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By: **Hye-Sung Kim**, Yong Yoon, and Mary Mutinda

Abstract

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Secure land tenure for urban slum-dwellers: A conjoint experiment in Kenya

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ABSTRACT

Until recently, improving land tenure security has been an integral part of slum upgrading initiatives aimed at improving living conditions in urban slums. However, there is limited empirical evidence on whether slum dwellers find housing options with improved tenure security preferable and whether they can afford such options. This study identifies the causal effects of improving land tenure security on slum dwellers' preferences and abilities to afford alternative, upgraded housing options. To this end, it employs a conjoint experiment embedded in a public opinion survey on a sample of 3,715 respondents from five urban slums in Nairobi and its outskirts. Our experiment has three main findings. First, slum dwellers prefer a more secure land tenure type rather than contested land when considering where to live, but this preference depends on the respondents' informal settlement, occupation, and stated reasons for living in the slum. Second, improvement of land tenure security has almost no influence on slum dwellers' abilities to afford upgraded housing options. Instead, the cost of rent is the most important factor determining affordability. Finally, slum dwellers' preferences and affordability frequently do not overlap. For instance, over half (56%) of the respondents who prefer the housing option with a more secure land tenure type—that is, land with clear ownership—over contested land are unable to afford it. Therefore, improving land tenure security alone will have limited success in helping slum dwellers transition to housing options with improved living conditions. Instead of one-size-fits-all land formalization policies aiming at improving land tenure security, policies should be designed specifically for each informal settlement to address its residents' unique needs and interests.

1. Introduction

Around 60% of the population in Sub-Saharan Africa lives in slums (UN-Habitat, 2016). In Kenya's capital city, Nairobi, there are more than 260 slums, housing over 2 million people on less than 5% of the total residential land (Amnesty International, 2009). Despite significant progress, the access to basic public services in slums is still lower than in formal settlements (Bird, Montebruno, & Regan, 2017; Talukdar, 2018).¹ Arguably, the absence of secure land property rights limits the land owners and tenants in making any meaningful investments, which has been a major barrier to improving services and other basic infrastructure in slums (Brueckner & Lall, 2015; Marx, Stoker, & Suri, 2013). Consequently, various governments have implemented slum upgrading initiatives, focusing on improving land tenure security. Nonetheless, empirical evidence on the demand side effects, namely whether slum

dwellers do find the improvements from these initiatives desirable and their rental or housing payments remain affordable, is lacking in the literature. This study empirically demonstrates that improving land tenure security without addressing affordability can only have limited success in relocating slum dwellers to upgraded housing and formal settlements.

An extensive literature has argued that improving land tenure security is an integral part of improving the living conditions of slum dwellers (Croese, Cirolia, & Graham, 2016; El-hadj, Faye, & Geh, 2018; Handzic, 2010; UN-Habitat, 2006). Standard economic theories predict that infrastructure and services will improve in slums with more secure land tenure, as improved property rights would increase the incentives for investing in land (De Soto, 2000; Field, 2005). In the same vein, extant studies provide evidence that land titling initiatives may benefit the poor by increasing investment in land (Brasselle, Gaspard, & Platteau, 2002; Do & Iyer, 2008; Field, 2005; Galiani & Schargrodsky,

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¹ Talukdar (2018) shows that the disparity in access to some services between formal settlements and slums in Nairobi has significantly reduced over time. Almost all slum dwellers have now some access to primary education. Regarding other basic services, such as access to in-house electricity and public transportation, despite improvements, there remains considerable disparity compared to formal settlement areas.

2010). However, in terms of the broader impacts, several studies have shown that the policies aimed at improving land tenure security in slums do not always have the intended results. Particularly, some slum upgrading initiatives have benefitted structure-owners and the middle-class rather than slum dwellers (Bassett, 2005, 2007; Huchzermeyer, 2008; Rigon, 2016). As such, many newly relocated slum dwellers often find their mortgage repayments too high and end up renting their units and returning to slum dwelling (Huchzermeyer, 2008). Until recently, however, a systematic empirical examination of the causal relationship between improving land tenure security and the intended beneficiaries of slum upgrading initiatives using disaggregate micro-level data has largely been missing in the relevant literature.

To mitigate the unintended consequences of slum upgrading programs, it is essential to understand the likely changes in the preferences and financial abilities of slum dwellers as land tenure security improves. Slum dwellers' successful transition to upgraded housing depends on both their preferences and the ability to afford the upgraded housing. Recent evidence shows that legal tenancy rights are positively associated with monthly rents, indicating that tenure security is highly valued by slum dwellers (Talukdar, 2018). However, monthly rents not only reflect renters' preferences but also their financial constraints. To the best of our knowledge, there is no empirical study identifying the causal effects of improving land tenure security on both slum dwellers' preferences and upgraded housing affordability.

To address this gap in the literature, we conducted a survey-based conjoint experiment embedded in a public opinion survey on a sample of 3,715 respondents from five urban slums in Nairobi, Kenya and its outskirts, namely Riara, Mukuru Kwa Ruben, Mukuru Kwa Njenga, Viwandani, and Kiandutu. Specifically, the respondents were presented with a hypothetical upgraded housing option, where the features of housing and residential characteristics, including the land tenure type with varying level of land tenure security, are randomly varied. Respondents were then asked to choose a preferred option between the upgraded housing and their current slum dwelling and whether they could afford the upgraded alternative housing. We analyzed the responses of all respondents from the five sampled slums together, as well as separately. The sub-group analyses enabled us to test whether the effect of land tenure type on slum dwellers' preferences and their affordability of housing varies by the informal settlement they reside in, their reasons for living in slums, and their occupations.

Although our study focuses on Kenya's urban slums, it could be generalized to similar settings to understand the consequences of improving land tenure security for slum dwellers. The rapid growth of the urban slum population is not a problem unique to Kenya but a worldwide challenge, particularly in Sub-Saharan Africa. Consequently, the United Nation's Sustainable Development Goals (SDGs) announced in 2015 chose the improvement of urban slums in developing countries as a primary goal (United Nations, 2015; 2016). Due to common challenges in urban slums in Sub-Saharan African countries, studies have compared different policy initiatives across Sub-Saharan African countries in terms of their trends and effectiveness (Croese et al., 2016). Overall, most large-scale slum upgrading initiatives aim to improve land tenure security as a primary goal (Croese et al., 2016; El-hadj et al., 2018; Handzic, 2010; UN-Habitat, 2006). Kenya, like many other countries in Sub-Saharan Africa, has increased its efforts to improve land tenure security and services to slum dwellers. As such, several programs have been implemented over the past decade, with spending over USD 8.8 billion (Muraguri, 2011).² Our findings could thus

provide relevant implications not only in the Kenyan context but also to similar countries striving to improve living conditions and the land tenure security of slum dwellers.

This study contributes to the literature in the following two areas. First, it contributes to the literature on the effectiveness of land formalization policies by focusing on the effects on the slum dwellers' preferences and financial constraints. The findings confirm the heterogeneous effects of improving land tenure security on preferences across different informal settlements, suggesting that one-size-fits-all land formalization policies are not likely to have the same efficacy in improving the quality of lives across different informal settlements. Second, the study further contributes to the emerging empirical literature examining housing and residential conditions from the demand side using microdata (Gulyani, Talukdar, & Bassett, 2018; Talukdar, 2018). Particularly, the use of a conjoint experimental design, which has the added advantage of avoiding endogeneity issues typical of observational studies, allows for the identification of the relative causal effects of the different attributes or factors that affect slum dwellers' preferences and affordability.

The remainder of the paper is organized as follows. Section 2 reviews the literature on the current debate on whether and how land formalization and other policies that aim to improve land tenure security benefit slum dwellers. Section 3 presents our data collection methods, experimental design, and estimation strategy. Section 4 presents the empirical findings, including sub-group analyses. Section 5 provides discussion and conclusions.

2. Literature review

There is considerable debate in the literature on whether land formalization, consisting of land titling and registration, actually benefits poor slum dwellers. Proponents of land formalization, such as De Soto (2000), consider that land titling and registration would economically benefit poor slum dwellers because, by establishing private property rights to land, land as a private asset can be traded on the market, thereby providing income to slum dwellers. However, many studies challenge this view, suggesting land formalization alone will not automatically benefit slum dwellers economically (Boone, 2019; Boone et al., 2016; Buckley & Kalarickal, 2006; Payne, Durand-Lasserre, & Rakodi, 2009). From this perspective, the following three arguments are most relevant in the case of Kenya and other Sub-Saharan African countries, namely, affordability constraints, un-targeted beneficiaries, and pre-existing de-facto land tenure security not necessarily based on private property rights provision.

