t*. For this and subsequent analysis, we include the following indicators: household size, rural dummy, the education status and age of the woman/mother. We also include a Muslim dummy, accounting for the religion of the woman. In addition, we control for different fixed effects, including factors common among children and women residing in the same cluster ($\zeta_r$), such as access to medical information/advice and interventions specific to particular cluster that could directly matter for child health outcome. Further, we include the Demographic and Health Surveys round fixed effects ($\delta_t$), which accounts for the seasonality in factors that could affect a child's health that is common to all clusters, including inflation in food expenditure. Likewise, we include fixed effects for the year of IDPs settlement ($\pi_t$), as this may account for similar seasonality shocks that coincide with the year the IDPs resettled in the respondents' community. Other specific variations at the State of residence level, including differences in State-level public policy that vary across Nigerian States and could determine cost of health care or access to health care is another important factor that could explain the outcome variable[9]. Therefore, the fixed effects for the State of residence ($\gamma_s$) is included in the empirical analysis. Finally, we control for the mother's fixed effects ($\varpi_m$), since certain factors are peculiar to children of the same mother. Apart from adjusting for the state-

[9] There are other differences in public officials' approach to IDPs settlement. For example, there are incidences when some state governors closed IDPs camp, with the aim of reducing the dependence on humanitarian aid and promoting better living conditions, dignity, stability and resilience among IDPs. Evidence shows that such decision was met with anxiety, fear, and disbelief, and limited the extent to which humanitarian organizations were allowed to distribute food and non-food Items in any newly resettled communities across the state.

specific time trends ($\gamma_{sb}$)[10], the standard errors ($\varepsilon_{wrcyt}$) are clustered by the year of birth and cluster of residence[11]. This clustering accounts for correlation in the error terms among children with similar birth year, and residing in the same local area and experiencing similar health shocks. This issue might bias the OLS standard errors downward. All estimations are weighted using sample weights provided in the DHS[12].

The variable of interest is the interaction between IDPs exposure and birth cohort ($IDP\ exposure\ \times Cohort_{ibmrst}$) which is the impact of the presence of IDPs population in proximate locations of the residence of the child in periods when the child was born. Although, ideally, we would investigate effects of IDPs settlement by month of exposure of the child to IDPs presence using the month of birth of the child and calculating, for example, how long the child was exposed in utero. However, the IDPs settlement data includes only the year of settlement; the month of settlement in these locations is not available. This may be a limitation of the design of this research, but it does not affect the validity of our estimate, as the focus of this study is the health outcome of children whose birth year coincides with the year of IDPs inflow into the community. In addition, since our measure of health outcome is comprised of indicators that demonstrate long-term health conditions, the year of IDPs inflow may be more suitable for estimation purposes.

Overall, the design of this study is a difference-in-difference technique that is applied using a two-way fixed effects approach to generate a consistent estimate that isolates the influence of IDP presence from secular trends caused by other confounding factors. It successfully adjusts for systematic differences in residence location and birth year cohorts. This

[10] The regressions include state-specific time trends ($\gamma_{sb}$) to address the potential for differential time trends in anthropometric measures across states in Nigeria because of diverse factors, including violence intensity that vary by time.
[11] Which is the community based on the DHS definition of a cluster in their sampling approach.
[12] The sample weight compensates for different probabilities of selection within the samples and varying levels of non-response. Adjusting the estimates to the weights may be relevant to improve the precision of this study's estimates for a policy whose adoption varies across regions.

identification approach has gained credence in similar studies, such as Akresh et al. (2022) and Rotondi and Rocca (2022), among others.

### *4.2. Key Identification Assumption*

The key identifying assumption is that, in the absence of IDPs population sites in each location in Nigeria, the average change in health outcomes and other variables of interest would have been the same for the child of women whose households reside closest to the IDPs sites and those who reside farthest from these sites. An important threat to this study's identification is endogenous migration. There is a possibility that the cohort include children with birth years coinciding with the year of IDP inflow into their community despite that they may have just relocated into the community shortly before the DHS survey was conducted. Hence, these children will be classified in our analysis as cohorts that are affected by the IDP inflow despite the short exposure to IDP settlement. This issue is further exacerbated given that the data consists of repetitive cross-sections of households and not longitudinal panel data that follows households/children over the survey years. In a subsequent analysis we address this issue and show that our analysis is not influenced by endogenous migration.

A further concern is that IDPs locations may be systematically distinct from non-IDP locations for a variety of reasons, including the possibility that non-IDP locations may be more prone to conflict than IDPs locations, and that this systematic difference may explain the results. Moreover, some may argue that clusters with IDPs are those with systematic advantages, such as healthcare facilities, food access, and other factors that could result in improved child health outcomes despite the absence of IDPs. Given that the sample originates from the conflict-prone Northern region of Nigeria, these concerns are plausible. However, based on our identification's design, this may not pose a significant concern for the following reasons.

First, our reliance on distance from the IDPs site ensures that our treated and control groups do not originate from distinct clusters or local government areas, but rather are based on the proximity of the households to the IDPs site. Assuming we relied on individuals' residential clusters to determine treatment, these issues would have been plausible causes for concern, as some LGAs may be more conflict-prone than others. Second, the inclusion of a 200-kilometer cutoff buffer for our sample selection ensures that we do not capture significant systematic differences across location that will become more prominent with larger buffers. Thirdly, anecdotal evidence demonstrates that IDPs travel over 400 kilometers from their formal settlement in quest of employment and resettlement with their families (United Nations High Commissioner for Refugees, 2020). Inferentially, this would not be the case if there were conflicts in locations closer to their site – say, below 200 kilometers within the study's sampling buffer. More so, as seen in other contexts, IDPs settlements in war-torn regions are not located near the conflict zones: for instance, in Saada Yemen, where more than 23 million people require humanitarian assistance, according to the UN's refugee agency, IDP settlements are located in distant communities 200 kilometers from the conflict zone[13]. Fourthly, Figure 4 demonstrates that there is no systematic pattern in conflict incidence by proximity to IDP settlement based on our sample inclusion decision. In other words, conflict patterns remained relatively constant from 0 to 200 kilometers away from IDP sites.

The issue of returning IDPs to their original areas or settlements is a separate concern, and as a result, the effect of IDPs may be compromised because the data we use do not specify the return date of IDPs in their settlement area. We contend that this may not be a concern in this instance, given that most of the displacement was caused by a protracted and ongoing conflict by the Boko Haram combatant and other non-state armed groups (UNHCR, 2014). In light of this, the issue of returnees or resettlement of IDPs may not be a concern within the

[13] See news report here https://www.aljazeera.com/gallery/2019/9/24/in-pictures-living-through-the-yemen-war-as-an-idp

short timeframe of our analysis. Moreover, the mechanisms may continue to be at play if at all there are incidences of the return of IDPs to their home communities.

Finally, George and Adelaja (2022) contend with time-varying confounding variables associated with the non-random assignment of IDPs to destination communities. Following the approach of other related studies in the conflict literature (Akresh et al., 2022; Rotondi and Rocca, 2022) and the design of this study, which eliminates time-related and location-related confounders, we are confident that this issue will not be a concern for our identification. In summary, this study's simplified empirical strategy entails comparing the average health outcome of the child of a sampled woman in locations closer to IDP settlements to those in non-IDP locations, based on birth year, before and after the flow of IDPs. Consequently, any difference in outcome can be attributed to the presence of IDPs in the woman's residence location.

**Figure 4 Here**

### *4.3. Conceptual Framework*

As illustrated in Figure 5, the impact of IDPs on host communities is complex, and there are several reasons why IDP settlements could explain the anthropometric outcomes for host community children. First, the host community's economic and social system changes as a result of IDP inflows, because the additional population exerts significant shocks on the market system, such as the labour, price, health, and housing markets (Alix-Garcia and Saah, 2010; Adelaja and George, 2019; George, Adelaja, and Awokuse, 2021; George and Adelaja, 2022). Such shocks frequently have ramifications for infant health, depending on whether the inflow of IDPs benefits or harms market systems. In Uganda, Kenya, and Tanzania, for example, proximity to IDP settlements increases the welfare and level of economic activity in host communities by creating incentives for economic exchanges, public service provision, infrastructure development, and the influx of displaced persons' assets, savings, and market impact (Alix-Garcia and Saah, 2010; Kreibaum, 2016; Alix-Garcia, et al., 2018; d'Errico, et

al., 2022; Zhou et al., 2023). Such gains in economic and social systems can have a positive impact on the well-being of children in the host community by increasing household income, nutrition, and healthcare access, all of which can benefit cohort children's well-being (Lamichhane and Mangyo, 2011; Morrill, 2011; Hammer and Spears, 2016; Mekasha et al., 2022; Woldemichael et al., 2022).

