REFUGEE HOUSING IN SUPPORT OF SELF-RELIANCE: A CROSS-SECTIONAL STUDY IN BIDIBIDI REFUGEE SETTLEMENT, UGANDA

A Thesis

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ABSTRACT

This research explored associations between refugee housing characteristics and desired refugee outcomes – namely health & well-being and self-reliance – and examined plausible mediating mechanisms that may explain the associations between these variables. It is one of the first studies to directly examine the relationship between refugee housing and refugees' ability to be self-reliant, in alignment with Housing First models. A sample of 82 participants was randomly selected in three zones of Bidibidi Refugee Settlement in Uganda, where residents are largely responsible for constructing and maintaining their own earthen housing. These housing structures and layouts were described, and a matrix of bi-variate correlations was examined. A series of significantly correlated variables was tested for mediation based on the hypotheses, and this mediation model was then tested for moderation by demographic variables (zone, sex, marital status, hut tenure, and age). Results identified several statistically significant housing variables relevant to self-reliance and health & well-being. Presence of pests within households was associated with resource access, and sleep quality served as a significant mediator in this model. No demographic variables served as significant moderators for the *pests-sleep quality-resource access* mediation model. Ultimately, these findings help identify specific future points of intervention for settlement housing, thereby informing projects, policies, and the design of refugee settlements going forward.

BIOGRAPHICAL SKETCH

Hannah Bidigare-Curtis was born in 1993 and raised on a farm in central Ohio. She was the third child of Diane Curtis and Jim Bidigare, and she grew up with her three siblings, Danielle, Luke, and Claire. She graduated from Case Western Reserve University (CWRU) in 2015, where she double majored in Biology and Environmental Studies and double minored in Chemistry and Sociology. As an undergraduate, she was inducted into Phi Beta Kappa academic honor society and the Sociological Honor Society. During college, Hannah also became the Vice Chair of CWRU's Student Sustainability Council, participated in the school's Civic Engagement Fellows program with Refugee Response, studied abroad in Ecuador, and served as a teaching assistant in biology lab courses.

After finishing her undergraduate degree, Hannah worked in urban farming, eventually becoming the Farm Manager at the Boys & Girls Clubs of Cleveland where she designed interactive outdoor growing areas for children and employed a team of local teens to grow and sell produce. She then moved to New York to join the Department of Design + Environmental Analysis at Cornell University to pursue her Master's in Human-Environment Relations with a concentration in Environmental Psychology. During her graduate studies, she served as a teaching assistant in two courses, successfully applied for a research grant from Engaged Cornell, and served as voting member and department representative in the Graduate & Professional Student Assembly. She began studying refugee settlements during this program and realized her passion for studying humanitarian aid and its contexts. Hannah is now gaining more experience in the humanitarian and nonprofit sector.

This thesis is dedicated to all who have been displaced.

“The ache for home lives in all of us. The place where we can go

as we are and not be questioned.”

Maya Angelou

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LIST OF ABBREVIATIONS

HHSR – Housing, Health, and Self-Reliance

CTEN – Community Technology Empowerment Network

DV – dependent variable

HFIAS - Housing Food Insecurity Access Scale

HoH – head of household

IDP – internally displaced people

IV – independent variable

PSN – Person with Specific Needs

OPM – Office of the Prime Minister, the government in Uganda

NGO – non-governmental organization

SRH – self-report health

SRS – Self-Reliance Strategy

UNHCR – United Nations High Commissioner for Refugees

UNRWA – United Nations Relief and Works Agency

Chapter 1

Introduction

Background & Justification

A robust body of literature has established linkages between housing quality and both physical and mental health (Alidoust & Huang, 2021; Evans et al, 2003; Evans et al., 2000; Gibson et al., 2011; Kasl, 1976; Singh et al., 2019; Wells, 2000; Ziersch & Due, 2018), yet this topic has not been extensively explored within refugee settlement populations. While numerous institutions, including host governments, the United Nations, and non-governmental organizations (NGOs), all dedicate resources to assist the recovery and eventual self-reliance of refugee populations, ensuring quality housing during the resettlement process is often considered too costly. The aim of this research is to explore associations between refugee housing characteristics and desired refugee outcomes, namely health, well-being, and self-reliance, as well as to examine plausible mediating mechanisms that may explain the associations between these variables. Ultimately, these findings will help to identify specific future points of intervention for settlement housing, thereby informing projects, policies, and the design of refugee settlements going forward.

At the end of 2020, the United Nations High Commissioner for Refugees (UNHCR) estimated that a total of 82.4 million people worldwide were categorized as displaced because of deteriorating societal conditions, including violence, human rights violations, and persecution, and 9.8 million of those people were newly displaced that year, one of the highest numbers in the last decade (UNHCR, 2021). The number of people displaced is predicted to grow exponentially over the next several decades due to a multitude of interconnected environmental and political factors, with environmental degradation, resource scarcity, and natural disasters triggering

displacement directly and serving as amplifiers of international conflict. Each of these factors will also continue to be exacerbated by climate change over the next several decades (Goodwin-Gill & McAdam, 2017; Levy, 2019). It is especially important to study displacement in the contexts of lower income countries due to their disproportionate likelihood both to produce and to host displaced people. Due to their increased fragility from preexisting stressors, countries in the Global South and economically underprivileged countries are more likely to produce the conditions that require populations to flee (Betts, 2013). In addition, over 85 percent of displaced people are currently hosted in these countries despite the long-term accountability of Europe and North America in creating many of the conditions that create displacement (UNHCR, 2021).

Though the conditions displaced people find vary considerably, initial housing is frequently tent-based within 'temporary,' emergency-style refugee settlements that are created by aid organizations. Refugees are a subcategory of displaced people that has a rather narrow definition involving two major criteria: they must (1) cross a border and (2) be fleeing conflict (Collier & Betts, 2017). Forced to find safety in another country, refugees face added difficulties relative to internally displaced people (IDPs). Due to a variety of political fears including national security and economic disruption, host governments and the UNHCR frequently choose to locate refugee populations in remote, temporary settlements (Crisp, 2003). Essentially, these settlements are designed to prevent integration of this displaced population, thereby extending the length of time refugees maintain their refugee status and preventing the housing supply from being responsive to the needs of this new population (Kibreab, 2007; Rozo & Sviatschi, 2021), producing inequality and biopolitical exclusion (Dhesi et al., 2018; Fassin, 2001). Refugee settlements turn into permanent, protracted living conditions with a temporary infrastructure due to their complicated sociopolitical frameworks. A 2015 report commissioned by the

Humanitarian Policy Group indicates that "more than 80% of refugee crises last for ten years or more; two in five last 20 years or more" (Crawford et al., 2015, p 1). While these large, long-term refugee settlements often have the population sizes, resource concentrations, and organization of a city or town, they become conditions of protracted impermanence. Architectural historian Anooradha Siddiqi describes a settlement in Kenya with the following:

> "To speak of urban life in this descriptive context is not metaphorical… Everything happens "as if" it was a town. Everything is potential, and yet nothing develops, as distinct from the townships of apartheid South Africa or the African encampments or the colonial towns, other models with which the refugee camp shares an incomplete and unfinished form of urbanism. The camp, even when stabilized, remains an amputated town, bare by definition" (Siddiqi, 2020, p 26).

This tendency for 'temporary' settlements to become long-term living arrangements for refugee populations means that international intervention and coordination is required to care for displaced populations in these contexts for lengthy periods of time, requiring the same aid year after year – e.g., residents must replace their housing materials every year due to deterioration, they continually rely on food and water shipped into the settlement, there is a continued absence of effective sanitation infrastructure, and so on (Collier & Betts, 2017; Siddiqi, 2017b). Though these 'temporary' settlements are by no means ideal solutions for displacement (Guglielmi et al., 2020; McConnachie, 2016; Olsen & Scharffscher, 2004; UNHCR, 2014), they will likely become ever more common unless dramatic global preparation, international human rights agreements and treaties, and humanitarian aid reform are all undertaken immediately. Due to their seeming inevitability, it is important to study refugee settlements to learn about their effects on residents, improve their design, and inform projects and initiatives that help displaced populations recover.

Housing & Health

As stated previously, a clear relationship between housing quality and both physical and mental health has been established in the literature (Alidoust & Huang, 2021; Evans et al, 2003; Wells & Harris, 2007; Evans et al., 2000; Gibson et al., 2011; Kasl, 1976; Singh et al., 2019). Housing conditions contribute to health directly and indirectly via factors like indoor air quality, home safety, lighting quality, crowding, and mold growth (Anand & Phuleria, 2021; Bonnefoy, 2007; Chay & Greenstone, 2005; Pevalin et al., 2017; Pollack et al., 2004; Shannon et al., 2018). Though there is no universally agreed upon definition of 'healthy housing,' Shaw (2004) identifies essential 'hard' and 'soft' housing factors, two categories that are both necessary to meeting human needs via housing; hard factors are the more tangible aspects of housing such as mold, heat, ventilation, and roofing quality that impact physical health. Soft factors are the aspects of the meaning of housing that relate to mental health and well-being like ontological security, social status, and a sense of home. Interventions focused on improving housing conditions have been associated with improvements in both physical and mental health (Curl et al., 2015; Thomson et al., 2001; Thomson et al., 2009). A 2017 longitudinal study in Britain showed evidence that persistent poor housing conditions in the prior four years was associated with worse mental health regardless of present housing conditions (Pevalin et al., 2017). Research exploring the impact of housing quality on health and well-being has been a complex endeavor, mainly because associations between poor health, poverty, and poor housing quality can often be difficult to disentangle and randomizes controlled trials are rarely possible (Wilkinson, 1999). Regardless, the abundance of research on housing and health has spurred a reframing of housing policy in the last few decades as an important social determinant of health, where initiatives and policies improving housing quality connect directly to public health (Koh

& Restuccia, 2018; Marmot & Wilkinson, 2005; Sandel & Desmond, 2017; Shaw, 2004). As Shaw (2004) states,

> "Investment in housing can be more than an investment in bricks and mortar: It can also form a foundation for the future health and well-being of the population. Addressing poor-quality housing and detrimental neighborhoods, in the broadest sense, is thus a task that should be grasped with vigor and determination by all those involved in public health" (p 414).