First, affordability constraints often result from multiple sources. Land formalization, which includes land titling and registration, is a complex process consisting of multiple steps, from application to approval (Hendriks, Zevenbergen, Bennett, & Antonio, 2019; Schmidt & Zakayo, 2018). In each step, significant financial commitment, both formal and informal fees, and time-commitment can turn into significant constraints on those allocated land. That is, financial and procedural burdens often limit the affordability of new housing on land with legal titles. Furthermore, even if formal housing built on land with

(footnote continued)

including cash transfer programs to older persons launched in 2006 and 2009 for poverty eradication in urban slums; voucher schemes to enable poor women to deliver in hospitals implemented in 2005; providing children under 5 years of age with free treatment at public health facilities, introduced by the Ministry of Health in 2002, as well as allocation of funding for hand-washing in schools to improve health outcomes; and provision of non-formal schools in slums with governmental support under the free primary education program to improve education outcomes in urban slums. Other notable interventions in the last decade include the World Bank Water and Sanitation Programme - Africa (WSPA) in Kenya and the Pamoja Trust and the National Cooperative Housing Union (NACHU). See APHRC (2014) for details.

² An example of these efforts is the Kenya Slum Upgrading Programme (KENSUP), launched in 2004, and the Kenya Informal Settlement Improvement Project (KISIP), launched in June 2011, which were set up with an ambitious target of improving the near 1.6 million slum households by 2020 at a cost of approximately KES 884 billion or USD 8.8 billion. In addition to the large-scale slum upgrading initiatives, there have been multiple slum-specific projects,

secure tenure is considered more desirable to slum dwellers, living in such a housing unit may translate into higher rent or mortgage payments, beyond what the slum dweller may be able to afford. Consequently, because of the financial burden of land formalization, policy efforts to improve land tenure security can ultimately hurt slum dwellers instead of helping them.

Second, although the main targeted beneficiaries of slum development initiatives are poor slum dwellers who rent sub-standard structure units in urban slums, land formalization initiatives may instead benefit structure owners or middle-class non-slum dwellers. For instance, poor slum dwellers initially allocated with an improved housing units built on formal land with a legal title may find their mortgage repayments unaffordable, which could then lead them to sell or rent their units to the non-slum-dwelling middle class and return to slum dwelling (Bassett, 2005; Gulyani et al., 2018; Huchzermeyer, 2008). Additionally, land formalization often directly affects structure owners that had initially built and owned structures on land without proper legal ownership. Since most slum dwellers are renters (over 90% in our sample), land formalization may only have indirect effects for slum dweller tenants if it leads to secure tenancy rights.

Finally, in Sub-Saharan African countries, including Kenya, the actual impact of land formalization on improving land tenure security may not be as large as anticipated because there commonly exists “de facto land tenure security,” which already provides tenure security to slum dwellers (Marx et al., 2013; Payne et al., 2009).³

Recent empirical analyses address various questions, including on the effects of improving land tenure security on slum dwellers' preferences, as well as affordability constraints (Gulyani et al., 2018; Talukdar, 2018). Using hedonic regression analysis with monthly rents as the dependent variable, Talukdar (2018) examines how various housing and residential features, including a formal contract of tenancy rights, affect the rents paid by slum dwellers. Since rents can be considered revealed preferences or willingness to pay for rented units, the positive and statistically significant coefficient on formal tenancy rights may be viewed as evidence that slum dwellers find improved tenure security valuable. On a different sample, Gulyani et al. (2018) also employ hedonic regression analysis with monthly rents as the dependent variable to analyze the relationship between various housing features, neighborhood, and infrastructure on the value of the places they rent.⁴ Both Talukdar (2018) and Gulyani et al. (2018) include renters' perception of tenure security as an independent variable in their hedonic regressions and find no statistically significant effect of perceived tenure security on monthly rents. Furthermore, an alternative measure of tenure security—the length of stay in slums—is used in both studies and found to be negatively associated with monthly rents. Notably, different measures of tenure security, whether perceived tenure security, formal tenancy rights, or length of stay in slums, can lead to different results regarding the effects of improved tenure security on slum dwellers' preferences.

A major issue with the existing measures of land tenure security in observational studies is endogeneity (Durand-Lasserve & Selod, 2009). For example, actual monthly rents paid reflect both the supply and demand conditions, which may lead to simultaneous bias. To overcome potential endogeneity problems, we employ a conjoint experimental design, where the type of land tenure and other features of housing are randomly assigned to respondents. Such a randomized experimental design allows us to identify the relative causal effect of improving land tenure security and other housing features, while avoiding potential bias from endogeneity. Furthermore, we examine not only the effects on

slum dwellers' preferences but also on affordability, which allows us to identify the channels through which improving land tenure security may actually improve slum dwellers' welfare.

3. Data and method

For data collection, we used a vignette experiment in Nairobi and its outskirts, embedded in a larger public opinion survey.⁵ In the experiment, respondents were given information on nine attributes of a “rent-to-own” housing option (composite treatment) through an informational vignette read out to the respondent by a field interviewer. Conjoint analysis was employed as experimental design (Green, Krieger, & Wind, 2001; Hainmueller, Hopkins, & Yamamoto, 2014), where we randomized the values of the nine attributes, following Gulyani and Bassett (2010), which allowed us to separately identify the relative causal effect of each value of the nine attributes of upgraded housing on slum dwellers' preferences, as well as their ability to afford the upgraded housing option.

3.1. Sample and data summary

Specifically, the survey experiment was carried out in five informal settlement areas, namely Riara, Mukuru Kwa Ruben, Mukuru Kwa Njenga, Viwandani, and Kiandutu. Other than Kiandutu in Thika, Kiambu county, all other informal settlements are in Nairobi County.⁶ Kiandutu is at the outskirts of Nairobi city. The survey was conducted from July through August 2016, over 39 days. A team of 20 field interviewers were hired and trained to conduct surveys in the form of person-to-person interviews. The interviews were conducted in either English or Swahili, following the respondents' language of preference, as identified at the beginning of the interview. For the survey, a random-walk sampling method was applied to each informal settlement to ensure as representative a sample as possible. After data cleaning, a sample of 3,715 respondents from the survey was used in the analysis.

3.2. Experimental design

In designing our experiment, we followed the so-called “living conditions diamonds” of Gulyani and Bassett (2010), who identify infrastructure for better services, improvement in land tenure security, unit characteristics, neighborhood characteristics, and location as important conditions determining living conditions. In our study, we further disaggregated the five living conditions identified by Gulyani and Bassett (2010) into nine key features, namely, (a) rents, (b) land tenure type, (c) basic services such as water and electricity, (d) neighborhood security, (e) presence of schools and health clinics, (f) location

⁵ Our survey included respondents from formal settlements areas in Nairobi, while the experiment was conducted only among respondents from informal settlements. The Nairobi formal settlement sample was collected by a stratified random sampling method using wards as strata and the random-walk method.

⁶ Mukuru Kwa Njenga, Mukuru Kwa Reuben, and Viwandani form a Special Planning Area set by the Nairobi City County Government. Although Riara is located within the wider Mukuru Kwa Njenga, it was sampled separately from the rest of Mukuru Kwa Njenga because of its uniqueness. Unlike most of Mukuru land, Riara is located on 5.1 ha of government land with title under the Ministry of Education's School Equipment Production Unit (SEPU). In Kenya, the change in the Kenyan constitution in 2010 has devolved to the county governments (instead of the central government) the responsibility of urban planning, which is detailed in the County Government Act No. 17, 2012. In exercising its mandate, the Nairobi City Council issued a notice declaring Mukuru Kwa Njenga, Mukuru Kwa Reuben, and Viwandani as Special Planning Areas on March 17, 2017. This was followed by Kenya gazette notice number 7654 on August 1, 2017, designating an area measuring approximately 550 acres. In effect, this declaration suspended any further developments in the three settlements until the completion of the Mukuru Integrated Development Plan (Dodman, 2017).

³ This point is also supported by our data. We find no statistically significant difference in actual eviction experiences between respondents from formal settlements in Nairobi and slum dwellers.

⁴ Gulyani et al. (2018) analyze all urban cities and municipalities in Kenya, including both formal and slum areas.

Table 1
Attributes and levels of conjoint analysis.

Attributes, <i>l</i> (No. of levels)	Levels (<i>K_l</i>)
Rent (3)	<ul style="list-style-type: none"> ● KES 3,000^a (approximately USD 30) ● KES 5,000 (approximately USD 50) ● KES 7,000 (approximately USD 70)
Land Tenure/Ownership Type (3)	<ul style="list-style-type: none"> ● The house/structure is in an informal settlement area with contested title. ● The house/structure is built on land owned by the community in the area. ● The house/structure is built on land legally owned by a private owner.
Basic Service Delivery (2)	<ul style="list-style-type: none"> ● No information ● It has better access to water supply, sanitation, and electricity in comparison to your current residence.
Other Services (2)	<ul style="list-style-type: none"> ● No information ● It has better access to primary and secondary schools and health facilities.
Neighborhood Security (2)	<ul style="list-style-type: none"> ● No information ● It has better security in comparison to your current residence.
Location (4)	<ul style="list-style-type: none"> ● It is located within your current settlement area. ● It is located outside your current settlement area but within the same county. ● It is located in a different county, near the main road with easier access to transportation. ● It is located in a different county and away from the main road, with more difficult access to transportation.
House Structure (4)	<ul style="list-style-type: none"> ● The housing unit is on the ground floor. ● The housing unit is on the first floor. ● The housing unit is on the second floor. ● The housing unit is on the third floor.
Bedroom (3)	<ul style="list-style-type: none"> ● There is one bedroom, one living room, and one kitchen. ● There are two bedrooms, one living room, and one kitchen. ● There are three bedrooms, one living room, and one kitchen.
Availability of Communal Area (2)	<ul style="list-style-type: none"> ● It has no open green area for leisure and socializing with neighbors. ● It has an open green area for leisure and socializing with neighbors.