Second, the impact of IDPs is determined by the host community's policies, institutions, and development, particularly the injection of foreign aid into the system (see Figure 5). Arrival of IDPs in a host community can bring economic and societal pressures and opportunities that impact development processes in those areas, and aid flow can strengthen policies and institutions in host communities by providing resources to support infrastructure, education, and healthcare systems development (Apodaca, 2017). As a result, aid has been proven to increase in tandem with IDP flows, assisting in the strengthening of policies and institutions in host communities, so positively impacting the lives of both IDPs and host communities. This conclusion is based on anecdotal evidence from Somalia and other EU and OECD aid to IDP populations, including those in Nigeria (Mamman-Daura, 2022; European Commission, 2023; Gabobe et al., 2023).

**Figure 5 Here**

## 5. Evidence for the Identification Validity

### *5.1. Test for Parallel Trend*

The identification assumption for this study is that, in the absence of IDP settlements, the average change in child anthropometric outcomes would have been the same for children of women whose households live closest to IDP sites and those who live farthest away. Figure 6 depicts the parallel trend by observing the average outcomes for the treatment and control groups for the time immediately preceding and following the initial IDP settlement in 2011. Before 2010, the Figure demonstrates a similar trend in the anthropometric outcomes. Figure 6 shows that the treatment and the cohort had similar trends in periods before 2011, and the

averages only deviated in the 2011 and post-2011 periods for the likelihood of the child being underweight, stunted, or wasted, as well as the individual indicators of being underweight and stunted.

**Figure 6 Here**

*5.2. Treatment Effect Over Time*[14]

For two reasons, we estimate time-specific treatment effects to investigate pretreatment and posttreatment effects. (a.) Using the leads, we establish whether there is a difference in the average anthropometric measure of children in the treatment and control groups before the IDP population inflow. (b.) Using the lag, we graphically portray any change in treatment impact during the post-IDP inflow years. As a result, rather than relying on a single treatment effect estimate that is assumed to be constant throughout time, this exercise is useful in highlighting initial treatment effect fluctuations over time (see section 5.1 for results).

For this analysis, we condition the treatment effect over the year of IDP settlement in the community of the children. As a result, in addition to the households' distance to the IDP settlement (10km distance), we evaluate the precise year of IDP settlement[15] relative to the year of birth of the children based on the following equation:

$$Anthropometric_{ibmrst} = \sum_{c} \beta_c \, IDP\ exposure_{r(t+c)} + X_{mrst} + \zeta_r + \delta_t + \pi_t + \gamma_s + \varpi_m + \gamma_{sb} + \varepsilon_{mrdt} \qquad (2)$$

$Anthropometric_{ibmrt}$ is the outcome variables for a child *i* with a birth year *b* of mother *m* that resides in cluster *r* in state *s*, and was surveyed in year *t*. $IDP\ exposure_{r(t+c)}$ is a dummy taking the value of 1 for *c* birth year relative to the year in which the IDPs settlement occurred in cluster *r* in IDPs exposed clusters[16], and 0 in all other years and clusters. I grouped all observations within the five years before 2011 (i.e., 2007) and three years after the reform

[14] For this analysis we consider IDPs cluster to be those locations within 10km of the child's household residence.
[15] See Figure 1 and section 3.3 where we discussed that the IDP year of settlement in the community was used to match the year of birth of the child. Based on this, we compute the lag and lead to estimate Figure 7.
[16] For this analysis we consider IDPs cluster to be those locations within 10km of the child's household residence.

(i.e., 2013, the last survey year for this study). Figure 7 describes two patterns. First, it confirms that in periods before the IDP settlement in the location of the respondents in 2011, there was no difference in the anthropometric outcome for the child of mother in close proximity to IDP settlement locations (i.e., residing in locations that are 10km closer) and those who do not reside in such locations (i.e., residing in other locations that are within 150 km proximity). That is, there is no differential pre-trends in the primary indicator in periods following the IDP settlement, as the lead coefficients are small and statistically indistinguishable from zero. These estimates are predominantly concentrated around zero. Second, in periods immediately after the IDP settlement in the respondent's location, the effect sizes appear to have substantially declined over time. These effects are significant, indicating that the IDP settlement may have had immediate and sizeable effects on improvement in the anthropometric outcome of the child of women who reside in close proximity to the IDP settlements.

**Figure 7 Here**

Figures 8a and 8b also shows the treatment effect over time for the supplementary wellbeing measures - i.e., the likelihood of the child being underweight and stunted. The figures confirm the none existence of differential pre-trends in these indicators for the children of women by locations. In addition, it reveals that children of women in close proximity to IDP settlements, whose birth year coincide with periods after the IDP settlement, substantially and significantly record lower likelihood of being underweight and stunted.

**Figures 8a and 8b Here**

This preliminary assessment of the existence of pre-trends in Figures 6, 7, and 8 (a and b) alleviates concerns that our estimates may capture the influence of contemporaneous shocks. It also suggests that the outcome variables of interest among households within a 200-kilometer radius of the IDP settlement were not significantly affected by any external shocks other than the inflow of IDPS, which could explain why the average trends for the T and C were similar before the first IDP settlement was officially recorded. We have no anecdotal evidence of

systemic variations in health care service delivery among communities in Northern Nigeria, the region from which the study sample was drawn. Of course, rural and urban locations may be systematically different, but we account for these differences in our model and adjust for community-level fixed effects to account for any potential changes across locations. As a result, while structural differences or any systematic benefit of location could have been a factor driving the estimated disparities in outcomes, they do not appear to be a problem and instead appear to be driven by mechanisms in operation owing to the entry of the IDP population.

## 6. Effect of the IDP Flow on Child's Health Outcomes

### *6.1. Effects on Anthropometric Outcomes by Different Proximity to IDP Location*

#### *A. Effects on the Likelihood of Being Underweight, Stunted, or Wasted*

Figure 9 depicts the effects of location proximity to IDP settlements (within 10km, 11 to 25km, 26 to 50km, and over a 50km radius of the IDP settlement) for children whose birth years coincide with periods after the IDP settlements (hereafter referred to as cohort). The results imply that cohorts who reside near IDP settlements have improved anthropometric outcomes. For example, cohort children who live within a 10km radius of the nearest IDP settlement had a 10-percentage points significant decrease in the likelihood of being underweight, stunted, or wasted. Those residing within 25km and 50km of the IDP camp have similar improvements in this outcome (9.8 percentage points for 25km and 8.2 percentage points for 50km proximity) but with smaller effects than those residing within 10km of the IDP settlement. The effect of the IDP settlement became statistically insignificant for individuals residing more than 50km away, based on the conventional significance criteria of 1 and 5 percent. The results suggest that the effect is strongest for children who reside in very close proximity to the IDP settlements (within a radius of 10km). The pattern is particularly evident due to the steady reduction in impact as the distance from the settlements increases. For individuals living more than 50km away, the effect diminishes substantially by around 80% compared to those living within 10km, and it no longer holds statistical significance.

**Figure 9 Here**

*B. Effects on the Likelihood of Being Underweight and Stunted*

Figure 10 displays the estimations for the probability of being underweight (Figure 10A) and stunted (Figure 10B) among cohort children by the distance of their households from the IDP settlements. This supplementary analysis reinforces the previous finding from Figure 8, indicating that cohort children of mothers who reside closer to the IDP settlements are significantly more likely to report improvements in their underweight and stunting measurements. These measurements serve as indicators of their general well-being. Specifically, Figure 10(A) indicates that cohorts located within a 10km radius of the IDP settlements have an 8-percentage point lower likelihood of reporting being underweight. The outcome is comparable to a decline of approximately 16 percentage points in the probability of being stunted, as illustrated in Figure 10(B). For those whose mothers reside within a 50km radius, the data from Figure 10(A) and (B) indicate a lower probability of being underweight (7.7 percentage points) and stunted (11.4 percentage points), lower than the estimate for those residing within 10km radius. For those who reside more than 50km away, the effect ceases to exist and is no longer statistically significant at the conventional significance levels of 1 and 5 percent. The relationship seems to suggest a linear trend, such that the effect diminishes as households reside in locations farther from the IDP settlements.

**Figure 10 Here**

*C. Estimation with Alternative Measure of Proximity to IDP Settlements*

Table 1 shows an alternate specification that estimates equation (2) and measures IDP exposure using a linear indicator of proximity to IDP settlement sites. This additional estimator exclusively looks at the cohorts' anthropometric outcomes when the household's closeness to the IDP settlement is compared to others in the sample. The results indicate that for children in the cohort with birth years coinciding with periods after the IDP settlement in their community, there is a 7.3-percentage point significant decrease in the likelihood of recording being underweight, stunted, or wasted with a kilometer proximity to the closest IDP settlement

compared to others in the sample (see column 1). A similar decline is shown in the probability of reporting being underweight (5.5 percentage points, see Column 2) and stunted (11.1 percentage points, see Column 3).