Two key components of housing conditions relevant to health and well-being are density and crowding. Residential density and crowding have been shown to have numerous negative effects on household residents, including health, well-being, and development (Edwards et al., 2019; Evans et al., 1990; Lopoo & London, 2016; Shannon et al., 2018)**.** Though sometimes conflated, density and crowding are different constructs. As Stokols (1972) explains, density is a physical condition determined by the number of residents allocated to a space, which may or may not produce a psychological sense of crowding in an individual depending on their personal characteristics and social influences. In other words, density is an objective measure while crowding is subjective (Edwards et al., 1994). Research on residential crowding has shown that both age and gender can influence individual perceptions of crowding (Britton, 2013; Ruback & Pandey, 1996). In addition, constraints that limit one's opportunity to find other housing and one's personal housing history can also alter individual perception of household conditions, including crowding (Clark et al., 2000; Stokols et al., 1983). Cultural norms, socialization, and personal factors interact to influence perceptions of crowding. Evans, Lepore, and Allen (2000) surveyed four ethnic groups in the United States and, while they found no significant differences between groups regarding their psychological distress as a result of residential density, differences were found for crowding perception; those from contact cultures (Vietnamese American and Mexican American) found their homes to be less crowded on average than did

those from noncontact cultures (Anglo-American and African American). Kaya and Weber (2003) examined cultural differences regarding crowding and privacy for 408 students in residential halls in Turkey and the United States, finding that American students desired more privacy than their Turkish counterparts, and crowding perceptions were significantly influenced by preferences for privacy. It is important to reiterate that, while cultural norms may influence the perception of crowding, this does not necessarily indicate psychological tolerance of crowding (Evans, Lepore, & Allen, 2000). In other words, while individuals may not perceive high density to be crowded, they can still experience negative psychological effects of this high density.

In addition to perceptions of crowding, measures of housing satisfaction – or residential satisfaction – can be used to expand upon the impact of housing conditions on residents. Housing satisfaction has been used in a variety of ways, including as a method of evaluating successful housing design, perceptions of current housing insufficiencies, and changes in housing perception after relocations (Abidin et al., 2019; Riazi & Emami, 2018; Wang & Wang, 2020). Canter & Rees proposed a model of housing satisfaction in 1982 based on the premise that this subjective evaluation "is a reflection of the degree to which [the inhabitants] feel it is helping them to achieve their goals" (p 185). Housing satisfaction is inherently subjective and is often related to comparison within one's social group, and research has shown that relative deprivation is correlated with self-rated health and mental health (Knoechelmann et al., 2020; Kuo & Chiang, 2013; Subramanyam et al., 2009). Detailed measures of satisfaction that include questions regarding specific housing features (e.g., materials, utilities, ventilation, space) can enable a more pointed approach to improving housing conditions and design (Narsai et al., 2013; You et al., 2021; Zanuzdana et al., 2013). For example, a 1997 study of housing satisfaction

among tenants of public housing in Nigeria analyzed five more housing variables – structure types, building features, housing conditions, neighborhood faciliaties, housing management, and demographic characteristics – as predictors of overall housing satisfaction, finding that housing management practices explained the most variance in overall housing satisfaction (Ukoha & Beamish, 1997).

Meeting the housing needs of the human population is a concern worldwide and is often framed as a global crisis (Brown, 2003; Goldstein et al., 1990; King et al., 2017). The association between housing quality and health is found cross-culturally, yet this research has largely been conducted on European and American housing, and housing research has had limited focus on refugee settlements housing specifically (Albadra et al., 2018; Alidoust & Huang, 2021). Due to these limitations, it is prudent to recognize that while many of the predictions made within the present study are grounded in prior research findings, the generalizability of much of this body of research to refugee contexts is limited.

Refugee Settlement Conditions

Housing is a primary concern for displaced populations and one of the main purposes of temporary settlements. The inadequacy of this housing is a prominent and ongoing problem across refugee settlements and is often fundamental to their 'temporary,' emergency-oriented design, generating conditions with over-crowding, poor ventilation, no windows, dampness and mold, pests, and leaking roofs (Ziersch & Due, 2018). Though aid programs within settlements may be perceived to be generous, particularly when compared to the living conditions of host communities, refugee populations have historically experienced low living standards (Armstrong, 1988). In 1989, Jabr wrote about the housing conditions of Palestinian refugees in the West Bank, saying,

> "Tents did not provide adequate shelter. It was found that in the bad weather, a tent only lasted for two years; moreover, the cost of two tents ($90) was equal to one room made of bricks with an area of 9 square meters. UNRWA offered to replace tents with housing units, but the refugees' attitude to shelter were ambivalent. On the one hand, they sought improved camp standards, but on the other, they disliked the concrete housing because it indicated a degree of permanency. This conflicted with their determination to return home." (p 75).

This account speaks to the desires on the parts of some refugees to keep their settlement housing in a temporary and inadequate state, as if accepting adequate housing would distance themselves from a return to true normalcy. Thirty years later, Jabr's account could easily be a description from a modern refugee settlement in many areas of the world. Quite a few other studies have documented housing deficiencies in settlements worldwide over that time, particularly in research on refugee camps in Palestine. A survey of Baqa'a camp in Jordan found that the majority of housing was poorly constructed and maintained (Alnsour & Meaton, 2014), and another survey of Palestinian refugees in camps in 1993 Amman, Jordan found that housing conditions were poor and over-crowded despite considerable efforts on the part of refugees to improve their own housing (Helwa & Birch, 1993). The importance of both of Shaw's (2004) soft and hard aspects of housing to physical and mental health was evident in interviews with fifty people from refugee and asylum-seeking backgrounds in South Australia (Ziersch et al., 2020). Poor housing conditions were associated with respiratory conditions like colds and ear infections in a survey of 200 housing units in the Palestinian Jalazone Refugee Camp (Al Khatib & Tabakhna, 2006) and directly related to housing conditions in a study in Al-Ama'ri camp in the West Bank of Palestine (Al-Khatib et al., 2010). In a camp in Sierra Leone, poor housing conditions were associated with disease transmission due to the presence of rodents indoors (Bonner et al., 2007).

Outside of inadequate housing, refugees face a host of other physical and mental difficulties due to settlement conditions. Conflict between host and refugee populations and discrimination on the part of host communities is commonplace, particularly in areas where host populations are as poor or poorer than refugees, and employment can be highly restricted depending on the context (Alix-Garcia et al., 2018; Fasani et al., 2021; Mah & Rivers, 2016; Martin, 2005). Low quality sanitation systems and overcrowding contribute to the spread of disease throughout settlements (Habib et al., 2006; Paquet & Hanquet, 1998; Rafa et al., 2020), and high percentages of refugees carry with them a host of trauma due to the conditions they fled, including PTSD, depression, and psychosocial distress (Bukuluki et al., 2021; Hollifield et al., 2002; Li et al., 2016; Onyut et al., 2009; Silove et al., 2017). Gender-based violence (GBV) is unfortunately very prevalent within refugee settlements, as well as throughout the refugee experience for women and girls (Hossain et al., 2021; Olsen & Scharffscher, 2004; Sullivan et al., 2021). In Uganda, a qualitative study across four major settlements found that gender-based violence was prevalent in peripheral communities, or areas that did not have an effective presence from aid organizations, which resulted in underreporting of harassment and assault to authorities (Kwiringira et al., 2018).

The formation of temporary relief shelters is not limited to refugee settlements. The formal definition of refugee – a displaced person who flees to another country due to conflict – excludes people displaced due to natural disasters, though these populations often must be similarly housed in temporary settlements, and research in these contexts overlaps conceptually and pragmatically with refugee settlement research. In a similar fashion to refugee settlements, those displaced by natural disasters are provided temporary aid and their living circumstances are often low quality, culturally inadequate, costly, and environmentally harmful (Felix et al., 2013;

Johnson et al., 2006). Johnson (2007) identifies numerous criticisms of post-disaster housing practices, including its expense, timing lag, and lack of necessity in the face of reconstruction needs. He continues, stating,

> "Ideally, after a disaster, temporary housing would be immediately available, offering a level of comfort consistent with the prevailing standard of living, at a cost proportional to intended length of use and easily eradicated or transformed once it is no longer needed; but in reality temporary housing is overly expensive and later on, temporary housing sites can become an environmental blight and a hotbed of social dysfunctions" (p 36-37).