^a KES 1,000 is approximately equivalent to USD 10.

of housing unit, (g) housing structure in terms of the number of floors, (h) the number of bedrooms, and (i) availability of a communal, open area for the community.

In describing the housing option, we followed Hainmueller et al. (2014) and used the full-profile conjoint analysis, where respondents are presented questions with a profile of an upgraded housing option with various attributes $K_l \in \{K_1, \dots, K_L\}$ randomly varied among different levels $l \in \{1, \dots, L\}$. The respondents' choice or ratings, Y_i , measure how they rank the option according to their preference (called "preference outcome") or affordability (called "affordability outcome"). As previously discussed, housing options are varied among the nine attributes, each with different levels. The value of each attribute is randomly selected among multiple levels or alternatives, as shown in Table 1.

An example of a composite treatment or informational vignette that is read by an interviewer can be found in Appendix A, Table A1. After details on the housing option are read to them, the respondents were asked whether they preferred the new housing option to the current informal settlement one. We then asked whether the respondents could afford the alternative housing option.

3.3. Estimation strategy

Our estimation strategy closely follows Hainmueller et al. (2014), who show that a causal quantity, the average marginal component effect (AMCE), can be identified using the potential outcome framework using conjoint analysis. A key feature of conjoint analysis is that it enables us to simultaneously decompose composite treatments and assess several causal hypotheses. For identifying the AMCE, we need to randomize all attributes in all profiles, after which one can empirically estimate the AMCE using linear regression (i.e., imitating a difference-in-means estimator).

Specifically, we ran the following regression to estimate the AMCE of each housing profile:

$$Y_{ik,l} = \beta_0 + \sum_{k=1}^9 \sum_{l=2}^{l=K_l} \beta_{kl} x_{ik,l} + \varepsilon_{ik,l} \tag{1}$$

where Y_i is a binary choice variable, $Y_i \in \{0,1\}$, indicating a respondent choice (= 1 if the respondent prefers the presented housing option for

the "preference" outcome and if the respondent can afford the described housing option for the "affordability" outcome, and = 0 otherwise); i is the individual; k an attribute; and l is a particular value or level of a given attribute. Note we have N respondents (i.e., $\in \{1, \dots, N\}$) and x_k attributes, where $k \in \{1, \dots, 9\}$, each discrete with K_l levels (i.e., = l), and stated outcome variable Y_i ; all are considered either real-valued random variables (e.g., a rank) or binary choice variables. Note that we have two binary dependent variables: (1) a "preference" outcome measure and (2) an "affordability" outcome measure. The former is based on the answer to the following question: "Do you prefer this housing option as opposed to where you currently stay?" The latter is based on the answer to the following question: "Can you afford this housing option?"

4. Results

Fig. 1 presents the AMCE on respondents' preference with its 95% confidence intervals for each level of upgraded housing option attribute, using the full sample (i.e., all respondents in the five informal settlements). The AMCE is our main causal quantity of interest and represents an incremental change in the outcome when a certain level of an attribute is presented to the respondent compared to the outcome when all attributes are held at baseline-level values (baseline scenario). Specifically, the baseline characteristics include the following: monthly rent of KES 3,000 (approximately USD 30); built on a land with a contested title; location within the respondents' current settlement area; unit located on the ground floor, with one bedroom, a living room, and a kitchen; and no open green area for leisure and/or socialization with neighbors. Moreover, at the baseline level, we provided no information on basic services (water, electricity and sanitation), social services (schools and health clinics), or neighborhood security.

When all attributes are held at the baseline values, on average, 59.2% of respondents would prefer the baseline housing option over their current unit in the informal settlement, and this result is statistically significant. Given that the baseline upgraded housing option is similar to the respondents' informal settlement in terms of the type of land tenure and, therefore, the level of land tenure security (built on contested land) and that the majority of respondents (59.2%) prefer this

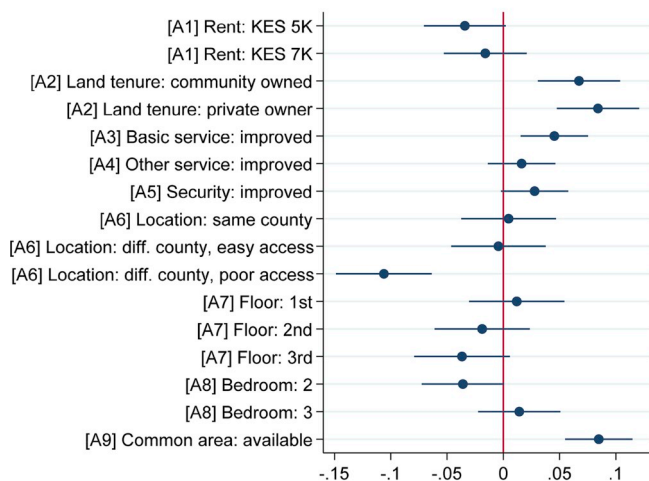


Fig. 1. Average marginal component effect for housing preference. Note. N = 3,715. Point estimates are indicated by dots, and 95% confidence intervals by lines. The constant estimate, at 59.2% with standard error 3.2%, is dropped from the figure.

option over their current slum dwelling, we could argue that this indicates that improving land tenure security is not the single determinant of respondents' preferences. In other words, a policy such as land titling operations to improve land tenure security may not be all encompassing in resolving slum problems in Kenya or elsewhere.

The two attributes that increase respondents' likelihood of preferring an upgraded housing option over their current informal settlement most and whose effects are statistically significant are (1) the type of land tenure and (2) access to a communal open area. Particularly, regarding the type of land tenure, if an upgraded housing is "built on a land legally owned by a private owner," the respondent would prefer the upgraded housing over their current informal housing by 8.4% compared to the baseline option, where the housing unit is built on contested land. A housing built on land owned by the community, although preferred compared to the one built on contested land (baseline level), remains less desirable than a housing unit built on privately owned land. The probability of preferring an upgraded option built on a community-owned land over the current informal settlement increases by 6.7%.

Having access to a communal area is found to be almost equally important to individual preferences as the improvement of land tenure security—due to the change from living on contested land to living in a unit built on land legally owned by a private owner—thus exhibiting an AMCE of 8.5%. An improvement in basic service delivery, such as water, electricity, and sanitation, also increases the probability that a respondent would prefer an alternative housing over the current housing when compared to the baseline option by 4.5%, which is statistically significant. This reflects the typically poor and, at times, appalling basic services and infrastructure in informal settlements.

The location of the proposed alternative formal settlement in the same or a different county does not seem to affect slum dwellers' preferences, except if the upgraded housing is difficult to access and far away from the main road. In this case, the predicted probability decreases by 10.6% compared to the baseline option and is statistically significant.

Given that slum dwellers allocated to an upgraded formal housing option could end up selling or renting their unit to middle-income households because of the financial burden of the monthly rents or mortgage repayments, we examined whether respondents can actually afford the upgraded housing options. Specifically, we estimated the AMCE for "affordability" outcomes with 95% confidence intervals, as shown in Fig. 2.

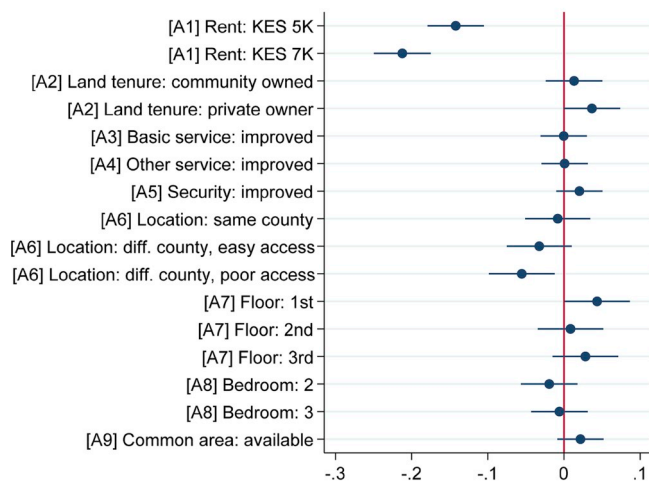


Fig. 2. Average marginal component effect for housing affordability. Note. N = 3,715. Point estimates are indicated by dots, and 95% confidence intervals are indicated by lines. The constant estimate, of 45.3% with standard error of 3.2%, is dropped from the figure.