The overall finding implies that cohort children are more likely to report better anthropometric results when they are 1km closer to the nearest IDP settlement locations. This conclusion is consistent with the findings in Figures 9 and 10, which show that the predicted anthropometric effects improve as the household reside in closer proximity to the IDP settlements. These findings are comparable with previous findings in Kreibaum (2016) and Alix-Garcia et al (2018), which suggest that the influx of refugees into the households' community improves child anthropometric outcomes and household consumption.

**Table 1 Here**

*6.2. Estimation Robustness*[17]

To confirm the reliability of our findings, we conducted several robustness exercises in the preceding section.

*Endogenous Migration*

Here, we report findings that support the validity of our primary results on IDP resettlement and its impact on children in host communities. To ensure that our preliminary findings are not influenced by endogenous migration: that is, the IDP settlement may have coincided with or resulted in household (in- or out-) migration, which could bias our estimates because we would incorrectly assign a child's IDP exposure based on the child's current location of residence without considering whether the household settled in such location immediately before or after the IDP settlement. Such migration can be systematically correlated with specific characteristics of the individuals that can be correlated with our outcome variables. For example, wealthy households with healthier children may instantly relocate from the IDP location to another non-IDP location after the IDP has settled in their community. As a result

[17] Moving forward, the estimation will be based on the primary explanatory variables that considers the different proximity thresholds (not the relative proximity indicator) and birth cohort.

of such endogenous movement, the influence of IDP settlement on child well-being may be underestimated. We conduct numerous tests to alleviate this issue, including demonstrating that household migration status is not systematically connected with whether or not the location of residence is IDP exposed, based on our IDP exposure measures. This conclusion is supported by Table A1 in the appendix, which decreases the likelihood of bias in the results resulting from differential migration patterns across households.

Furthermore, we perform a re-estimation of the major findings in Table A2 of the appendix, taking into account the influence of endogenous migration. We utilize a widely used adjustment approach in policy studies that accounts for confounding factors (see Freyaldenhoven et al., 2019; McGavock, 2021). We incorporate a variable to account for whether the child's household migrated in the periods directly preceding or following the settling of internally displaced persons (IDPs) in their community. The status in question would have been established two years before 2011 and three years until 2013, as it pertains to the eldest child whose family may have moved shortly after the IDP settlement before the 2013 DHS survey. We instrument this variable with the average ever-migrated status of the household who migrated in three years before (lags) and two years after (leads) 2011 in the community of the sampled household and the child's birth year. The results, which can be found in Table A2 in the appendix, indicate that including this instrumented control does not significantly alter the findings presented in Figures 9 and 10, as well as Table 1. To summarize, our analysis shows that endogenous migration does not influence the previous results.

*Placebo Test*

In addition, we conduct a placebo check to verify that the observed effects in this study are indeed caused by the unique location of the IDP settlements inside the communities of the households. We conduct a simulation-based placebo test by generating a series of placebo distances between households and the nearest IDP settlement. Each household is allocated a random and falsified distance, while the birth cohort remains unchanged. We estimate the

coefficients for the treatment effect (IDP exposure × Cohort), where IDP exposure is the false distance between the household and the IDP settlement, and Cohort is a binary indicator for children born in 2011 or later, after the IDP settlement took place. According to Figure A1, the estimate we provide for the interaction effect is not significant at the traditional levels. This strongly implies that the effects seen in this paper regarding the impact of the IDP settlement on the respondents' locality are only noticeable when the exact distance between the households and the IDP settlement is taken into account. When arbitrary distances, some of which may coincidentally align with other confounding factors, are applied, we do not observe "effects" that are nearly as significant.

## 7. Secondary Outcomes[18]

The results discussed thus far indicate that the establishment of IDP settlement sites in the community of the households led to an improvement in the anthropometric outcomes of children in the host community. As shown in the previous section, these results are robust to placebo test and is not influenced by endogenous migration. Yet, it is unclear what is causing these estimated effects. There are diverse reasons to expect an improvement in child anthropometric outcome with the influx of IDPs into their community, including increase in economic opportunities and the inflow of donor-funded healthcare initiatives[19] that may not have existed in the community if not for the influx of IDPs.

On the one hand, the resulting population surge of IDP population in the host community may lead to increase in local service demand and changes in local labor market, as seen in Foged and Peri (2016). On the other hand, if donor-led health initiatives expand in the IDP settlement community to support the wellbeing of the displaced individuals and households or if the current health facilities in the community is strained by the inflow of IDPs and the

[18] We only consider plausible channels based on data availability.
[19] The effectiveness of aid flow for improved health outcomes of vulnerable population remains an empirical concern that is outside the scope of this study.

initiatives are introduced to cushion the healthcare shock, children with birth years after the IDP inflow might experience improvements in their health outcomes because of the advantages associated with these health initiatives. In this section, we discuss these issues and estimate the results based on data availability.

### *7.1. Economic Opportunities*

As earlier noted in Figure 5, the economic consequences of internally displaced persons (IDPs) stem from existing research, which suggests that an influx of migrants can have both beneficial and detrimental effects on local workers. These effects can manifest in terms of (un)employment, occupational mobility, the skill composition of the local workforce, labor market transition, and the impact on the types of professions that members of the host community pursue (Ruiz and Vargas-Silva, 2015; Foged and Peri, 2016; George and Adelaja, 2021). Thus, if we assume that these changes are observed in the job prospects for members of the local community, it becomes clear that there is a direct impact on the wellbeing of children. This is supported by conclusive research on the relationship between a mother's employment status and the well-being of her children (Chuard, 2020).

We consider this mechanism in this study by relying on the indicators of labor engagement and the quality of employment, as follows: a binary indicator, (a) if the mother/respondent is working in the survey year and earns cash from such work (*work*); (b.) if the kind of work engaged by the respondent is in the agricultural sector (*agric jobs*); (c.) if the work is in other professional jobs, including professional, sales, services or skilled manual jobs (*other professional jobs*). We estimate equation (2) by considering these indicators as outcomes that depict changes in economic opportunities in the community with the inflow of IDPs. The results are presented in columns 1 to 3 of Table 2, showing that the labor market channel akin to changes in economic opportunities is not a credible channel explaining the effect of IDP settlement on child wellbeing – in terms of the likelihood of resident working or working in a job outside their home. However, we observe an increase of approximately 6 to 9 percentage

points in the probability of mothers engaging in agricultural employment when IDP settlements are established within a distance of 10 and 11 to 25 kilometers from their place of residence, as opposed to other professional occupations.

The observed result could be attributed to a surge in the demand for various agricultural crops due to the influx of IDPs, as a result of increases in the price of these locally produced goods (Alix-Garcia and Saah, 2010). Figure 11 depicts such increases in the price of major locally produced food items in IDP settlement locations following the arrival of IDPs. These locations in Nigeria is primarily agricultural production[20], thus allowing residents engaged in agriculture to either continue with their current activities or switch to cultivating different crops, as seen with forced migration shock in Tanzania (Ruiz and Vargas-Silva, 2015). As a result, the increase in demand for locally produced crops may have caused changes in the intra-household allocation of activities and labor, resulting in a shift or intensification of household labor towards higher crop production. As a consequence, household income increases due to more IDP settlements in locations closer to their residents (Ruiz and Vargas-Silva, 2017).

**Figure 11 Here**

*7.2. Increase in Donor-led Health Initiatives in IDP Communities*

As demonstrated in Figure 5, the existence of internally displaced persons (IDPs) might have prompted donors to engage in humanitarian efforts within IDP settlement communities, potentially leading to improved child well-being. To substantiate this argument, we present in Figure A2 a correlational evidence showing increase in health-related humanitarian Aid in locations closer to IDP settlements. We utilize geocoded data from AidData[21] that categorizes World Bank-funded projects in the International Bank for Reconstruction and Development (IBRD) and International Development Association (IDA) lending lines by sector, serving as a proxy for aid flow to the respective IDP communities[22].

[20] Two of every three households in this region produce crops, with 84% of households in the northeast engaging in crop production and 69% raising livestock (Oladunni et al., 2022).
[21] See AidData (2017).
[22] We are aware of no other publicly available micro-level dataset pertaining to aid projects in our study region.

The World Bank, a prominent donor in Africa, was the primary donor in Nigeria (2000-2014), funding 31% of documented aid projects in the country (Archibong et al., 2023). Based on the provided data, which comprises the classification of World Bank (WB)-funded projects, the amount of aid disbursed, and the location and sectors of such projects between 2011 and 2013, we estimate the distance between internally displaced persons (IDP) settlements and the nearest aid projects (health-related aid project)[23]. Therefore, subsequent analysis examines how the proliferation of donor-health projects in the IDP population impacts the well-being of children by focusing on metrics that align with the actions of donor-funded health efforts, such as vaccinations, access to insecticide-treated bed nets, and use of health services by beneficiaries.