Temporary, culturally inappropriate housing commonly results in negative impacts for their residents. In a study on the housing provided to victims of the 1997 earthquake in Marche, Italy, the residents provided with wooden dachas were significantly more satisfied with and attached to their homes and had a greater sense of psychological wellbeing than those housing in mobile homes converted from containers (Caia et al., 2010). A longitudinal study of residents in temporary housing after the Great East Japan Earthquake saw increased psychological distress and sense of isolation as their stay in that housing continued (Nagata et al., 2015). In addition to creating dysfunctional environments psychologically, housing conditions in post-disaster contexts also result in decreased physical health. After a tsunami in Sri Lanka, the self-reported health risk factors of IDPs in transitional camps were significantly higher than those living in permanent housing projects (Turner et al., 2009). Studies of temporary housing accommodations in China for homeless victims of earthquakes in 2008 and 2013 found that "[s]helter occupants suffered from extreme heat and humidity in summer and coldness and bitter wind in winter, which was detrimental to their recovery from the disaster, both physically and psychologically" (Yu et al., 2016, p 176).

While disaster housing literature contributes to demonstrating the potential health effects of temporary style housing, refugee settlements, once formed, can evolve over time,

transforming their living conditions. Settlement conditions vary widely, often producing variable housing characteristics depending on the region, the policies of the host country, and the culture and practices of the refugee community. All settlements bear key commonalities, however; they hold a population that is reliant on humanitarian aid for survival, is limited in terms of resource access, and resides as foreigners in their new host country after fleeing conflict or persecution. Housing assessments across diverse settlements will allow this body of research to capture the refugee experience fully and find ways of tailoring housing solutions to individual contexts.

Refugee Self-Reliance

A common approach to assisting refugee populations is through a policy of self-reliance, which was first made into a formal policy in Uganda in 1999 and has since spread to other countries (Betts, Chaara et al., 2019b). The United Nations High Commissioner for Refugees (UNHCR) defines self-reliance as "'social and economic ability of an individual, a household or a community to meet its essential needs (including protection, food, water, shelter, personal safety, health, and education) in a sustainable manner and with dignity" (UNHCR, 2005, p 1). The Self-Reliance Strategy (SRS) is a method of managing and transitioning refugees by providing them with the means to support themselves autonomously, therefore promoting well-being and dignity among refugee populations. This has included the incorporation of policies that allocate plots of land to refugees for subsistence farming, allow the right to work within host countries, and let refugees move freely and choose their place of residence (Slaughter et al., 2017).

Though the SRS is a considerable improvement on former refugee policies that emphasized containment and isolation rather than the rebuilding of livelihoods, this strategy has been frequently criticized as a methodology for addressing refugees' circumstances, primarily

due to the lack of self-reliance facilitation while this population simultaneously faces mounting pressure to achieve self-reliance (Hunter, 2009). Achieving self-reliance is difficult when facing trauma, a lack of connections and resources, and an uphill battle from nothing (Asgary, 2018). The characteristics of a 'self-reliant' refugee as defined by the UNCHR must vary based on context as they are largely dependent on the resources, services, and opportunities available to them. For instance, access to affordable healthcare is outside of a refugee's control; this is dependent upon the proximity and cost of healthcare institutions. Employment opportunities are similarly dependent external economic factors, and they must often overcome additional obstacles – e.g., language barriers and discrimination from host communities – in order to gain employment (Grove & Zwi, 2006). Easton-Calabria and Omata (2018) point out that despite the continued and prevalent use of SRS, there have been very few successful instances of large-scale transitions into self-reliance for refugee populations. In studies comparing the success of South Sudanese refugees in two encampments in Kenya – one with less progressive policies and the other created with the intention of promoting self-reliance – it was found that the aid programs supporting self-reliance were too weak to foster true improvements (Betts et al., 2020; Betts, Omata et al., 2019). In addition, framing refugee populations in the self-reliance light can also create a binary between the vulnerable and the capable, thereby casting aside their true diversity and encouraging the creation of one-dimensional programming tailored to one or the other 'type' of refugee (Slaughter et al., 2017). In essence, the self-reliance strategy can seemingly belie the true nature of successful human existence and ignore the normative absence of necessary social systems and services in and around refugee settlements, implying an onus of responsibility on this population to achieve independence from receiving humanitarian aid under settings and policies that stifle their ability to do so while framing an exit strategy for those who provide aid

(Omata, 2017; Skran & Easton-Calabria, 2020). Research on refugee populations has not yet examined the role of housing quality in relation to self-reliance.

Approaches to addressing refugee livelihoods that emphasize self-reliance arguably deny the multifactorial, structural nature of self-reliance (Easton-Calabria & Omata, 2018), which is similar to early models for addressing homelessness. In the past, homelessness was understood and addressed primarily in terms of individual characteristics, choices, and incentives, seeing homeless people as responsible for their living conditions due to personal failings (Stefancic & Tsemberis, 2007). This approach resulted in restrictive housing programs that generated criteria homeless individuals had to meet prior to 'earning' real housing by demonstrating their housing readiness - maintaining sobriety, having an income, and demonstrating psychiatric stability. Starting in the early 1990s, however, the Housing First model for addressing homelessness began to find success. This model flipped traditional approaches by first providing permanent, independent housing for homeless individuals before they are expected to have income or address their mental health and instances of addiction (Tsemberis et al., 2004; Tsemberis, 2011). The thought behind Housing First is that: 1) the ability to thrive in a transitional setting does not serve as a fair representation of whether an individual can thrive in an independent, less controlled, permanent environment, and 2) permanent housing provides a solid ground from which people can begin to build a fully functional, independent lifestyle. The use of Housing First models for homeless individuals has been studied in numerous instances, solidifying its status as an evidence-based approach that improves outcomes considerably (Gulcur et al., 2003; Stefancic & Tsemberis, 2007; Tsemberis et al., 2004; Woodhall-Melnik & Dunn, 2016).

The Housing First model has meaningful implications for refugee settlements, and it is interesting to consider the similarities between the conditions of homeless populations and

refugee populations as well as the differences between what is considered their ideal aid models. Both groups have faced challenging life circumstances outside of their control, have been removed from their permanent and secure homes, must often navigate intense societal discrimination, and are usually suffering from trauma and mental illness (Li et al., 2016; Martens, 2001). Yet we can observe that, like former traditional models for addressing homelessness, the model for helping refugee populations does not prioritize high quality, permanent housing prior to expecting self-reliance; instead, host governments and other settlement authorities frequently seek to push refugees off aid as soon as possible while they are living in a highly impermanent, transitional setting (Collier & Betts, 2017; Kibreab, 2007; Rozo & Sviatschi, 2021; Watera et al., 2017). The Housing First model would argue that focusing on housing aid for refugee populations could facilitate development of self-reliance much more effectively than other types of supportive initiatives. Unfortunately, refugee populations are kept in constant states of impermanence in settlement environments due to the nature of humanitarian aid and political obstacles to economic integration (Collier & Betts, 2017; Dhesi et al., 2018; Fassin, 2001).

Higher quality refugee housing that meets basic needs arguably allows refugees to attain goals like a steady income more easily and effectively. If a relationship between housing conditions and self-reliance exists, the challenge then becomes identifying the standards of housing necessary to support these populations appropriate to their climate and cultural backgrounds as well as discovering what kinds of aid can be provided to refugee populations to ameliorate their current housing circumstances most effectively. To our knowledge, research examining the relationship between measures of refugee housing quality and their self-reliance status has never been conducted. Part of the goal of the present research is, therefore, to examine

the associations between specific features of refugees' housing – such as a secure front door, thermal insulation, proper ventilation, etc. – with their health and well-being. This information can then inform the types of initiatives that governing bodies prioritize for this population.

Conceptual Model, Aims & Hypotheses

The conceptual model created for this research is grounded in the wealth of literature documenting the effect of housing conditions on health as well as the success of Housing First models in homelessness. Inaugurally named the Housing, Health, and Self-Reliance (HHSR) model, it combines understandings of refugee self-reliance, housing and homelessness, and housing and health to facilitate effective research on refugee housing experiences. The HHSR model positions qualities of housing in direct relation to self-reliance, the goal sought for refugees after displacement, and health & well-being is hypothesized to mediate relations between housing quality and self-reliance. Additionally, housing satisfaction is hypothesized as a mediator between housing quality and health & well-being (Figure 1).

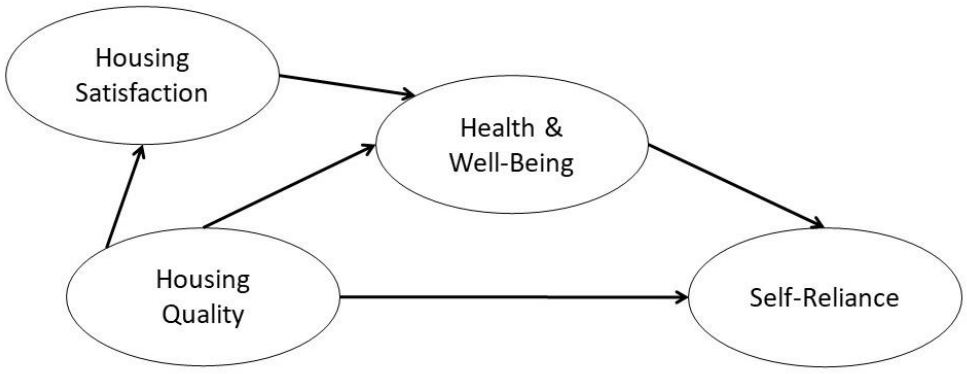


Figure 1. The Housing, Health, and Self-Reliance conceptual model for this research.