When all attributes are held at the baseline values, on average, 45.3% of respondents stated they could afford the baseline housing option, and this estimate is statistically significant. The main determinant of the affordability of alternative housing is rent. As expected, the probability that a respondent can afford an upgraded housing option decreases substantially as monthly payment increases from the baseline of KES 3,000 to 5,000 and 7,000. At KES 3,000 monthly rent, approximately 45.2% of respondents stated they could afford the monthly payment, while at rents of KES 5,000 and 7,000, 14.2% and 21.2% fewer respondents (i.e., 31% and 24% of respondents) stated they could afford the monthly payments, respectively.

Other attributes are statistically insignificant regarding affordability, except for the type of unit structure itself. That is, compared to the ground floor, an alternative upgraded housing unit built on the 1st floor increases the predicted probability that our respondents can afford the upgraded housing by 4.3%, which is statistically significant. One potential explanation would be that unit structures would affect the marketability of the alternative housing option, which could in turn affect affordability for the house owner/tenant.

4.1. Sub-group analyses

We have hitherto discussed how the features of an alternative housing unit, including improved land tenure security, influence the likelihood that respondents would prefer it over their current slum dwelling and whether they could afford it. While we found heterogeneous effects of the various features of an alternative housing unit for slum dwellers' preferences regarding their ability to afford the housing unit, monthly rents were found to be the single most important factor regardless of sub-group. We now present sub-group analyses examining whether respondents' preferences depend on the actual informal settlement slum dwellers live in, their reasons for staying, and their occupation. Then, Appendix B shows the AMCE of each level of attribute of the housing option on respondents' affordability outcome by the informal settlements respondents live in, their reason to settle in the informal settlement, and respondent's occupation.

4.1.1. Informal settlement

We estimated the relative causal effect of each value of an upgraded housing's features, the AMCEs, on respondents' preference by informal settlement area. The regression coefficients representing the AMCEs and their 95% confidence interval are presented in Fig. 3.

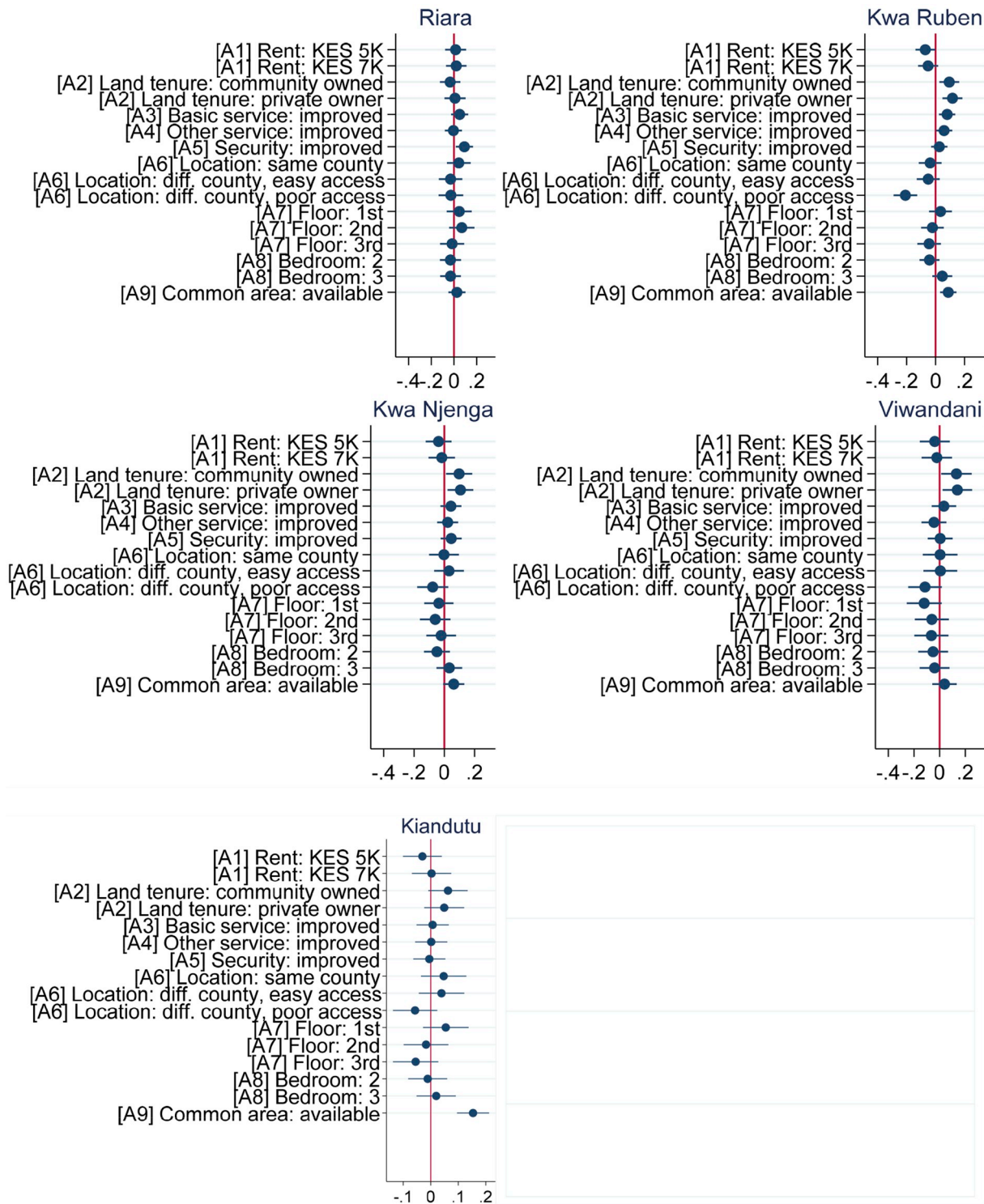


Fig. 3. Average marginal component effect on preferences by informal settlement areas.

Note. Riara (N = 613), Mukuru Kwa Ruben (N = 1,048), Viwandani (N = 349), Kiandutu (N = 1,033), and Mukuru Kwa Njenga (N = 672). Point estimates are indicated by dots, and 95% confidence intervals are indicated by lines.

Among the five informal settlement areas, respondents from three areas, namely, Mukuru Kwa Ruben, Mukuru Kwa Njenga, and Viwandani, show similar preferences regarding the degree of land tenure security varying by the type of land tenure. They all prefer an

alternative housing option built on land legally owned by the community or by private owners to their current housing units built on contested land. By contrast, for residents in Riara and Kiandutu, the improvement of land tenure security was found to be statistically