*Vaccination:* As evidenced by contemporaneous data and an NGO report, the influx of IDP settlements led to the expansion of a vaccination campaign that benefited IDP host communities, including educating families on the importance of vaccination, such as when and where to have their children vaccinated (Njoku, 2023). In determining the child's vaccination status, we utilized a standardized measurement of the child's vaccination history. That is, we computed the sum of having taken BCG (Bacille Calmette-Guérin), DPT (diphtheria, pertussis, tetanus), HepB (hepatitis B), Hib (Haemophilus influenza type b), three doses of polio vaccine (Polio 1, 2, and 3), Polio 0 (birth dose of OPV), and Measles containing vaccine (MCV) vaccinations. Subsequently, the variable underwent standardization through the process of subtracting the mean of the sample from the sum of each child, which was then normalized by the standard deviation of the sample.

The mean number of immunizations administered to the children in the sample is roughly four, with some children having had none and others having received nine shots. The

[23] The reason we prioritize this project is because our data indicates that this specific category of Aid projects is more prevalent in areas that are in close proximity to IDP settlements. This is in contrast to other types of Aid projects, such as those that aim to enhance infrastructure (see to Figure A2).

child in the birth cohort whose family lives in close proximity (within 10 kilometers) received 0.14 standard deviation more immunizations (see column 4 of Table 2). Those in more distant communities (i.e., more than 10 kilometers from the IDP settlement) showed no such significant effect, supporting the claim that expanding the vaccination campaign may have a significant spillover effect on vaccination uptake by children in communities close to the settlement.

*Insecticide Treated Bed Nets (ITNs):* Access to ITNs, which are provided by donors in the majority of SSA countries (Desmon, 2020), serves as a secondary measure of donor involvement in IDP host communities. Indeed, acquiring bed nets is unattainable in this particular context, since only affluent households do so from informal markets and donor-supplied nets that have leaked (Olapeju et al., 2019). Exploring treatment effects for the likelihood of the household having ITNs could thus provide insight into how enhanced donor-led healthcare activities from IDP inflows could benefit child wellbeing.

The DHS offers information on whether the household has ITN, which is an important indicator of NGOs' activity in the respondents' community (Marty et al., 2017). In the sample, around 49 percent of the households have ITNs[24]. The estimates in column (5) reveal a positive effect for households living within a 10-kilometer radius of the IDP settlement, but this effect is not statistically significant. We also find no meaningful effect for various distance bands.

*Health Services:* The increase in donor-activities can also be seen with the expansion of the skillset and improvement in the work facility for local health providers, seen by support of local health centers with medicines and supplies and the training of health workers on effective service delivery (UNICEF, 2018). Assuming this is the case, we would expect to see increase in health investments by mothers residing in locations closer to the IDP settlements. Since, for example, maternal investment in this service may strain the household budget (Ademuyiwa et

[24] Note that the household actual usage of the ITN is not the focus of this study and was not considered for this analysis.

al., 2020), we would expect that without the availability of such service by donor-agencies in the IDP community, the uptake of any health services would be smaller.

This variable is measured using the (standardized) number of antenatal visits made by the mother of the sampled child[25], and we estimate our regression using this indicator as the outcome of interest. The results suggest that the mother of the affected child who lives close to the IDP settlements (within a 10-kilometer radius) had a non-significant increase in the frequency of antenatal visits. Other distance threshold shows a similar non-significant effect.

*Sanitations:* Finally, another benefit from donor presence is improved sanitation activities, including the WASH programme, that was promoted by NGOs and donors in the IDP community for healthy living. Specifically, improving access to safe water and sanitation services under the Water, Sanitation, and Hygiene (WASH) programmes in host communities was an important highlight of NGOs activities in response to IDP flow (UNICEF, 2018). The indirect effect of this campaign on child health is a settled evidence, as research has shown a direct effect of sanitation and access to safe water on child health outcomes (Lamichhane and Mangyo, 2011; Hammer and Spears, 2016).

In Table 2, columns 7 and 8, we present estimates of the household's distance to water access (minutes of walking distance to water access) and the likelihood of engaging in open defecation - the household lacks a toilet facility. According to the findings, there is no difference in estimates for these variables between cohort and non-cohort children based on their household's proximity to IDP communities. In other words, the influence of non-governmental organisations (NGOs) on sanitation may not be a valid pathway for understanding the effect of proximity to IDP settlements on child well-being. This conclusion may be due, among other reasons, to the low intensity of NGO infrastructure investment in these communities, as illustrated in Figure A2.

[25] Due to data constrain, we do not consider an alternative post-natal visit measure.

**Table 2 Here**

## 8. Conclusions

This paper documents the spillover effect of the IDP settlement on wellbeing of the children of the locales in Africa's most populous country, Nigeria, and establishes that the IDP settlements led to improvements in anthropometric outcomes of affected children. These are children whose birth years coincides with periods of the IDP settlements in their community and who resides in communities that are in close proximity to the IDP settlement. Specifically, we show that these children are less likely to be underweight, stunted, and wasted. They are also less likely to be underweight and stunted. This result is evidently not driven by strategic location-specific advantages or favorable economic fluctuations that benefit one birth cohort over the other. We explain that this result is seen because of a likely shift in household labor activities towards intensifying agricultural production for improved household earnings and increase in vaccination efforts because of the expansion of donor-led activities in the host communities. That is, mothers of affected children are more likely to intensify their labor production in the agricultural sector and these children record higher vaccination.

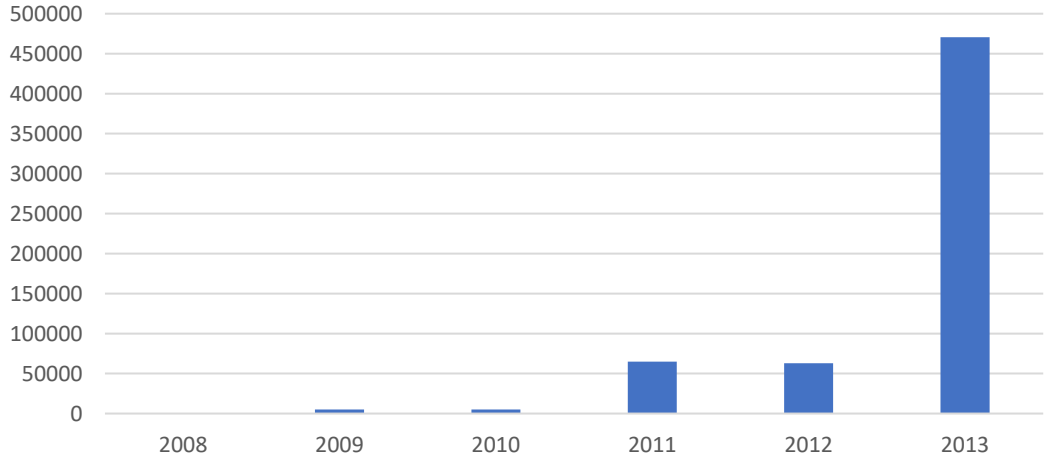
Our findings have significant implications for countries dealing with expanding IDP settlements and attempting to adapt to this situation despite internal political pressure and host community resistance. Policy actions that successfully manage donor resources flowing into these communities and maintain the labor market system to ensure continuing and productive labour engagement, particularly in the agricultural sector, may result in generational benefits for host community children as IDP communities expand (Ruiz and Vargas-Silva, 2017; Njoku, 2023).

This study has its own limitations, which could be an opportunity for future studies. First, due to data limitations, in terms of the extent of reportage in the DHS data, we do not study other health or wellbeing outcomes. We are cautiously optimistic that the result may be similar with the earlier findings. Second, because the study was not designed to test for causal

pathways, the conclusions on mechanisms should be viewed with caution. At best, they are suggestive evidence to explain the reason for changes in the primary outcome variables due to IDP inflow. Studies to elicit mechanisms are an interesting area for future work, particularly, in the context of Nigeria where this evidence remains sparse.