This research is organized through both aims and hypotheses. The analytic plan corresponding to each of the following Aims will be described in the Data Analysis Strategy section of Chapter 2.

Aim I. *Describe the housing of refugees residing in Bidibidi and describe the survey responses.* The first task of this research is to characterize the housing circumstances of the refugee participants, which will pertain to their material types, shape, size, openings, and indoor features.

Aim II. *Examine the associations among all housing quality, housing satisfaction, health & well-being, and self-reliance variables.* The second aim is to examine the relations between pairs of variables, also known as the bivariate relations. For example, the correlation between indoor smoke, an operationalization of housing quality, and respiratory health, an operationalization of health & well-being, will be analyzed.

Aim III. *Examine hypothesized mediators of significant bivariate relations between the housing quality, housing satisfaction, health & well-being, and self-reliance variables and quantify the significance of direct and indirect effects.* The third aim builds upon Aim II by examining potential mediators. This is the primary predictive focus of this research – to identify mediation pathways between operationalizations of the HHSR constructs. Mediator variables explain how or why two variables are related. In other words, mediators are causal pathways between an independent and dependent variable. They are the mechanisms through which these relationships operate. As Preacher and Hayes (2004) describe, "[t]he utility of mediation analysis stems from its ability to go beyond the merely descriptive to a more functional understanding of the relationships among variables" (p 717). Hypothesizing mediation in a conceptual model adds depth to cross-sectional research where relationships between variables are correlational. Mediators provide theoretical insight. Mediators are also practical. By finding pathways between variables, researchers can then propose multiple points of potential intervention to address social problems, provide fodder for more nuanced future research questions, and deepen understandings of the experiences of the research subjects.

The predicted relations among HHSR constructs are organized into two groupings: 1) housing quality, health & well-being, and self-reliance (Figure 2), and 2) housing quality, housing satisfaction, and health & well-being (Figure 3). Housing quality is predicted to impact self-reliance significantly via its impact on health & well-being. In this case, mediation explores whether health & well-being is the causal pathway by which housing quality affects self-reliance. In other words: does housing quality affect health & well-being, which in turn affects self-reliance? Determining whether health & well-being is a mediator can help to identify potential causal links between these variables. Similarly, housing satisfaction will be examined as a potential mediator between housing quality and health & well-being, which will allow us to understand the degree to which the housing quality measures chosen for this research are significantly related to the residents' own opinions of their housing. In turn, this research will evaluate whether residents' housing satisfaction is correlated with measures of residents' health & well-being.

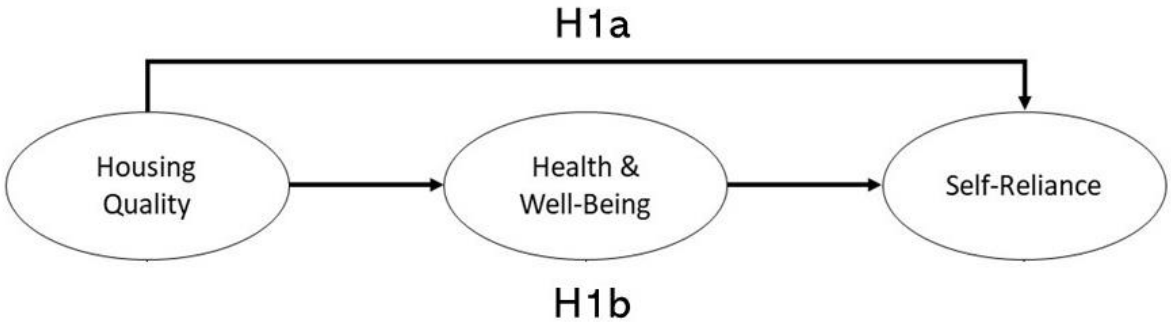


Figure 2. Hypotheses H1ab among Housing Quality, Health & Well-Being, and Self-Reliance.

H1a. Housing Quality is associated with Self-Reliance.

H1b. Health & Well-Being is a mediator of the Housing Quality – Self-Reliance relation.

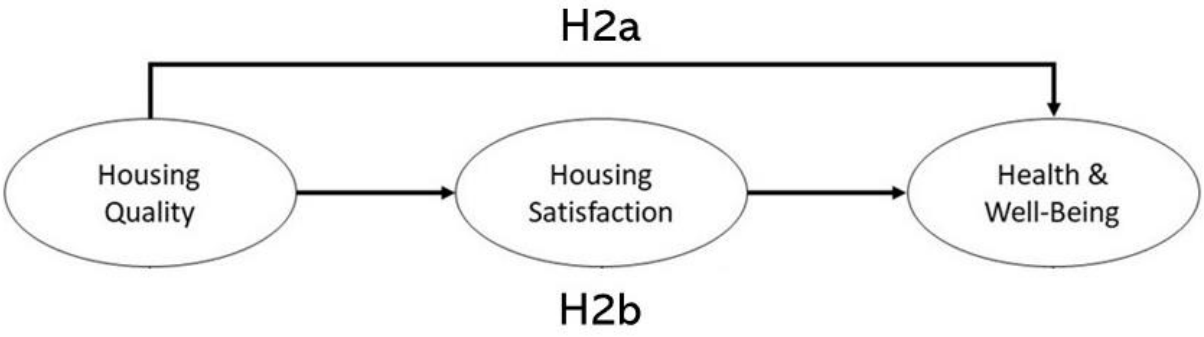


Figure 3. Hypotheses H2ab among Housing Quality, Housing Satisfaction, Health & Well-Being.

H2a. Housing Quality is associated with Health & Well-Being

H2b. Housing Satisfaction is a mediator of the Housing Quality – Health & Well-Being relation.

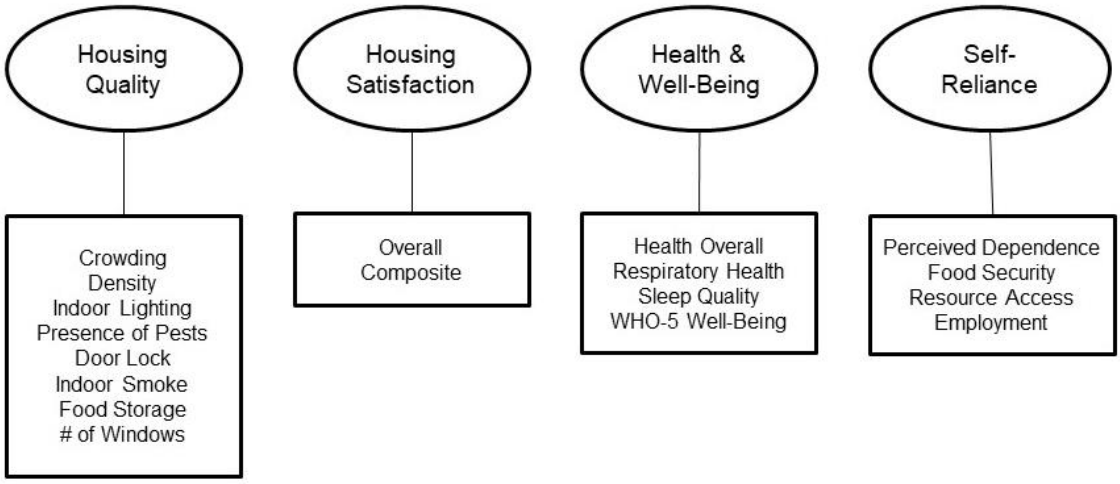


Figure 4. Operationalizations of each construct - Housing Quality, Housing Satisfaction, Health & Well-Being, and Self-Reliance.

Aim IV. *Examine demographic factors as potential moderators of the mediation model(s).* The final aim is to explore moderated, or conditional, mediation. It is predicted that demographic factors such as location within a refugee settlement may impact the conditions experienced by the residents and, therefore, may moderate the relationships among variables. Moderators—also

known as “effect modifiers”—influence the degree of an effect between an independent and dependent variable. In the case of mediated moderation (or “conditional mediation”), the moderator regulates the pathways linking independent, mediator, and dependent variables. The final hypothesis, H3, captured the prediction regarding conditional mediation:

H3. Demographic factors — zone within settlement, sex, marital status, hut tenure, and age — will moderate the mediation models identified in H1 and H2.

Chapter 2

Method

Research Design

This study is cross-sectional and non-experimental. Associations between variables are therefore correlational. The primary independent variable is housing quality, assessed via crowding, density, indoor lighting, presence of pests, security, food storage, indoor smoke, and number of windows. The dependent variables are (1) self-reliance operationalized via perceived dependence, resource access, food insecurity, and employment status; and (2) health & well-being, operationalized via a self-report measure of health overall, sleep quality, respiratory health, and WHO-5 well-being. Housing satisfaction is a hypothesized mediator between housing quality and health & well-being, and health & well-being is, in turn, a hypothesized mediator between housing quality and self-reliance.