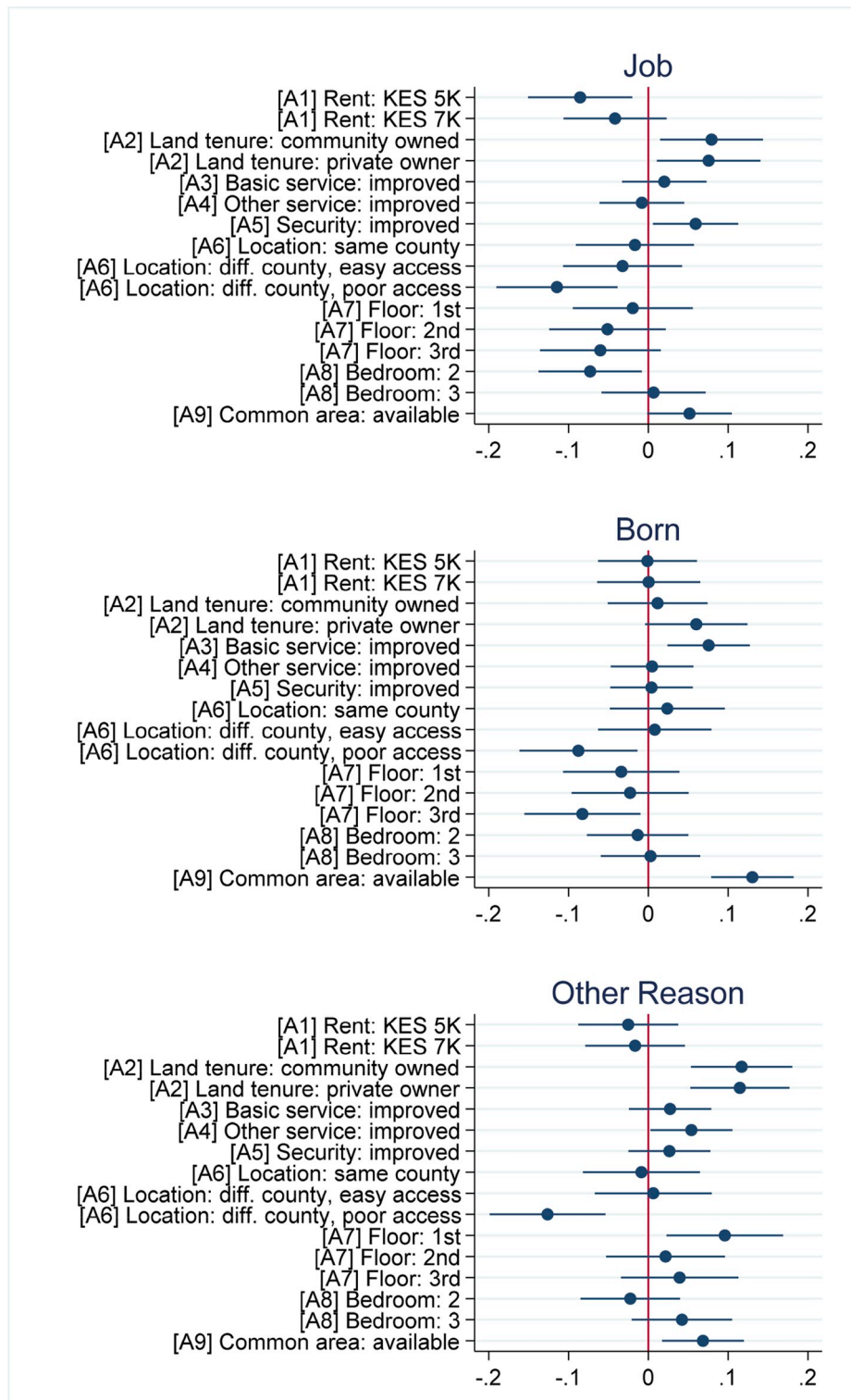


Fig. 4. Average marginal component effect on preferences by reason for settling in informal settlement areas. Note. Job (N = 1,183), born (N = 1,293), and other reasons (N = 1,239). Point estimates are indicated by dots, and 95% confidence intervals are indicated by lines.

insignificant. This is not likely to be a result with low statistical power because, even in Viwandani, whose sample size is smallest, the improvement of land tenure security was found to be statistically

significant. Hence, our sub-group analysis based on different informal settlements suggests that the importance of the type of land tenure may depend on the specific settlement itself.

Furthermore, in Riara, improvement in neighborhood security is an influential determinant of respondents' preferences and is the only statistically significant determinant. Among Kiandutu residents, having access to an open area was found to be the only statistically significant determinant positively affecting respondents' preferences, thus implying that successful transition to an upgraded housing option for residents in Kiandutu would involve having access to an open, communal area.

4.1.2. Reasons for staying in slums

Fig. 4 shows the AMCEs of each attribute of the housing option on respondents' preference by the reasons to settle in the informal settlement area in which they currently live. We grouped respondents' reasons to move and settle in the informal settlement into three categories, namely, (1) those who moved there for jobs (31.84%), (2) those born in the informal settlement (34.8%), and (3) others (33.36%). We found considerable variations in the influence of the different attributes on the preferences of the three groups, including the effect of the improvement of land tenure security.

The improvement of land tenure security positively influences the probability that slum dwellers would prefer an alternative, upgraded housing option to their current unit for those who have moved to the informal settlement areas to seek jobs and for other reasons. However, it has no effect on those born in informal settlement areas. One possible explanation is the "de-facto land tenure security" which is prevalent across Sub-Saharan Africa as discussed in Payne et al. (2009). The experience of having lived in the slums for a long time but with few, if any, actual evictions can provide them with a more intimate understanding of the "de-facto land tenure security." As a result, these respondents may not find any additional benefits from the improved "de jure" land tenure security.⁷ However, for those born in informal settlements, improved basic services, such as water and electricity, increased their preferences for alternative housing over their current slum dwelling.

We also found that access to an open, communal space is viewed as important for those born in informal settlement areas (and others), while it is unimportant to those staying in the area with the intention of finding work. This is likely to be the case because those seeking jobs are likely to be young, single, living alone in a single-family housing, and transient,⁸ thus not requiring a spacious, communal area for a larger family or relatives. We also find that rents or monthly payments affect the preferences of those who move to informal settlement areas to find work. Those born in informal settlement areas or who have moved for other reasons do not exhibit significant differences in terms of their preferences regarding the rent and/or monthly payments charged.

An attribute of an alternative housing option with similar effects across all slum dwellers regardless of their reasons for slum dwelling is the location of the alternative housing option. For all groups, respondents did not prefer an alternative housing outside their current county that has poor accessibility or connections to the main road.

⁷ For the difference between the "de facto" and "de jure" land tenure security, see Payne (2001).

⁸ In particular, the mean household size is smaller (2.9 vs. 3.4), the proportion of single-member household is higher (15.1% vs. 22.8%), and the proportion of those who want to move out of the informal settlement within the next five years is higher (68.2% vs. 66.2%) for those who moved to the informal settlement to look for jobs than those who moved for other reasons. In particular, in our sample of 3,715 informal settlement dwellers, the mean household size is smaller (3.1 vs. 3.6), the proportion of single-member household is higher (18.3% vs. 15.9%), the proportion of those not working is lower (18.4% vs. 20.2%), and the proportion of those who plan to move out of the informal settlement in the next five years is higher (67.7% vs. 65.2%) among those born outside the informal settlement but who moved to one than those born in the informal settlement.

4.1.3. Occupation

Fig. 5 presents the AMCEs of each level of attribute of the housing option on respondents' preferences by the selected respondent's occupation. We included five occupation categories⁹ with substantial observations, namely, (1) industrial workers (N = 237), (2) businesspersons (N = 688), (3) casual labor (N = 626), (4) unemployed (N = 704), and (5) homemakers (N = 390). We found some variations in the influences of different attributes on preferences for the five groups, including the effect of the improvement of land tenure security.

The improvement of land tenure security is a key factor influencing the preferences of upgraded housing for homemakers and the unemployed, while industrial workers, businesspersons, and casual workers are unaffected by the land tenure type and hence the change in the level of land tenure security. A potential explanation could be that those who do not earn income independently, such as homemakers and the unemployed, may find themselves more vulnerable to eviction than those who earn income, even if the risk of eviction is not large in practice. Such vulnerability can lead them to prefer the housing option with improved land tenure security.

Regarding the location of an alternative housing option, slum dwellers in all occupation categories, except for the unemployed, find this important. Particularly, slum dwellers prefer less an alternative housing option difficult to access by transportation compared to their current slum dwelling (i.e., the baseline category). Furthermore, for businesspeople and casual laborers, availability of an open area significantly increases their preference for the alternative housing option.

4.2. Preferences and affordability

To better understand the relationship between the preferences of slum dwellers and their ability to afford the alternative housing options, we present a cross-tabulation of preferences with affordability for our sample of 3,715 respondents using conjoint analysis. Table 2 shows that a desirable alternative housing option is often not affordable by slum dwellers and an affordable option may not always be desirable to them. Most notably, 66.8% of respondents stated they prefer the proposed upgraded housing option offered to them, but only 43.8% affirmed they could in fact afford the alternative housing plan. Of those that did not favor the proposed upgraded housing offer, only 20.7% said they could afford it. The frequent mismatch between preferences and affordability outcomes supports the possibility of unintended consequences of slum upgrading policies, whereby middle-income households may end up benefitting from an upgraded housing at the expense of the targeted poor slum dwellers who are unable to afford the alternative housing.

5. Conclusions

Kenya has undertaken a number of slum upgrading initiatives with particular emphasis on improving land tenure security. However, the causal effects of policy programs intended to improve land tenure security, such as land titling operations, on helping poor slum dwellers relocate to formal settlements have rarely been examined using micro-level data. As such, evaluating the effectiveness of the type of land tenure and hence change in land tenure security in terms of successful transition of slum dwellers to formal settlements requires examining demand-side effects, specifically on the preferences of slum dwellers and affordability of housing units when land tenure security improves. To this end, this study used a conjoint experiment in five urban slums in Kenya to empirically examine the causal effects of the types of land tenure and other elements of slum-upgrading initiatives on slum

⁹ We have the following 15 occupational categories in our data: farmer/farm worker, trader/hawker, industrial worker, businessperson, construction worker, casual worker, professional worker, teacher, government worker, artisan, student, homemaker, unemployed, retired, and other.