# LIST OF FIGURES

**Figure 1: Trend of IDP Settlements in Nigeria**




Source: Data from Internal Displacement Monitoring Centre, https://www.internal-displacement.org/

**Figure 2: IDP Settlements in Nigeria 2011 to 2013**

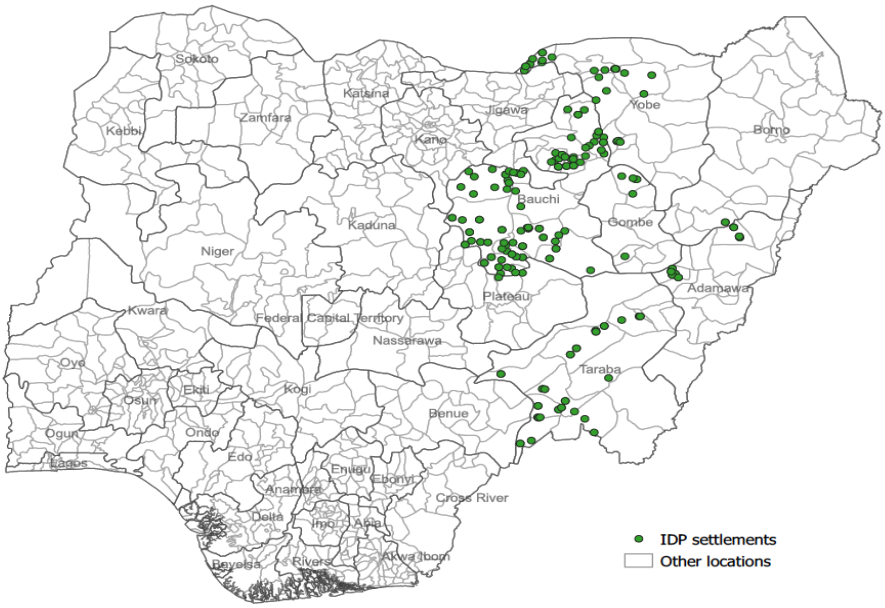


**Figure 3: IDP Settlements and Conflict Locations in Nigeria 2011 to 2013**

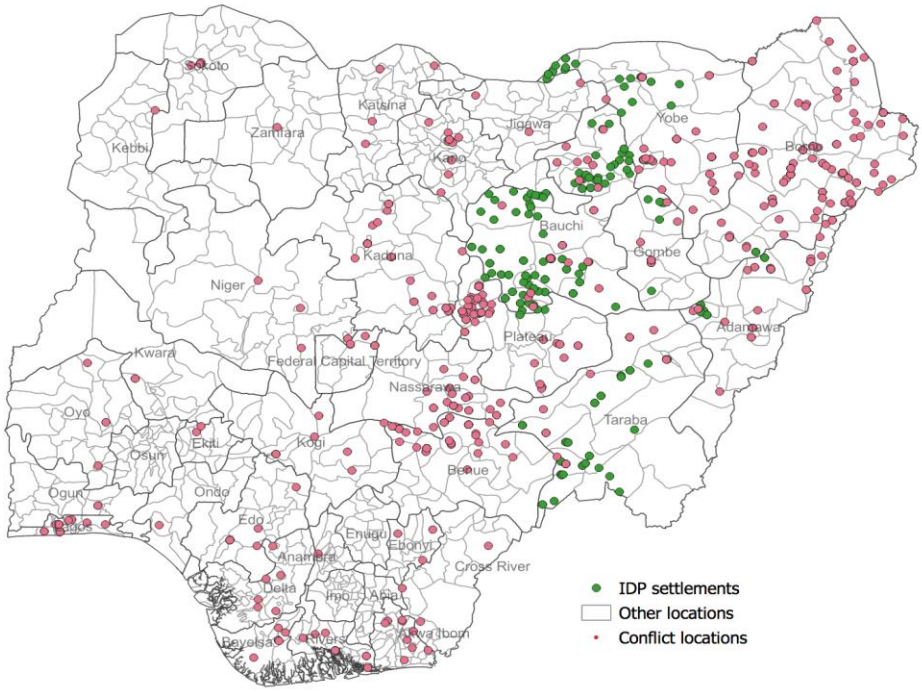
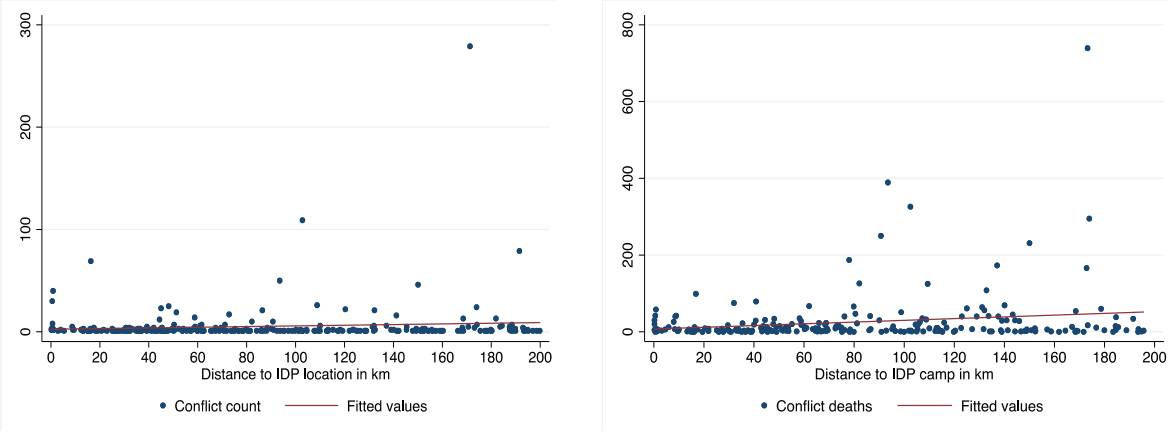



**Figure 4: Conflict Incidence by Distance to IDP Locations**




**Source:** Conflict count data comes from ACLED and conflict deaths data comes from Uppsala Conflict Data Program for periods 2011 and 2013.

**Figure 5: Conceptual Framework Explaining the Interaction between IDP Settlements and Host Communities**

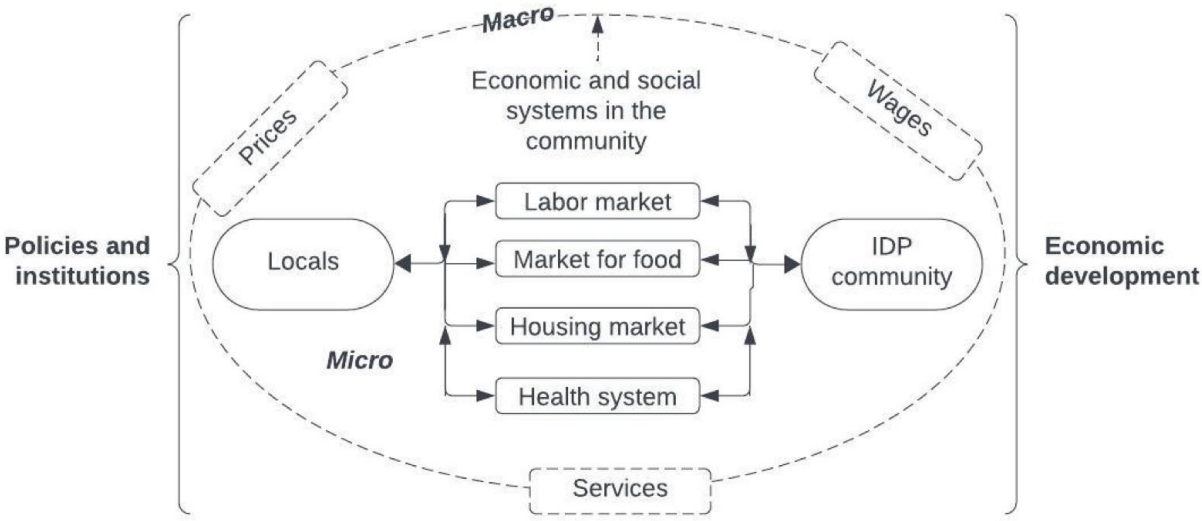
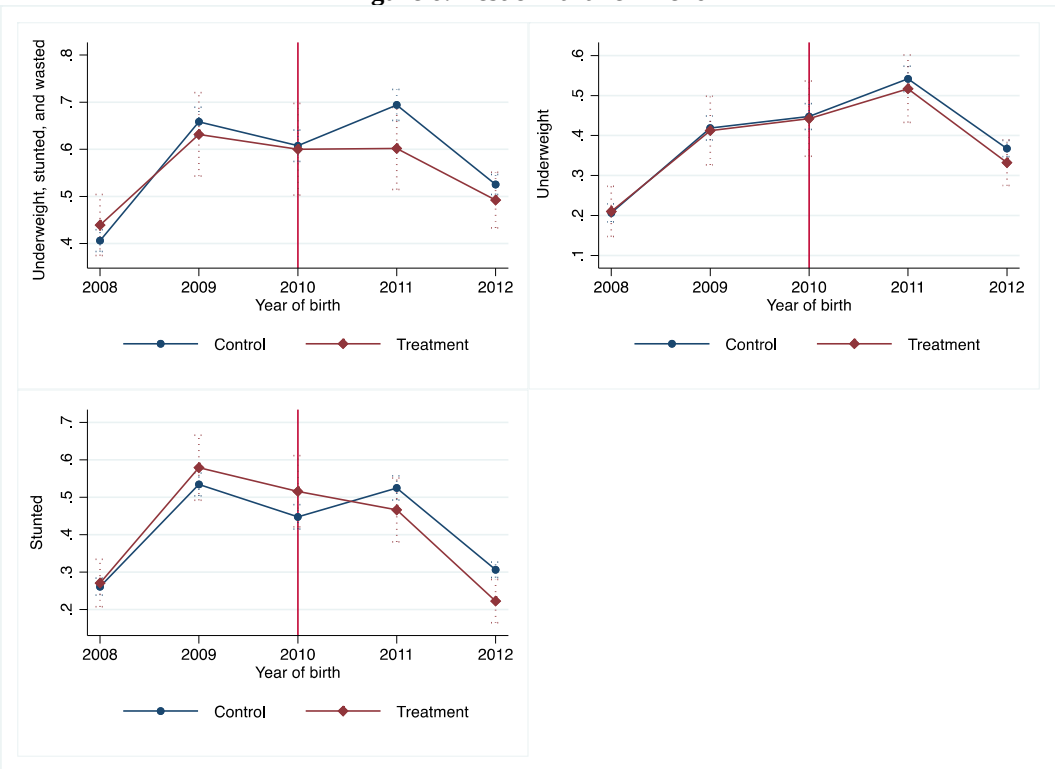
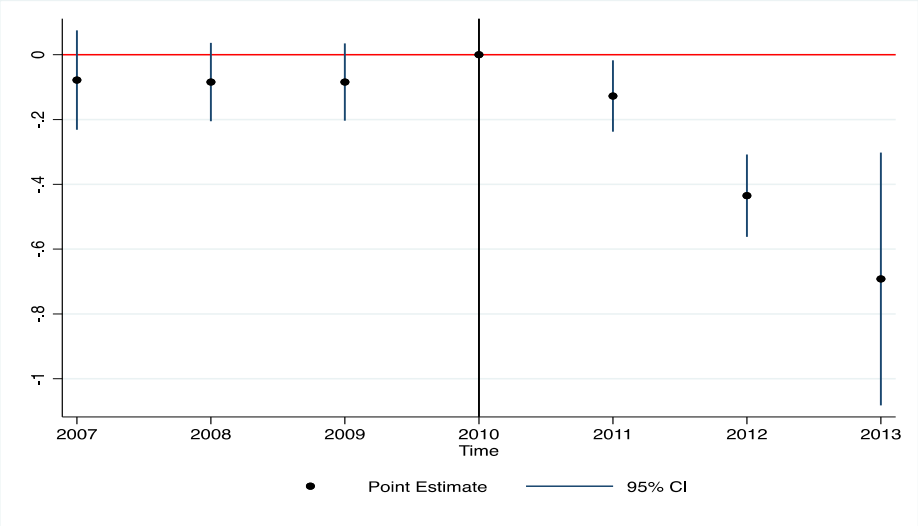