Procedure

The data for this study were collected via a collaboration with Community Technology Empowerment Network (CTEN), a local refugee-led organization in northern Uganda with skills in multiple languages and familiarity with our site, Bidibidi Refugee Settlement in Uganda. CTEN was present throughout the process of developing this research plan, assisted in two pilot tests, one in the October 2020 and another in June 2021, and translated documents to local languages: Bari and Juba Arabic. CTEN staff also facilitated research approval from the Office of the Prime Minister (OPM), the Ugandan government presence in the settlement, and coordinated with local leaders throughout the settlement to ensure that residents were comfortable with the data collection. In preparation for full data collection, the team of six research assistants (RA's) completed a series of four recorded training videos developed

specifically for this project, each between seven and twenty minutes long. These recorded trainings addressed the following topics and can be read through in Appendix C:

1. Research Overview & Guidelines
2. Data Collection Steps Part 1
3. Data Collection Steps Part 2
4. Data Storage, Transfer, and Upload

Following the completion of the training videos, the research assistants recruited participants, administered the surveys, and collected housing data. The CTEN research team and the U.S.-based researchers met weekly via Zoom throughout the training and data collection period to ensure mutual understanding, address any difficulties, and decide on points of revision.

The research team visited two villages per day, and a copy of the data collection calendar can be found in Appendix D. Recruitment was completed by visiting residents door-to-door, and consent was administered and accepted orally due to high illiteracy rates and a common suspicion of signing documents within the Bidibidi population (Lubari & Towango, 2020). The recruitment and consent scripts can be found in Appendix A. Only heads of household (HoHs) aged 18 years or older were surveyed. The RA's completed the following four data collection activities contained in a participant packet (see Appendix F). First, a full characterization of the household was completed with a list of huts, their primary uses, and their residents. Second, pictures were taken of the HoH's bedroom hut, which included a photo of each external side of the hut, several interior photos, and photos of the household's kitchen area and the full household. The bedroom hut's exterior measurements were also recorded. Third, the research assistants responded to a series of questions in a notes section, including questions about their personal observations of the HoH's hut. Lastly, the questionnaire was administered to the HoH

via KoBoCollect, a survey software used by humanitarian agencies and researchers in remote, developing contexts due to its offline capabilities (Harvard Humanitarian Initiative, 2021). See Appendix E for a summary of the full questionnaire in English as well as its formatting in Appendix F. All other data collection documents were transferred from the research team to the principal investigator via Box (box.com), which provided sufficient data security and tracking. Each participant received a small gift of a bar of soap and, as these data were collected during the COVID-19 pandemic, a reusable mask, in appreciation of their time.

A variety of challenges arose during the preparation for data collection. These challenges, which occurred largely due to the COVID-19 pandemic, will be summarized briefly here and discussed in more detail in the Discussion section. COVID limited the number of settlement zones to which the team could travel, reduced the sample size, and eliminated the ability of the team to enter housing. The latter reduced the ability of the research team to collect data sufficient to generate an objective housing assessment, so adaptations and sacrifices were made regarding the operationalization of housing quality.

Site: Bidibidi Refugee Settlement, Uganda

Uganda hosts a large population of displaced people with nearly 1.5 million documented refugees and asylum-seekers in the country as of September, 2021 (UNHCR Representation in Uganda, 2021). Uganda's refugee policies are praised internationally as highly progressive thanks to its general open-door policy, its focus on refugee integration into the host communities, and allowing refugees to seek employment and travel outside of settlements, thereby facilitating self-reliance (Ahimbisibwe, 2018; Matovu & Chrispus, 2021). As Kreibaum (2016) summarizes,

> Since 1999 the Ugandan government has pursued an approach of local social and economic integration of refugees. They receive land, are permitted to work and are thus intended to become independent of assistance. This liberal policy is also of benefit to the native population: the enhanced economic dynamic in areas in

> which many refugees live leads to higher consumption and improved access to public infrastructure for people in neighbouring villages. In particular, they are also able to use the schools and health clinics operated by the aid organisations" (p 1).

Though Kreibaum describes numerous benefits to host communities within Uganda, native populations can frequently be resentful of refugees (Betts et al., 2019b). To help reduce this resentment from Ugandans, who are often in similar living conditions as the refugee population, the UNHCR and the OPM dictated that thirty percent of all humanitarian aid goes to host community members (Dawa, 2018). Other African counties, such as neighboring Kenya and Tanzania, have long operated under restrictive policies that view refugees primarily as threats to national security, limiting their tenure, movement, and right to work within these countries and seeking to close camps (Mogire, 2009). While Uganda, in comparison, offers welcoming refugee policies, this is not to say that there are not characteristics that limit refugees in their model. For rural refugee settlements, Betts et al. (2019b) identify a lack of education opportunities and an inadequate amount of land allocated to refugees to be able to support self-sufficiency and, therefore, self-reliance.

Over 65 percent of refugees in Uganda – approximately 933,000 – were displaced due to civil war in South Sudan (Rolandsen et al., 2015; Figure 4), who now mostly reside in refugee settlements in the northeastern part of Uganda just below the shared border with South Sudan (Figure 5).

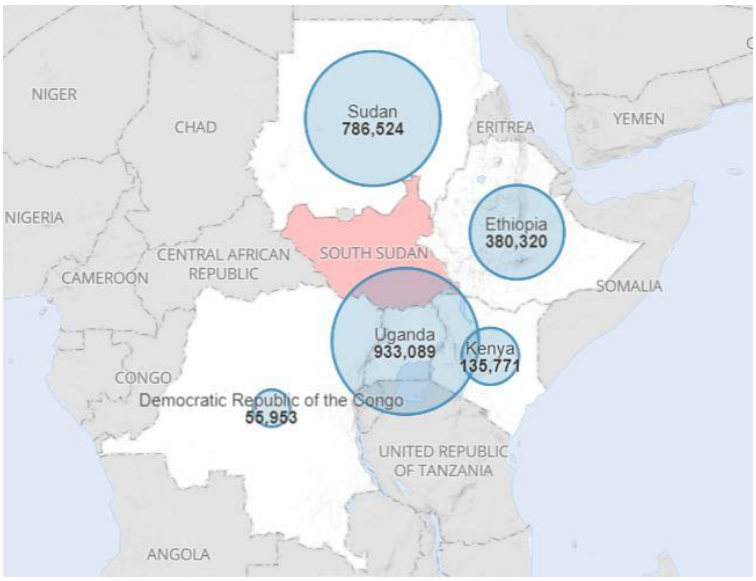


Figure 5. Flow of South Sudanese refugees to neighboring countries (UNHCR et al., 2021).

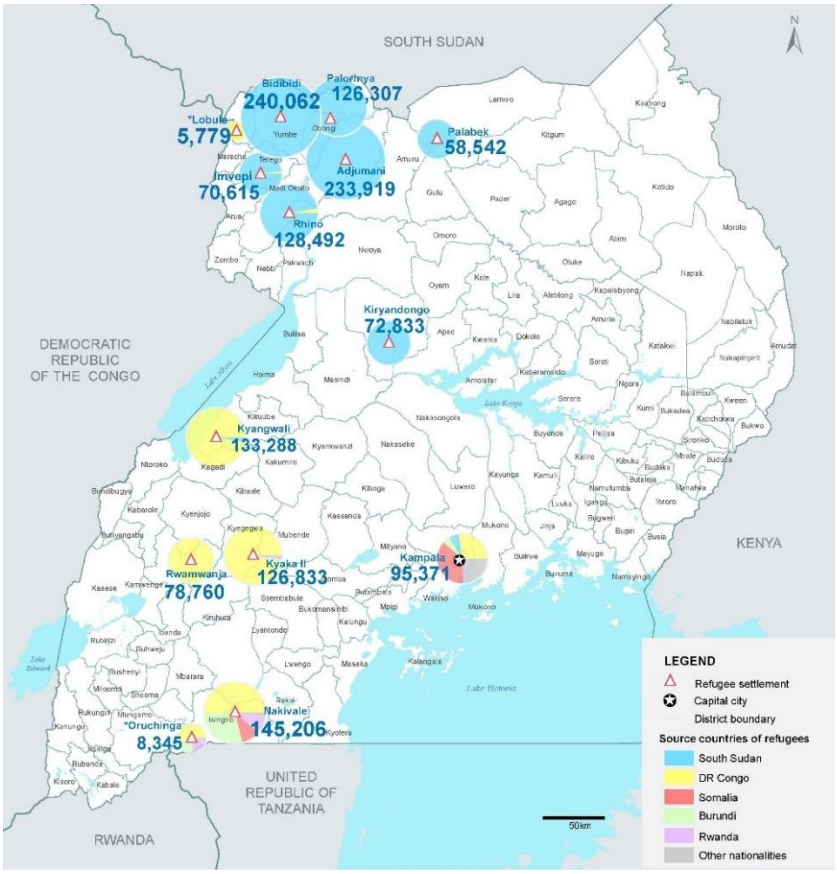


Figure 6. Refugee settlements in Uganda with population totals (UNHCR Representation in Uganda, 2021)

One of these northwestern refugee settlements, Bidibidi, serves as the specific site of this research. Bidibidi Refugee Settlement is the most populous settlement in the country with over 240,000 residents, or sixteen percent of the refugee population in Uganda, and it covers 250 square miles (Dawa, 2018; UNHCR Representation in Uganda, 2021). This settlement was founded in Yumbe district in September 2016 and reached its capacity by December 2016 with rapid development (Figure 6). There are five zones within Bidibidi (Figure 7; See Appendix B for zone maps and masterplan). Each zone has its own set of resources and comprises eight to 20+ villages dividing the land and populations therein.