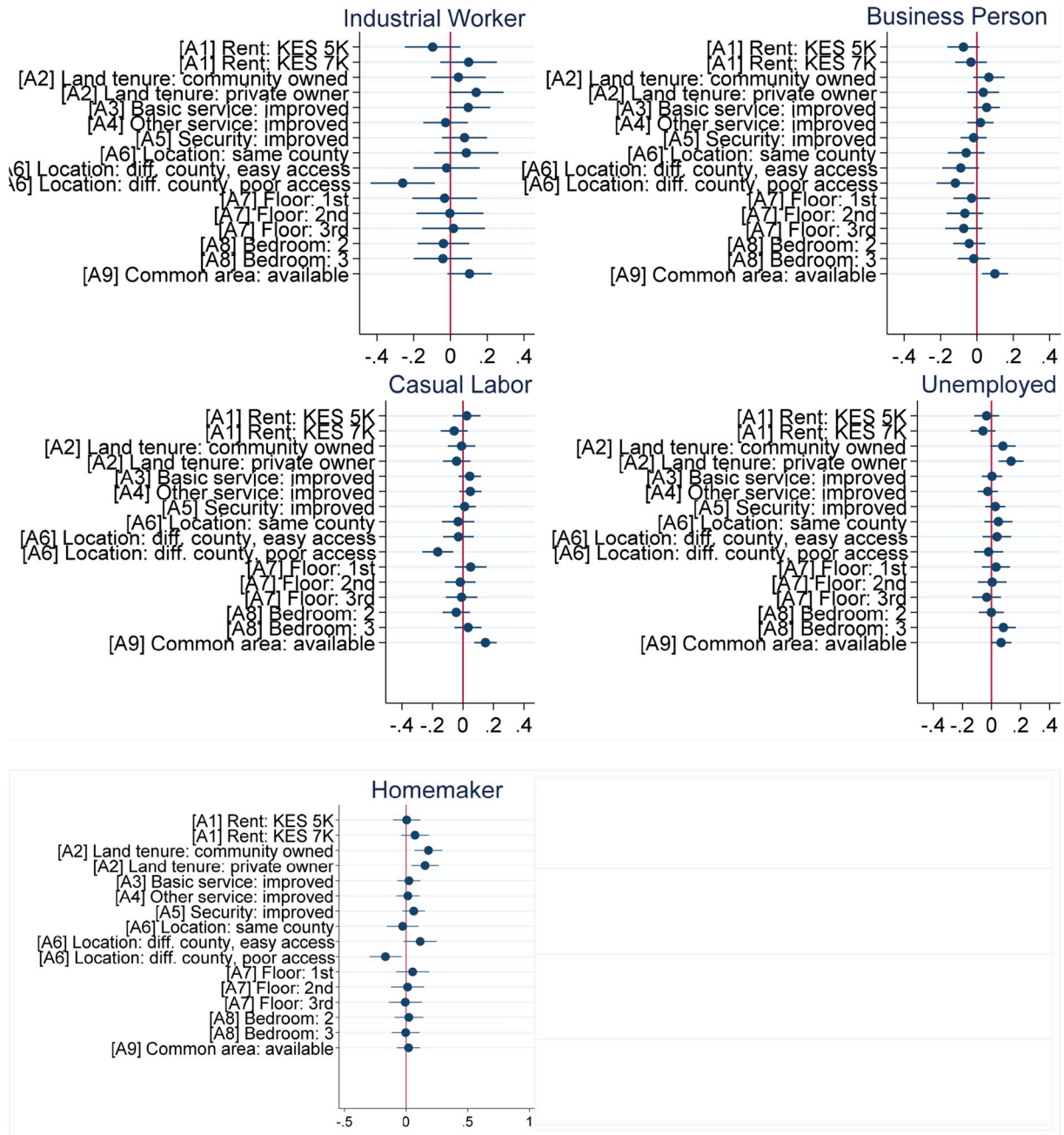


Fig. 5. Average marginal component effect on preferences by respondents' selected occupations. Note. Industrial workers (N = 237), businesspeople (N = 688), casual labor (N = 626), unemployed (N = 704), and homemakers (N = 390). Point estimates are indicated by dots, and 95% confidence intervals are indicated by lines.

Table 2
Preference and affordability of alternative formal settlement housing.

		Affordability		
		No	Yes	Total
Prefer alternative housing	No	977 (79.3) [41.19]	255 (20.7) [18.99]	1,232 (100.0) [33.16]
	Yes	1,395 (56.2) [58.8]	1,088 (43.8) [81]	2,483 (100.0) [66.84]
	Total	2,372 (63.8) [100.0]	1,343 (36.15) [100.0]	3,715 (100.0) [100.0]

Note. N = 3,715. Row percentages are shown in parentheses and column percentages in brackets.

dwellers' preferences and their abilities to afford alternative, upgraded housing. In the experiment, respondents were given a choice between their current dwelling and a hypothetical alternative housing with randomly assigned attributes, including the type of land tenure. We argue that improving land tenure security without addressing the issue of affordability (i.e., ability to afford rents) has only limited success in relocating slum dwellers to upgraded housing in formal settlements. The findings that support this argument are threefold. First, despite the preference of the majority of slum dwellers to live in a place with improved land tenure security (66.8%), this preference depends on the respondent's informal settlement, occupation, and stated reason for living in the informal settlement. This suggests that not all slum dwellers would benefit equally from land formalization policies such as land titling operations. This result is consistent with existing studies reporting that, when the affordability constraints remain unaddressed, policies such as land formalization initiatives often end up benefiting structure owners or middle-class non-slum dwellers instead of the poor slum-dwellers who are the intended beneficiaries (Basset, 2005; Gulyani et al., 2018; Huchzermeyer, 2008). Second, improved land tenure security has almost no effect on the affordability of upgraded housing among our respondents. Instead, monthly rents are found to be the most important determinant of slum dwellers' ability to afford upgraded housing. Third, a significant mismatch exists between slum dwellers' preferences and affordability, meaning their preferences toward improved land tenure security are not an indicator of their ability to afford a housing unit with improved land tenure security and vice versa. For instance, only 42.8% of those who found an alternative housing option attractive stated they could afford the preferred housing solution. Therefore, the heterogeneous effect of the type of land tenure on slum dwellers' preferences, limited effect on affordability, and frequent mismatches between slum dwellers preferences and affordability indicate the limited effectiveness of land formalization policies to improve living conditions among slum dwellers.

As a result, one-size-fits-all land formalization policies are not

Appendix C. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.habitatint.2019.102048>.

Appendices

Appendix A. Experimental design

An example of a composite treatment or informational vignette that is read by an interviewer is presented in Table A1. This is an example vignette where all nine attributes that appear in square parenthesis [] are a randomly selected value from multiple levels.

Table A1
Experimental design – vignette example

I will now describe to you about features of a “rent-to-own” housing option where a portion of your monthly payment goes toward the purchase of the house at a later date. After listening to this option, I will then ask you about your views on this option in comparison to where you currently stay. This housing option's monthly payment is [5000 KES] and [the house/structure is in an informal settlement area with contested title.] [It has better access water supply, sanitation and electricity in comparison to your current residence.] [It has better access to primary and secondary schools and health facilities.] [It has better security in comparison to your current residence.] [It is located within your current settlement area.] [The housing unit is on the ground floor.] [There is one bedroom, one living room and one kitchen.] [It has no open green area for playing and socializing with neighbors.]

promising due to the varying preferences across slum dweller groups and the mismatch between slum dwellers' preferences and their ability to afford upgraded housing. Instead, policies should be specifically designed for each informal settlement to address the unique needs and interests of its residents. For example, our experimental results indicate that the residents of Riara prefer a policy that improves neighborhood security, while those of Kiandutu prefer a policy that provides an open, communal area in the community. Furthermore, land formalization is desirable to the residents of Mukuru Kwa Njenga, Mukuru Kwa Ruben, and Viwandani, while improving access to basic services, such as water, electricity, and sanitary facilities is especially desirable to the residents of Mukuru Kwa Ruben. However, a critical common policy element for all informal settlements should be to maintain affordable upgraded housing options, as the residents of all informal settlements face affordability constraints.

Conflicts of interest

This manuscript titled “Secure land tenure for urban slum-dwellers: A conjoint experiment in Kenya” has not been published or presented elsewhere in part or in entirety and is not under consideration by another journal.

All study participants provided informed consent, and the study design was approved by Strathmore University's Research Office and by Kenya National Commission for Science, Technology and Innovation.