**Figure 6: Test of Parallel Trend**




**Note:** The estimates in Figure 6 shows the averages of the outcomes for the treatment and control group over birth years of the children. We use the primary indicator of exposure (i.e., 10km cut off) to determine treatment, such that the *Treatment* are children in the cohort whose household resides within 10km proximity to the IDP settlement. The *Control* on the other hand are those children whose birth year coincide with other periods before the IDP inflow, those who reside in distances outside 10km proximity to the IDP settlement, or those cohort children who reside in distances outside close proximity to the IDP settlement. We only consider periods closer to the year of the first IDP settlement and the years immediately after the IDP settlement.

**Figure 7: Effects on Child Anthropometric (i.e., being Underweight, Stunted, and Wasted) Measure Over time**




**Note:** We grouped all observations within the five years before 2011 (i.e., 2007) and three years after the reform (i.e., 2013, the last survey year for this study). The estimates are based on equation 2 that shows effects for each birth year for those in the treatment group relative to the control.

**Figure 8a: Effects on Likelihood of being Underweight Over time**

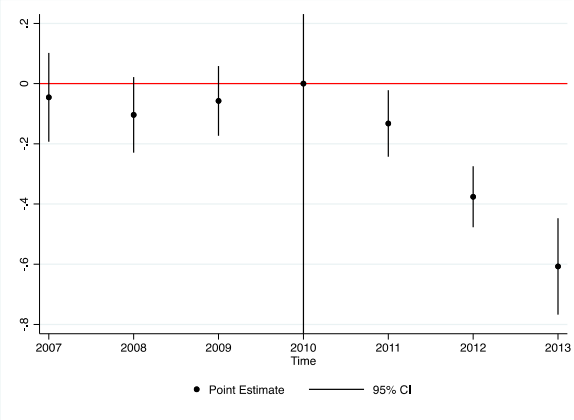
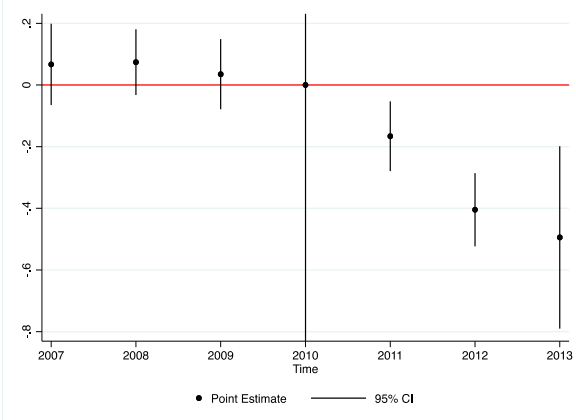
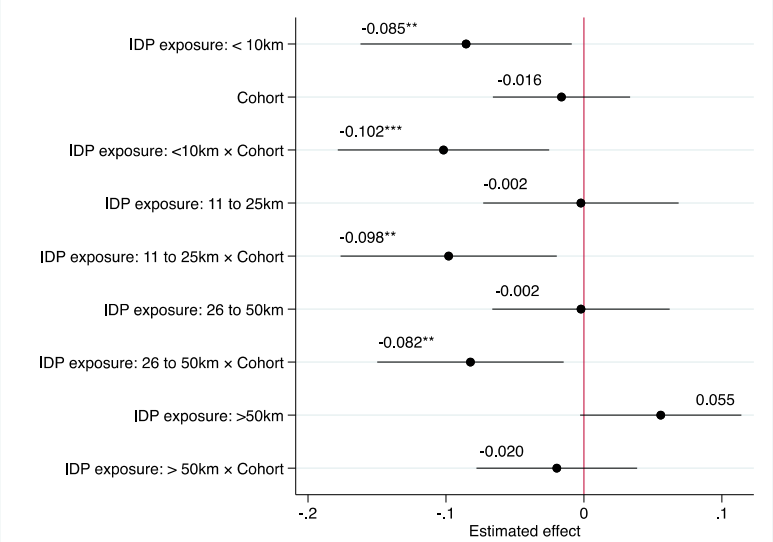



**Figure 8b: Effects on Likelihood of being Stunted Over time**



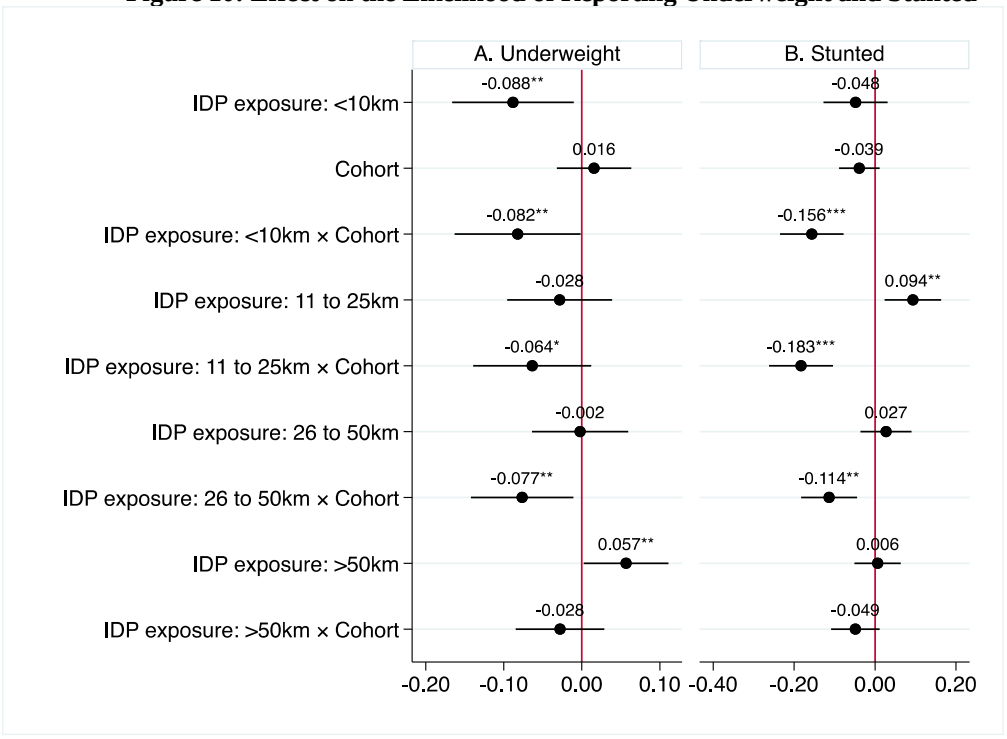

Note: We grouped all observations within the five years before 2011 (i.e., 2007) and three years after the reform (i.e., 2013, the last survey year for this study). The estimates are based on equation 2 that shows effects for each birth year for those in the treatment group relative to the control.