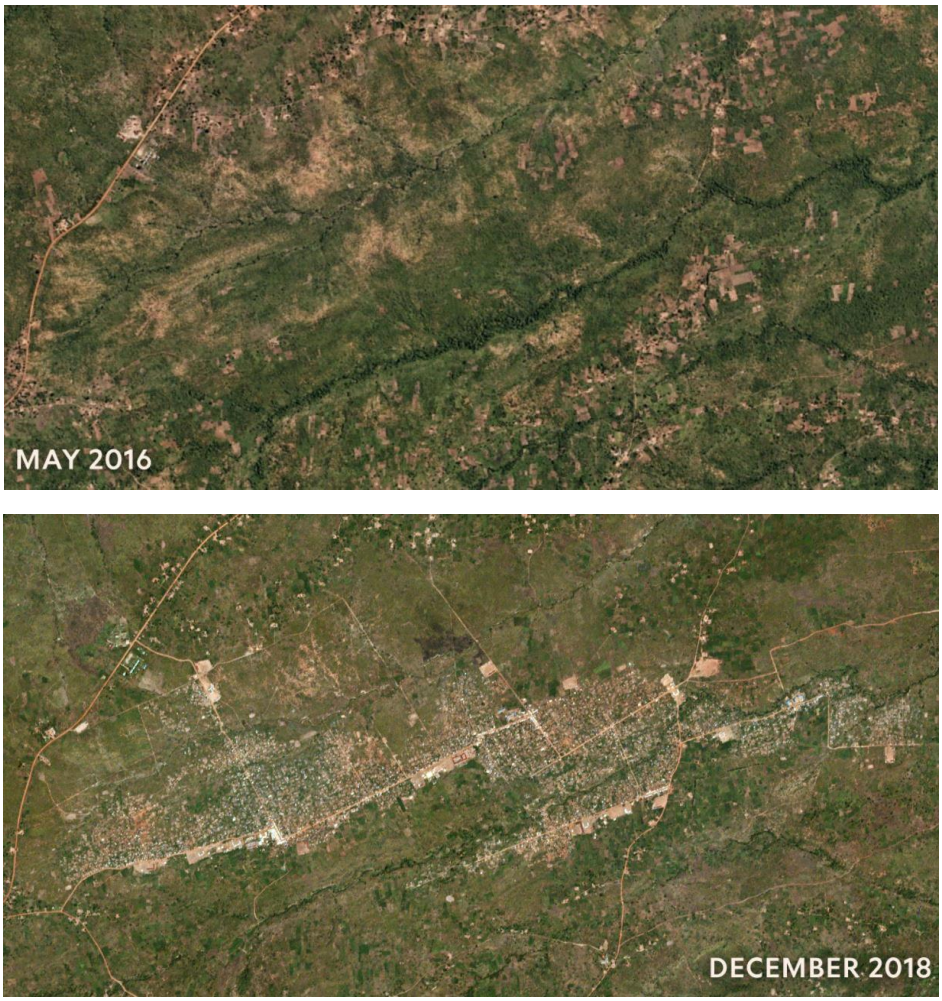
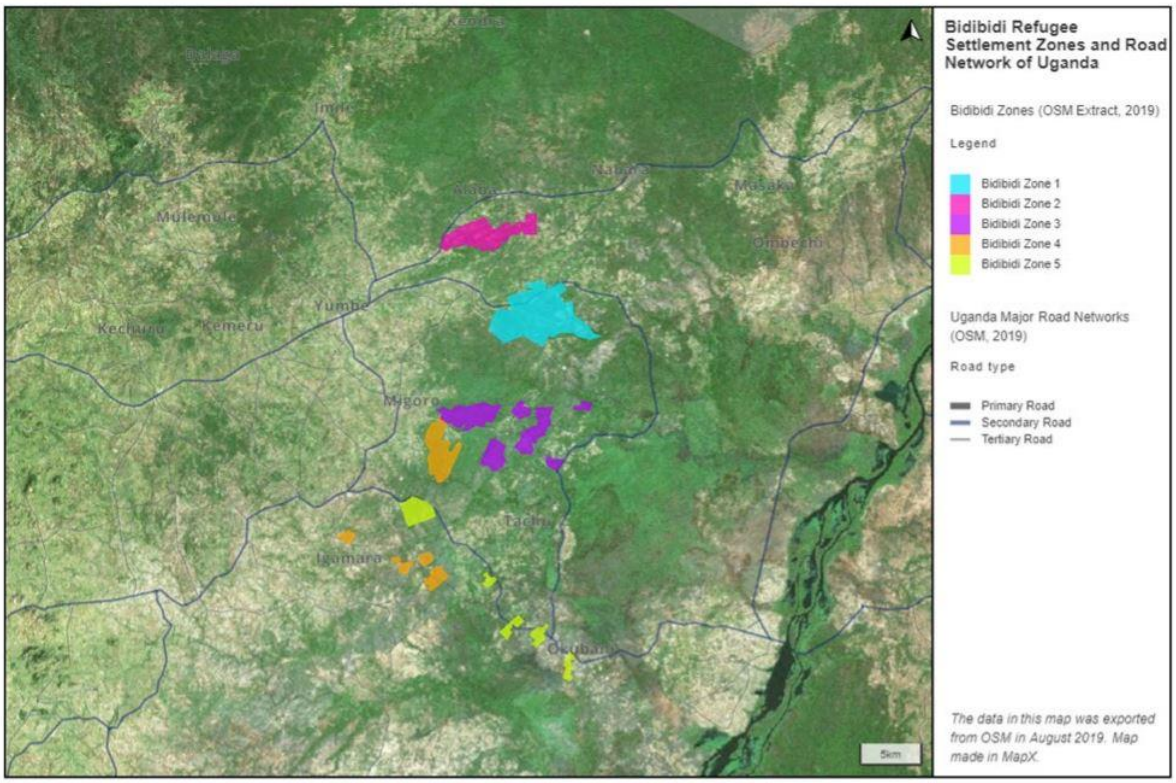


Figure 7. Satellite images in May 2016 and December 2018 of Zone 2, Bidibidi (Strochlic, 2019; courtesy of NGM Maps and Planet Labs, Inc.).


Bidibidi Refugee Settlement Zones and Road Network of Uganda
Bidibidi Zones (OSM Extract, 2019)
Legend
Bidibidi Zone 1
Bidibidi Zone 2
Bidibidi Zone 3
Bidibidi Zone 4
Bidibidi Zone 5
Uganda Major Road Networks (OSM, 2019)
Road type
Primary Road
Secondary Road
Tertiary Road
The data in this map was exported from OSM in August 2019. Map made in MapX.
Mufumbiro
Yumbe
Kiryandongo
Masaka
Mbarara
Kyenjojo
Kamwenge
Kyegegwa
Kiboga
Kyankwanzi
Kyotera
Rakai
Lyantonde
Sembabule
Mubende
Kassanda
Nakaseke
Luwero
Nakasongola
Mityana
Mubende
Mpigi
Wakiso
Kampala
Mukono
Buikwe
Jinja
Iganga
Bugiri
Mayuge
Kamuli
Kaliro
Pallisa
Budaka
Kibuku
Kumi
Bukedea
Soroti
Kaberamaido
Dokolo
Amolatar
Lira
Oyam
Apac
Kole
Alebtong
Otuke
Amuru
Nwoya
Gulu
Omoro
Pader
Agago
Lamwo
Kitgum
Pakwach
Nebbi
Zombo
Arua
Maracha
Koboko
Terego
Madi-Okollo
Obongi
Moyo
Adjumani
Yumbe
Kyegegwa
Kyenjojo
Kabarole
Kamwenge
Ntoroko
Bundibugyo
Kasese
Kyegegwa
Mitooma
Ntungamo
Rukungiri
Kanungu
Kisoro
Rubanda
Kabale
Rukiga
Kabale
Kisoro
Rubanda
Kanungu
Rukungiri
Ntungamo
Mitooma
Kasese
Bundibugyo
Ntoroko
Kabarole
Kamwenge
Kyenjojo
Kyegegwa
Yumbe
Mufumbiro

human population lives in earthen dwellings. Research on tukuls shows inhabitants frequently have added respiratory problems due to limited ventilation and because indoor cooking smoke is sometimes seen as a traditional way of 'conditioning' tukul houses (Tamire et al., 2018; Tamire et al., 2020). Over-crowding is also a common occurrence within tukuls because the lack of structural integrity limits their size (Kumie, 2002; Kumie & Berhane, 2002). Most tukuls in Bidibidi, also often referred to simply as "huts," were built by the refugees with assistance from the UNHCR and other NGOs.

Figure 9. Aerial photograph of a portion of Bidibidi showing tukul housing (Wernick, 2019; courtesy of DroneNerdsAfrica).