Acknowledgements and Declaration of Interest

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Appendix B. AMCE on affordability outcomes by sub-group

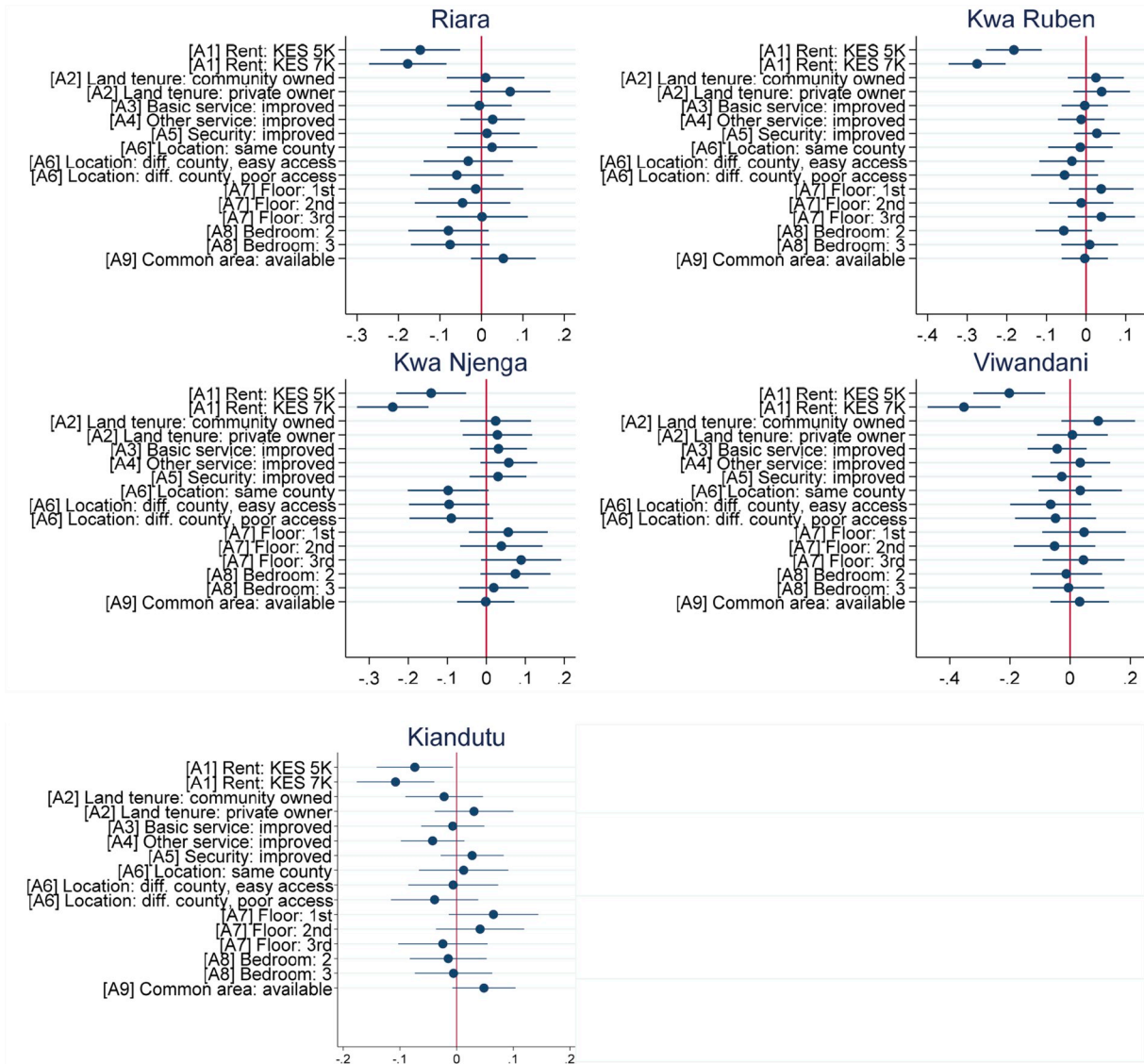


Fig. B1. AMCE on affordability by informal settlement areas.
 Note. Riara (N = 613), Mukuru kwa Ruben (N = 1,048), Viwandani (N = 349), Kiandutu (N = 1,033), Mukuru Kwa Njenga (N = 672); Point estimates (indicated by dots) 95% confidence intervals (indicated by lines) are shown

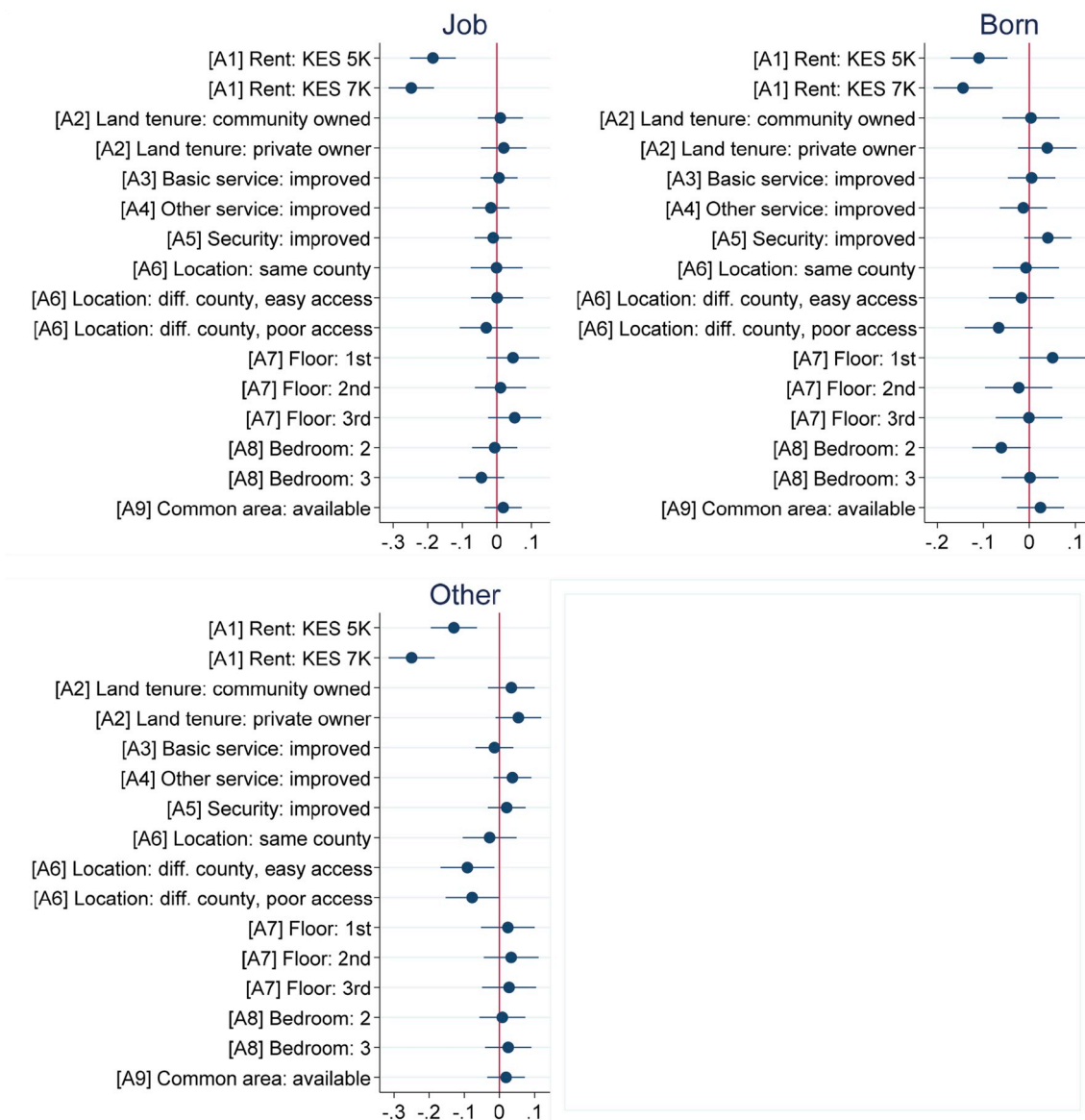


Fig. B2. AMCE on affordability by reasons for settling in informal settlement areas. Note. Job (N = 1,183), Born (N = 1,293), Other reasons (N = 1,239); Point estimates (indicated by dots) 95% confidence intervals (indicated by lines) are shown