**Figure 9: Effect on Likelihood of Reporting Underweight, Stunted, or Wasted**



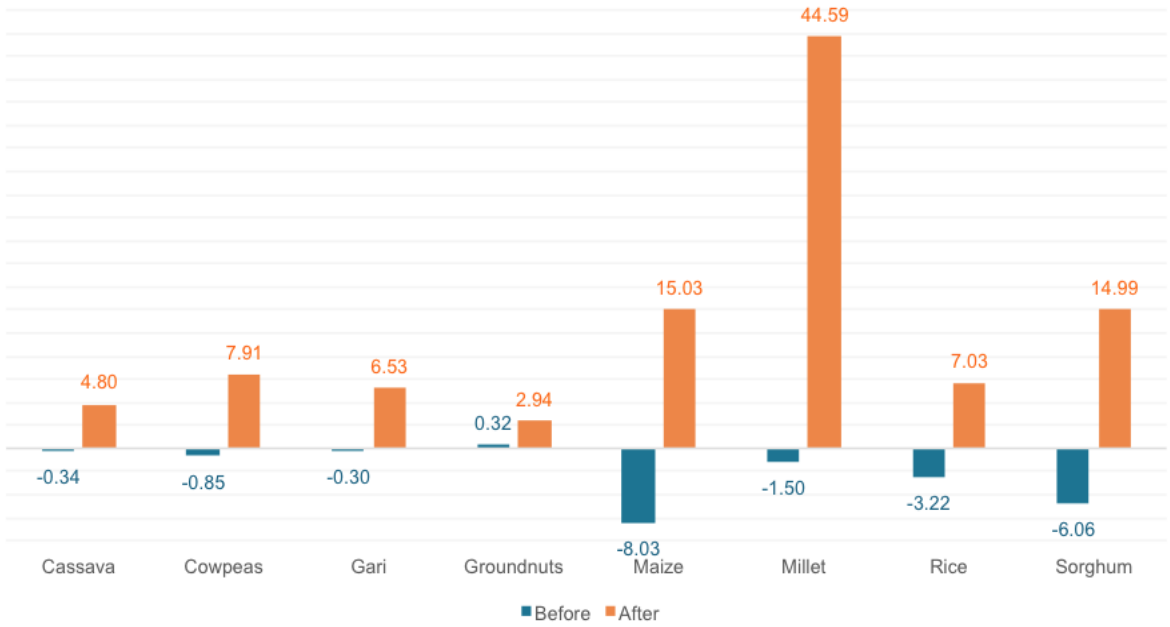

Notes: These estimates are based on equation (1). The outcome variables is the likelihood of the child reporting underweight, stunted, or wasted, such that the weight-for-age, height-for-age, and weight-for-height are below minus two standard deviations (and not above plus two standard deviations). The following control variables are included for all the estimates, household size, rural dummy, the education status and age of the woman/mother. ∗∗∗p < 0.01, ∗∗p < 0.05, ∗p < 0.1.

**Figure 10: Effect on the Likelihood of Reporting Underweight and Stunted**




Notes: Estimates presented in Figure 10 are from equation (1), with the outcome variable being the individual indicators of underweight and stunted. The control variables are household size, rural dummy, the education status and age of the woman/mother. ∗∗∗p < 0.01, ∗∗p < 0.05, ∗p < 0.1.

**Figure 11: Changes in Locally Produced Food Prices Before and After IDP Inflow**




**Note:** The estimates represent price inflations for various agricultural produce/foods in just LGAs with IDP settlements. Based on data availability and clear identification of local governments when matching data sources, we consider the two years before and after the 2011 IDP settlements to represent the periods immediately preceding and after the settlement. Aside from the clear increases in food prices observed after IDP settlement, the figure also shows that the highest price changes are recorded for crops primarily produced in these states, such as millet (Yobe and Borno states), maize (Gombe, Bauchi, Taraba, and Borno states), and sorghum (Adamawa, Plateau, and Borno states).

**Source:** Authors computation from Andree (2021) monthly food price estimates by product.

# LIST OF TABLES

**Table 1: Relative Proximity to IDP Settlements and Anthropometric Outcomes**

| | Anthropometric measure | Underweight | Stunted |
|---|---|---|---|
| Relative proximity | -0.027 | -0.033* | 0.033* |
| | (0.018) | (0.017) | (0.017) |
| Cohort | 0.000 | 0.671* | 0.001 |
| | (0.000) | (0.343) | (0.000) |
| Relative proximity × Cohort | -0.073*** | -0.055*** | -0.111*** |
| | (0.017) | (0.018) | (0.018) |
| Observations | 19,078 | 19,078 | 19,078 |
| R-squared | 0.195 | 0.185 | 0.169 |
| Covariates | Yes | Yes | Yes |
| Fixed effects | Yes | Yes | Yes |

Notes: The proximity indicator is the relative distance of the household to the closest IDP settlement. The outcome variable, anthropometric measure, is a binary indicator if the child is underweight, stunted, or wasted. The other individual indicators of underweight and stunted are as earlier defined. The control variables are household size, rural dummy, the education status and age of the woman/mother. The standard errors are displayed in parenthesis. $***p < 0.01$, $**p < 0.05$, $*p < 0.1$.

**Table 2: Increased Donor-Funded Healthcare Initiatives in the IDP Communities**

| | **Economic opportunities** | | | **Donor-led Health Initiatives** | | | **Sanitation** | |
|---|---|---|---|---|---|---|---|---|
| | Work | Agric jobs | Other professional Jobs | Vaccination | HH has ITN | Antenatal visit | Access to water | Open defecation |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| IDP exposure: <10km × Cohort | -0.067* | 0.060** | -0.061 | 0.138** | 0.047 | 0.050 | 0.027 | 0.006 |
| | (0.039) | (0.025) | (0.039) | (0.066) | (0.035) | (0.052) | (0.037) | (0.038) |
| IDP exposure: 11 to 25km × Cohort | -0.025 | 0.089*** | -0.034 | 0.053 | -0.026 | 0.053 | 0.022 | 0.036 |
| | (0.038) | (0.028) | (0.037) | (0.075) | (0.036) | (0.057) | (0.038) | (0.039) |
| IDP exposure: 26 to 50km × Cohort | 0.003 | 0.030 | -0.003 | 0.028 | -0.016 | 0.064 | 0.002 | 0.028 |
| | (0.030) | (0.024) | (0.030) | (0.075) | (0.030) | (0.046) | (0.029) | (0.029) |
| IDP exposure: over 50km × Cohort | 0.039 | 0.001 | 0.013 | -0.063 | -0.032 | -0.040 | 0.003 | 0.001 |
| | (0.027) | (0.021) | (0.027) | (0.061) | (0.028) | (0.042) | (0.028) | (0.025) |
| Observations | 19,078 | 19,078 | 19,078 | 19,078 | 19,061 | 11,892 | 18,984 | 18,991 |
| R-squared | 0.286 | 0.541 | 0.310 | 0.431 | 0.432 | 0.369 | 0.524 | 0.564 |
| Covariates | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Fixed effects | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |

Notes: Estimates presented in Table 2 are analysis from equation (1). The outcome variable are the indicators of economic opportunities and donor-led health initiatives, as earlier defined. The estimation includes the direct indicators for the cohort and the different distance threshold. We do not report these indicators for space. The control variables are household size, rural dummy, the education status and age of the woman/mother. The standard errors are displayed in parenthesis. $***p < 0.01$, $**p < 0.05$, $*p < 0.1$.