Households are commonly made up of multiple huts spaced several meters apart, each of which is one room, and the number of huts per household as well as the materials and methods used for each hut vary; they can be made using a brick- or frame-based construction technique; they can have thatch, metal, or tarp-covered thatch roofs; and they sometimes have coverings for

the earth floor (Lubari & Towango, 2020; Figure 6). The UNHCR provides building tools for the residents, including shovels and some wood for framing, and can also provide labor assistance for residents to transition from tents into these earthen huts after they have arrived. For residents with PSN status (Person with Specific Needs), additional aid is provided, including pre-built housing for the elderly and orphaned children (Radonjic, 2021). Within the households, separate kitchen areas are generally contained in lower quality huts, and these can be shared across multiple families (Muna et al., 2021).

Figure 10. Photos of hut types from October 2020 pilot data collection. A) metal roof with window, B) tarp-covered roof, C) thatch roof.

Though Bidibidi's housing conditions and refugee policies may differ considerably from other refugee settlements throughout Africa and the world, this does not preclude its psychosocial similarities to other refugee settlements worldwide, which have been demonstrated in numerous studies conducted within the settlement. For instance, conflict between Bidibidi refugees and the local host population occurs regularly and is mostly centered around firewood and the inability of the host population to now use this land for hunting, livestock grazing, and charcoal production (Dawa, 2018). The refugee residents of Bidibidi have no formal land rights outside of their plots, making land use difficult, while members of the host community are angered by the environmental degradation wrought by the presence of this large refugee population (Dawa, 2018; George & Dearden, 2019). A survey of adolescents in Bidibidi found a very high prevalence of suicidal ideation and psychological distress in female participants

(Bukuluki et al., 2021). Sexual and gender-based violence – a common problem throughout refugee settlements – is also present in Bidibidi; a series of focus groups and interviews with young adult residents ages 16-24 revealed complex relationships between poverty, sexual and gender-based violence, gendered tasks, and transactional sex in Bidibidi (Logie et al., 2021). A recent study on the nutritional status of mothers and children in Bidibidi found that host and refugee members of the community were 27% and 22.4% stunted, respectively, which were correlated with household size and episodic illness (Mandre et al., 2021). Moreover, food insecurity and nutritional status were correlated in a 2018 study of Bidibidi children 6-59 months (Atim, 2018).

Participants

Table 1. Participant characteristics (N=82).

Characteristic	No.	%
Zone		
3	29	35.4%
4	30	36.6%
5	23	28.0%
Sex		
Female	60	73.2%
Male	22	26.8%
Marriage Status		
Single	9	11.0%
Married	69	84.2%
Widowed	3	3.7%
Other	1	1.2%
Hut Tenure (yrs)		
≤ 3	3	3.7%
4	24	29.3%
5	55	67.1%

Data were collected from 85 residents in Zone 3, 4, and 5. Three participants were excluded due to incomplete data. Of the 82 participants, 81 were originally from South Sudan, and the sample had a mean age of 33.17 (18-65, SD=10.85). While most participants completed the full questionnaire in English, five completed a shorter questionnaire translated into Bari. Therefore, sample sizes (n) per variable vary between 77 and 82. Sixty participants (73.17%) were female. Descriptive statistics – zone distribution, sex, marriage status, and hut tenure – can be found in Table 1. Data were collected between July 21st and August 27th,

2021.

Constructs + Measures

Measures for this study used minimal items to limit the participant burden, and, where needed, were adapted to match the refugee context. See Table 2 for a summary of measures.

Housing Quality

Housing quality was assessed using several subscales and variables: crowding, density, indoor lighting, presence of pests, household security, indoor smoke, food storage, and number of windows.

- **Crowding** was assessed using one subscale of a housing scale developed by Evans, Wells, Chan and Saltzman (2000). The subscale was revised to have three Likert-style items: "My home is cramped," "My home is crowded," and "When everyone is home, I feel crowded," rated on a 5-point scale (0=Strongly Disagree, 4=Strongly Agree) (Evans et al., 2000; Wells & Harris, 2007). Crowding was quantified by calculating the mean of these three items. A 4-item crowding subscale was initially used and yielded a Cronbach alpha of .645. A correlation matrix and factor analyses indicated one item, "In my home, people get under foot, or in the way," was not correlated with the other three items, perhaps indicating that the meaning of this phrasing was unclear for this sample. Eliminating this item yielded a Cronbach alpha of .901. Therefore, our analyses employed a 3-item version of the crowding subscale. In previous studies, these crowding items were part of a 13-item crowding scale and had a Cronbach alpha of .80 (Evans, Lepore, & Allen, 2000).
- **Density**, which is often measured via persons per room (e.g., Evans, Lepore, & Allen, 2000), was instead calculated based on the square footage of the main hut (measured by

the research team) and its number of residents (participant self-report) since each hut was only one room. Hut Density = (# hut residents) / (square footage of hut). The dimensions of the hut were measured from the outside since the research assistants were unable to enter the huts.

- **Indoor Lighting** was measured via one dichotomous, yes/no question that asked: "Do you have a source of lighting that you use within your hut?"
- **Presence of Pests** was assessed via one Likert-style question on a 5-point scale (1=Strongly Disagree, 5=Strongly Agree): "Pests (roaches, mice, etc.) are frequently in my home."
- **Door Lock** was measured via one dichotomous, yes/no question that asked: "Are you able to lock your door?"
- **Indoor Smoke** was assessed via agreement with the statement "I experience indoor smoke from cooking" on a 5-point scale (1=Strongly Disagree, 5=Strongly Agree). This single item measure is not sourced from prior literature.
- **Food Storage** was assessed via two Likert-style questions on a 5-point scale (1=Strongly Disagree, 5=Strongly Agree): "I need more space for food storage" and "I need better food storage containers." The two item responses were then added and the mean was used in analyses.
- **Hut Characteristics** were assessed via photos of the huts from several angles, both external and internal. These photos allowed for hut type verification (structure, roof, floor, and shape) of the survey responses and they provided information for a window count, making these objective measures. The **Window** variable was simply the total

number of windows visible, and the presence of ventilation holes in a single side were counted as a half window.

Demographics

Several demographic questions were included in the questionnaire, including sex, marital status, age, PSN status, tribe membership, length of stay in Bidibidi, hut tenure, and country of origin.

Dependent Variables and Hypothesized Mediators. The operationalization of self-reliance dependent variables – perceived dependence, food security, resource access, and employment – are described below along with the measurement of overall health, respiratory health, sleep quality, well-being, and both composite and overall housing satisfaction, the hypothesized mediators. A summary of these measures can be found in Table 3.

Self-Reliance

Self-reliance is a difficult construct to operationalize, so four of its components were captured in the questionnaire: perceived dependence, food security, resource access, and employment status. These operationalizations are similar to the method of measuring self-reliance implemented by Betts et al., (2020a). As Betts explains,

> "Self-reliance is both an ability to meet essential needs in a sustainable manner and a type of programme that strengthens livelihoods and resilience, and reduces dependence on humanitarian aid…We translated UNHCR's understanding of self-reliance into a conceptual framework. We conceptualize self-reliance as a process through which self-reliance inputs (a combination of enabling factors and aid programmes) lead to self-reliance outcomes (socio-economic out-comes and autonomy)" (p 190-191).

The survey questions Betts uses to capture this understanding of refugee self-reliance were used for this research as described below.

Table 2. Summary of independent variable measures.

Variable	Description / Measurement	# Items	α	α*	Test retest	Source
Housing Quality:						
Crowding	Likert-style items rated on a 5-point scale (0=Strongly Disagree, 4=Strongly Agree).	4	.80	.901**	NA	Evans, Wells et al., 2000
Density	The square footage of the main hut divided by its number of residents.	-	-	-	-	-
Indoor Lighting	One dichotomous, yes/no question – "Do you have a source of lighting that you use within your hut?"	1	-	-	-	-
Presence of Pests	Likert-style statement on a 5-point scale (1=Strongly Disagree, 5=Strongly Agree).	1	-	-	-	-
Door Lock	One dichotomous, yes/no question – "Are you able to lock your door?"	1	-	-	-	-
Indoor Smoke	Dichotomous, yes/no question:"Do you have a source of lighting that you use within your hut?"	1	-	-	-	-
Food Storage	Likert-style questions on a 5-point scale (1=Strongly Disagree, 5=Strongly Agree).	2	-	-	-	-
# of Windows	Counted via photos of resident housing. Small ventilation holes were counted as half a window (0.5).	-	-	-	-	-

α is from the literature; α* from the present study **this alpha used 3 of 4 items

Table 3. Summary of dependent and hypothesized mediator variable measures.