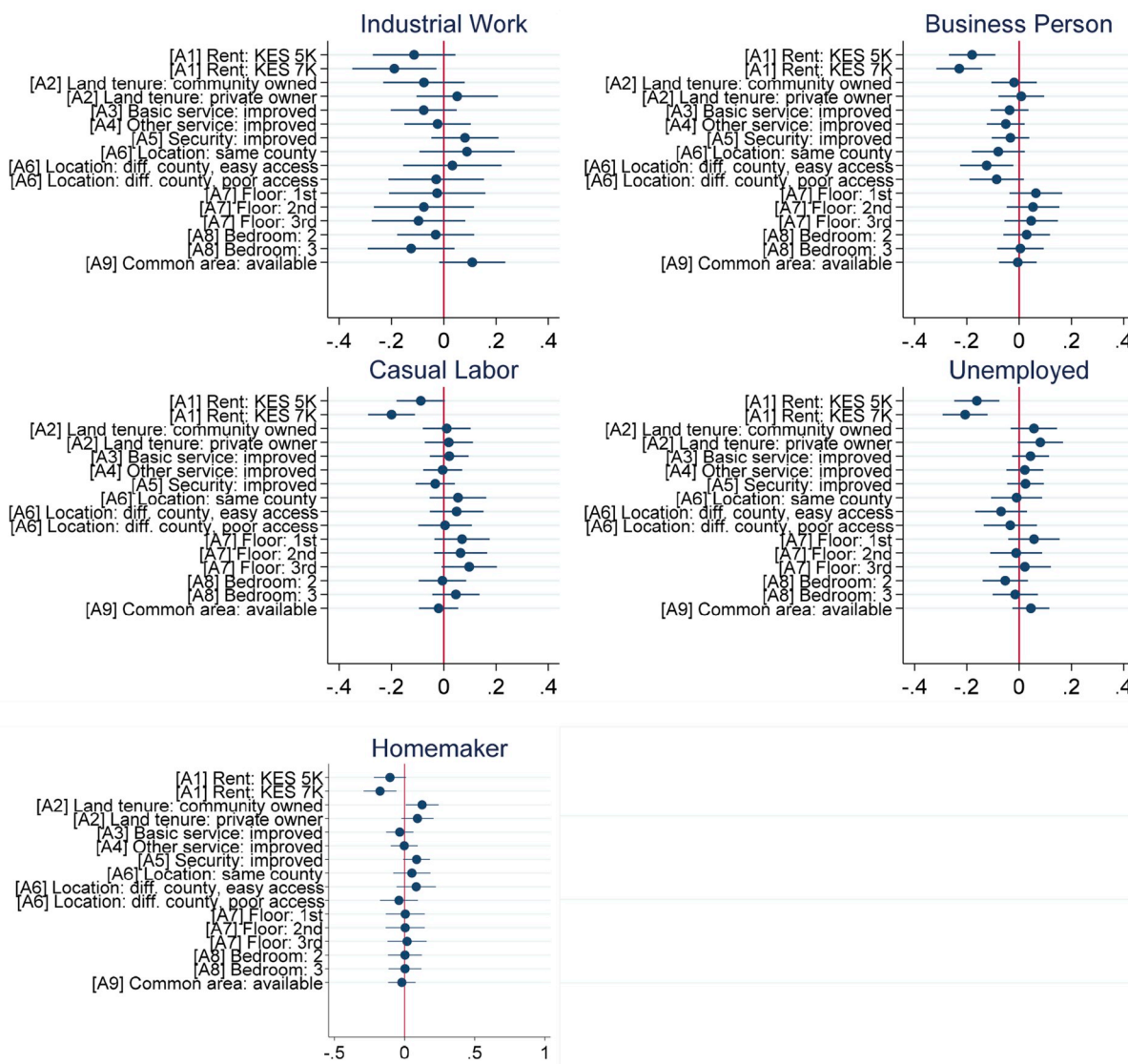


Fig. B3. AMCE on affordability by respondents' occupation. Note. Industrial workers (N = 237), Businessmen (N = 688), Casuallabor (N = 626), Unemployed (N = 704), Housewife (N = 390); Point estimates (indicated by dots) 95% confidence intervals (indicated by lines) are shown

References

African Population and Health Research Center (APHRC) (2014). *Population and health dynamics in Nairobi's informal settlements: Report of the Nairobi cross-sectional slums survey (NCSS) 2012*. Nairobi: APHRC.

Amnesty International (2009). *Kenya: The unseen majority: Nairobi's two million slum-dwellers*.

Bassett, E. M. (2005). Tinkering with tenure: The community land trust experiment in Voi, Kenya. *Habitat International*, 29(3), 375–398.

Bassett, E. M. (2007). The persistence of the commons: Economic theory and community decision-making on land tenure in Voi, Kenya. *African Studies Quarterly*, 9(3).

Bird, J., Monteburano, P., & Regan, T. (2017). Life in a slum: Understanding living conditions in Nairobi's slums across time and space. *Oxford Review of Economic Policy*, 33(3), 496–520.

Boone, C. (2019). Legal empowerment of the poor through property rights reform: Tensions and trade-offs of land registration and titling in sub-Saharan Africa. *Journal of Development Studies*, 55(3), 384–400.

Boone, C., Dyzenhaus, A., Ouma, S., Owino, J. K., Gateri, C., Gargule, A., et al. (2016). *Land politics under Kenya's new constitution: Counties, devolution, and the National land commission*.

Brassel, A. S., Gaspard, F., & Platteau, J. P. (2002). Land tenure security and investment incentives: Puzzling evidence from Burkina Faso. *Journal of Development Economics*, 67(2), 373–418.

Brueckner, J. K., & Lall, S. V. (2015). Cities in developing countries: Fueled by rural–urban migration, lacking in tenure security, and short of affordable housing.

Handbook of regional and urban economics. 5. Handbook of regional and urban economics (pp. 1399–1455). Elsevier.

Buckley, R. M., & Kalarickal, J. (Eds.). (2006). *Thirty years of World Bank shelter lending: What have we learned?*. The World Bank.

Croese, S., Cirolia, L. R., & Graham, N. (2016). Towards Habitat III: Confronting the disjuncture between global policy and local practice on Africa's 'challenge of slums'. *Habitat International*, 53, 237–242.

De Soto, H. (2000). *The mystery of capital: Why capitalism triumphs in the West and fails everywhere else*. Basic Civitas Books.

Dodman, D. (2017, October 18). *A special approach to slum upgrading: The special planning area in Mukuru*. Nairobi. Retrieved from <https://www.iied.org/special-approach-slum-upgrading-special-planning-area-mukuru-nairobi>.

Do, Q. T., & Iyer, L. (2008). Land titling and rural transition in Vietnam. *Economic Development and Cultural Change*, 56(3), 531–579.

Durand-Lasserre, A., & Selod, H. (2009). The formalization of urban land tenure in developing countries. *Urban land markets* (pp. 101–132). Dordrecht: Springer.

El-hadj, M. B., Faye, I., & Geh, Z. F. (2018). Slum upgrading and housing alternatives for the poor. *Housing market dynamics in Africa* (pp. 215–253). London: Palgrave Macmillan.

Field, E. (2005). Property rights and investment in urban slums. *Journal of the European Economic Association*, 3(2–3), 279–290.

Galiani, S., & Scharrodsky, E. (2010). Property rights for the poor: Effects of land titling. *Journal of Public Economics*, 94(9–10), 700–729.

Green, P. E., Krieger, A. M., & Wind, Y. (2001). Thirty years of conjoint analysis: Reflections and prospects. *Interfaces*, 31(3 supplement), S56–S73.

Gulyani, S., & Bassett, E. M. (2010). The living conditions diamond: An analytical and

- theoretical framework for understanding slums. *Environment and Planning*, 42(9), 2201–2219.
- Gulyani, S., Talukdar, D., & Bassett, E. M. (2018). A sharing economy? Unpacking demand and living conditions in the urban housing market in Kenya. *World Development*, 109, 57–72.
- Hainmueller, J., Hopkins, D. J., & Yamamoto, T. (2014). Causal inference in conjoint analysis: Understanding multidimensional choices via stated preference experiments. *Political Analysis*, 22(1), 1–30.
- Handzic, K. (2010). Is legalized land tenure necessary in slum upgrading? Learning from Rio's land tenure policies in the Favela Bairro program. *Habitat International*, 34(1), 11–17.
- Hendriks, B., Zevenbergen, J., Bennett, R., & Antonio, D. (2019). Pro-poor land administration: Towards practical, coordinated, and scalable recording systems for all. *Land Use Policy*, 81, 21–38.
- Huchzermeyer, M. (2008). Slum upgrading in Nairobi within the housing and basic services market: A housing rights concern. *Journal of Asian and African Studies*, 43(1), 19–39.
- Marx, B., Stoker, T., & Suri, T. (2013). The economics of slums in the developing world. *The Journal of Economic Perspectives*, 27(4), 187–210.
- Muraguri, L. (2011). Kenyan government initiatives in slum upgrading. *Les cahiers d'Afrique de l'Est*, 44, 119–128.
- Payne, G. (2001). Urban land tenure policy options: Titles or rights? *Habitat International*, 25(3), 415–429.
- Payne, G., Durand-Lasserve, A., & Rakodi, C. (2009). The limits of land titling and home ownership. *Environment and Urbanization*, 21(2), 443–462.
- Rigon, A. (2016). Collective or individual titles? Conflict over tenure regularisation in a Kenyan informal settlement. *Urban Studies*, 53(13), 2758–2778.
- Schmidt, S., & Zakayo, E. (2018). Land formalization and local leadership in Moshi, Tanzania. *Habitat International*, 74, 18–26.
- Talukdar, D. (2018). Cost of being a slum dweller in Nairobi: Living under dismal conditions but still paying a housing rent premium. *World Development*, 109, 42–56.
- UN-Habitat (2006). *Analytical perspective of pro-poor slum upgrading frameworks*. Nairobi: UN-Habitat.
- UN-Habitat (2016). *Slums almanac 2015–16. Tracking Improvement in the Lives of slum dwellers*.
- United Nations (2015). *Transforming our world: The 2030 agenda for sustainable development*. New York: United Nations General Assembly.
- United Nations (2016). *Progress towards the sustainable development goals. Report of the secretary-general*. New York: United Nations Economic and Social Council.