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# APPENDIX

**Table A1: Migration and Proximity to IDP Settlements and Anthropometric Outcomes**

| | Household migration status | |
|---|---|---|
| | (1) | (2) |
| IDP exposure: <10km | 0.007 | 0.010 |
| | (0.095) | (0.095) |
| IDP exposure: 11 to 25km | 0.095 | 0.099 |
| | (0.084) | (0.084) |
| IDP exposure: 26 to 50km | 0.048 | 0.051 |
| | (0.068) | (0.068) |
| IDP exposure: 51 to 75km | 0.047 | 0.048 |
| | (0.048) | (0.047) |
| IDP exposure: 76 to 100km | 0.073* | 0.073* |
| | (0.041) | (0.040) |
| Observations | 16,096 | 16,096 |
| R-squared | 0.507 | 0.509 |
| Covariates | No | Yes |
| Fixed effects | Yes | Yes |

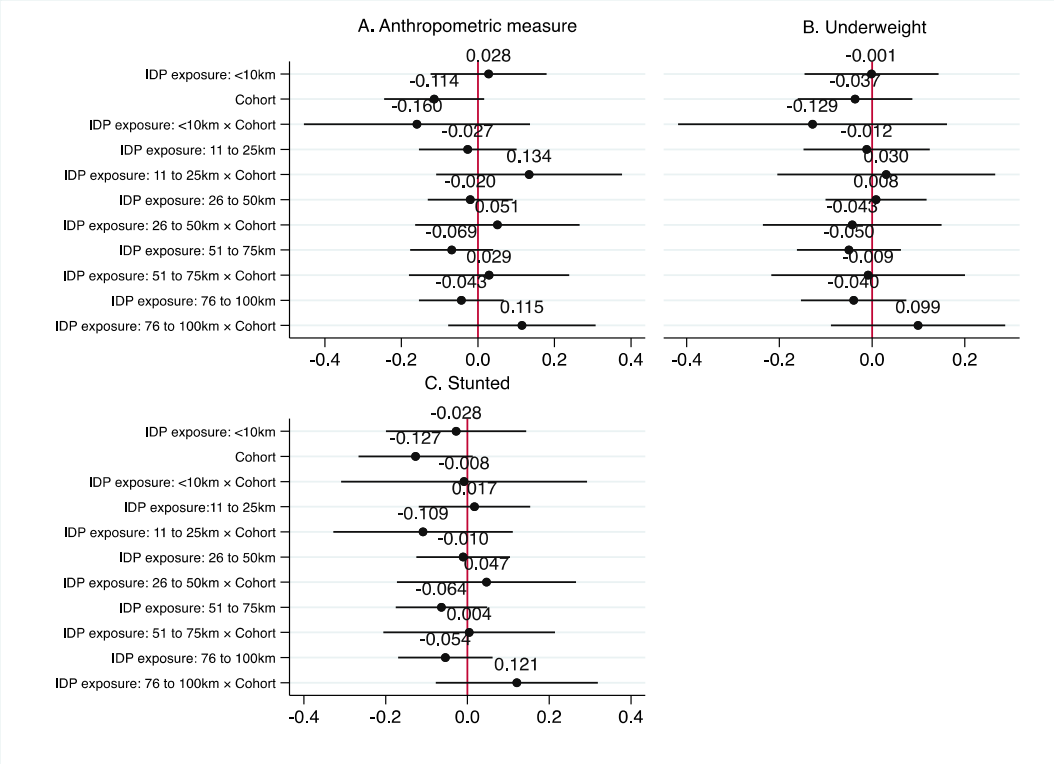
Notes: Estimates presented in Table A1 are from equation (2). The outcome variable, is the likelihood of migration. The only explanatory variable reported is the proximity variable. The control variables are household size, rural dummy, the education status and age of the woman/mother. The standard errors are displayed in parenthesis. $*p < 0.1$.

**Table A2: Proximity to IDP Settlements and Anthropometric Outcomes, Controlling for Ever-Migration Rates**

| | Anthropometric measure | Underweight | Stunted |
|---|---|---|---|
| IDP exposure: <10km × Cohort | -0.113*** | -0.076* | -0.172*** |
| | (0.037) | (0.042) | (0.040) |
| IDP exposure: 11 to 25km × Cohort | -0.119*** | -0.067** | -0.204*** |
| | (0.038) | (0.030) | (0.040) |
| IDP exposure: 26 to 50km × Cohort | -0.112*** | -0.082** | -0.146*** |
| | (0.033) | (0.034) | (0.034) |
| IDP exposure: 51 to 75km × Cohort | -0.078** | -0.051 | -0.132*** |
| | (0.038) | (0.038) | (0.041) |
| IDP exposure: 76 to 100km × Cohort | -0.071** | -0.072* | -0.112*** |
| | (0.036) | (0.039) | (0.041) |
| Ever migrating rates | 0.024 | 0.038 | 0.034 |
| | (0.038) | (0.038) | (0.039) |
| Observations | 16,096 | 16,096 | 16,096 |
| R-squared | 0.195 | 0.189 | 0.170 |
| Covariates | Yes | Yes | Yes |
| Fixed effects | Yes | Yes | Yes |

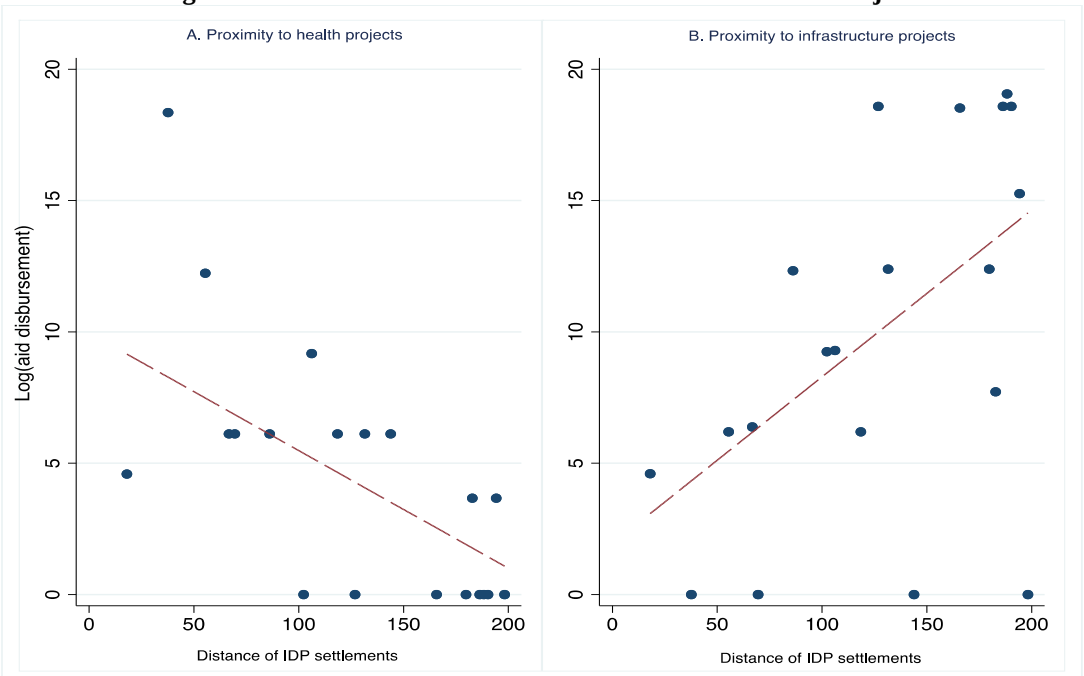
Notes: We only report the main estimate – the interactive term between the indicators of proximity (both the binary and linear indicator) and the birth cohort dummy. The estimates of the other indicators are not reported for space. The outcome variable, anthropometric measure, is a binary indicator if the child is underweight, stunted, or wasted. The other individual indicators of underweight and stunted are as earlier defined. The control variables are household size, rural dummy, the education status and age of the woman/mother. It also includes the average ever migrated status of the household who migrated in two years before (lags) and two years after (leads) 2011. The standard errors are displayed in parenthesis. $***p < 0.01$, $**p < 0.05$, $*p < 0.1$.

**Figure A1: Using a Pseudo Distance to IDP Settlement for our Analysis**




Notes: Estimates presented in Figure A1 are from equation (2). The outcome variable, anthropometric measure, is a binary indicator if the child is underweight, stunted, or wasted. The other individual indicators of underweight and stunted are as earlier defined. The control variables are household size, rural dummy, the education status and age of the woman/mother.

**Figure A2: Distance of IDP Settlements to Closest WB-Aid Projects**




**Note:** Aid data comes from Aid Data from the World-bank-geocoded-research-release-level-1-v1-4-2. We define two categories of projects as follows – health and infrastructure projects – if any of the listed projects correspond with the classification. Panel A shows that on the average, the IDP settlements closer to the health-related projects

receive higher WB disbursements unlike locations that are farther from the IDP settlements. In contrast, Panel B shows higher WB-disbursement for infrastructural projects in locations farther from the IDP settlements.