Variable	Description	Items	α	α*	Test retest	Source
Health & Well-Being:						
Health Overall	Would you say that, for someone of your age, your health is: excellent, good, fair, or poor?	1	-	-	NA	Miilunpalo et al., 1997; Wardle et al., 2003
Respiratory Health	Likert-style scale that assesses the frequency, severity, and impact of cough and sputum	20	0.80-0.91	.858	ICC= >0.70	Monz et al., 2010; Crawford et al., 2008
Sleep Quality	Subscale from ASCQ-ME v2.0, which asks about trouble falling and staying asleep over the past week	5	0.92	.513	NA	Bonham et al., 2019
Well-Being	World Health Organization Well-Being Index 6-point Likert-style statements regarding psychological factors of respondents over the past two weeks.	5	0.83-0.95	.905	ICC=0.81	Topp et al., 2015
Self-Reliance:						
Perceived Dependence	"How dependent do you think your household is on support from the UNHCR, or any other NGO?"	1	-	-	-	Betts et al., 2020
Food Security	Household Food Insecurity Access Scale , and this score was grouped into four categories.	9	0.85, 0.90	.983	0.58	Coates et al., 2007
Resource Access	Likert-style statements about respondent's access to enough clean water, food, affordable and good quality healthcare, and education.	5	-	.655	-	-
Employment	One dichotomous, yes/no question – "Are you currently employed?"	1	-	-	-	-
Housing Satisfaction:						
HS Composite	Components of housing (e.g., ventilation, hut size) on a four-point scale (1= Very Dissatisfied, 4=Very Satisfied).	18	-	.965	-	Adapted from Aigbavboa & Thwala, 2012
HS Overall	Likert item asking about overall satisfaction with their shelter on a four-point scale (1= Very Dissatisfied, 4=Very Satisfied).	1	-	-	-	-

- **Perceived Dependence** was operationalized with one item: "How dependent do you think your household is on support from the UNHCR, or any other NGO?" with response options: 0=Independent, 1=Somewhat Dependent, 2=Moderately Dependent, 3=Completely Dependent.
- **Food Security** was assessed via the 9-item Housing Food Insecurity Access Scale (HFIAS) created by Coates et al. (2007) and used by Betts (2020a). This scale contains two subscales – food quantity and food quality. Each of the nine questions had two parts; first, they asked about the presence of a condition (e.g., "In the past 4 weeks, did you worry that your household would not have enough food?"), and a "yes" response added one point to the total score. Then, if "yes," the second part of that question inquired as to the frequency, which could add additional points: Rarely (0 points), Sometimes (1 point), or Often (2 points). A higher score therefore indicated more food insecurity, and the highest possible score was a 27, or 3 points per question. This total score could then be grouped into four categories of food insecurity: Secure (0–1), Mild food insecurity (2–7), Moderate food insecurity (8–14) and Severe food insecurity (15–27). Among village residents in Ethiopia, the scale was found to have an internal consistency of 0.85 (Gebreyesus, 2015), and in a survey of village residents in Tanzania, the scale had in internal consistency of 0.90 (Knueppel et al., 2010). In a study of households in rural Lebanon, HFIAS had a decent test-retest reliability (ICC=0.58) (Naja et al., 2015).
- **Resource Access** was assessed via five Likert-style statements asking about access to enough clean water, food, affordable healthcare, good quality healthcare, and education or job training where 1=Strongly Disagree, 2=Disagree, 3=Agree, 4=Strongly Agree. These statements were not gained directly from the literature, so there are no validity or

reliability statistics. Responses were summed and then the mean for each participant was used in data analyses.

- **Employment** status was a dichotomous, yes/no variable, "Are you currently employed?" and, if yes, asks for the type of employment and number of hours per week.

Health & Well-Being

The health and well-being of participants was operationalized as four different self-report measures within the questionnaire: health overall, respiratory health, sleep quality, and well-being.

- **Health Overall** was a one-item measure asking "Would you say that, for someone of your age, your health is: excellent, good, fair, or poor?" (Miilunpalo et al., 1997; Wardle et al., 2003). Though there is no validity or reliability information for this specific question, self-report health (SRH) measures have been validated against objective health measures internationally (Teas & Friedman, 2021; Wu et al., 2013; Goldberg, et al., 2001; Kaplan et al., 1996), and there is evidence indicating that economic and social factors are its main determinants (Mansyur et al., 2008; Linstrom, 2009). Responses were numbered 1=poor, 2=fair, 3=good, 4=excellent.
- **Respiratory Health** was assessed via a twenty-item scale which "was developed and initially validated to assess the symptoms of cough and sputum based on the description of symptom frequency and severity, and their impact on daily activities" (Monz et al., 2010, p 536). In previous research, each of the scale's domains had an internal consistency between 0.80 and 0.91, and stable medical patients saw a test-retest reliability of greater than 0.70 surveyed one week apart (Crawford et al., 2008). A few adaptations were made to the scale to match the refugee context (i.e., removed references

to movie theaters and driving). Response options range from 1=Never to 5=Always OR from 1=Not at all to 5=A lot/Extremely, depending on the question. Responses were summed and then the mean for each participant was used in data analyses. Higher scores indicate worse respiratory health.

- **Sleep Quality** was operationalized as a five-item subscale from ASCQ-ME v2.0, which asks about trouble falling and staying asleep over the past week (Bonham et al., 2019). In prior research, this portion of the ASCQ-ME had an internal consistency of 0.92 (Keller et al., 2014). Test-retest reliability information could not be found in the literature. Responses were summed, and then the mean response for each participant was used in data analyses. Higher scores indicate lower sleep quality.
- Lastly, **Well-Being** was measured via the 5-item World Health Organization Well-Being Index (WHO-5), which consists of Likert-style statements regarding psychological factors of respondents over the past two weeks, including "I have felt calm and relaxed" and "I have felt active and vigorous" with response options 5=All of the time, 4=Most of the time, 3= More than half of the time, 2=Less than half of the time, 1=Some of the time, 0=At no time. The final score is calculated based on the mean of the five items, and higher scores indicate greater well-being. This scale was derived from a 28-item scale created by WHO in 1998, has been widely used to assess subjective psychological well-being, has been translated into over 30 languages (Topp et al., 2015). In a study surveying three different subsamples of depressed patients and outpatients, WHO-5 showed an internal consistency of between 0.83 and 0.95 (Krieger et al., 2014). A study on Danish epilepsy patients using the WHO-5 saw a test-retest intraclass correlation coefficient of 0.81 (Schougaard et al., 2018). In a 2015 systematic review, the scale had

adequate validity as a depression screening tool and could be used in a wide variety of contexts with diverse populations (Topp et al., 2015).

Housing Satisfaction

Housing satisfaction was assessed using an eighteen-item measure with a four-point response options: 1=Very Dissatisfied and 4=Very Satisfied. This scale was modeled after one used by Aigbavboa & Thwala (2012) in their assessments of low-income housing in South Africa, which asked the resident to rate their satisfaction with specific housing characteristics (e.g., number of windows, ventilation, the space in the unit). For this study, items from their list that did not apply were removed (e.g., kitchen bathroom/toilet, # of rooms, position of kitchen, position of lounge, position of bedrooms, position of windows, position of unit), the wording was changed when necessary to apply to huts ("hut" rather than "unit"), and items regarding roofing and structural quality were added. With factor analysis, the eighteen items had a Cronbach alpha value of .965, indicating strong internal consistency. The mean of the items yields the aggregate score. Overall housing satisfaction was also assessed via a single Likert item on a four-point scale ("Overall, how satisfied are you with your shelter?" - 1= Very Dissatisfied, 4=Very Satisfied), similar to the single item used in other housing satisfaction studies such as Ukoha & Beamish's 1997 study on housing satisfaction in Nigeria.

Data Analysis Strategy

The following describes the analytic strategy to address each of the aims stated in the Introduction. IBM SPSS Statistics, Version 27.0 (IBM Corp. Released 2020) will be used for Aims I and II, and jamovi (The jamovi project, 2021) will be used for Aim III, mediation analysis, and Aim IV, moderated mediation analysis.

Aim I. *Describe the housing of refugees residing in Bidibidi and describe the survey responses.* Aim I will be examined using various descriptive statistics. Frequencies and percentage will be

reported for categorical variables describing the housing. These include the hut materials (roofing, flooring, walls), the hut shape, number of windows, and the presence of indoor lighting and door lock. Photos of the housing from each angle will also be featured. Means and standard deviations will be reported for continuous variables, and the overall distribution of the variables will be discussed.

Aim II. *Examine the associations among all housing quality, housing satisfaction, health & well-being, and self-reliance variables.* A Pearson's correlation matrix will be generated among all seventeen variables (i.e., eight housing quality, two housing satisfaction, four health & well-being, and three self reliance variables). By understanding whether the constructs are significantly correlated, H1a and H2a can either be confirmed or rejected, and it can be determined whether there is enough basis to analyze variable pathways for H1b and H2b. Significant correlations (i.e., $p<0.05$ or $p<0.01$) both within and between the four research constructs will be identified.

Aim III. *Examine hypothesized mediators of significant bivariate relations between the housing quality, housing satisfaction, health & well-being, and self-reliance variables and quantify the significance of direct and indirect effects.* Among all variables, two groups of correlated variables are predicted to involve mediation in the hypotheses: 1) an association between housing quality (X) and self-reliance (Y) with health & well-being as a mediator (M), and 2) an association between housing quality (X) and health & well-being (Y) with housing satisfaction as a mediator (M). Variables that operationalize these broader constructs will be chosen for mediation analysis if each bivariate correlation ($X \rightarrow M$, $M \rightarrow Y$, and $X \rightarrow Y$) is significant ($p<0.05$). The jamovi medmod mediation module will quantify the direct and indirect effects among the variables. The direct effect is the regression coefficient between the independent

variable and the dependent variable (X→Y), and the indirect effect is found when regression coefficient between the independent variable and the mediator (X→M) is multiplied by that between the mediator and the dependent variable (M→Y; Figure 11).

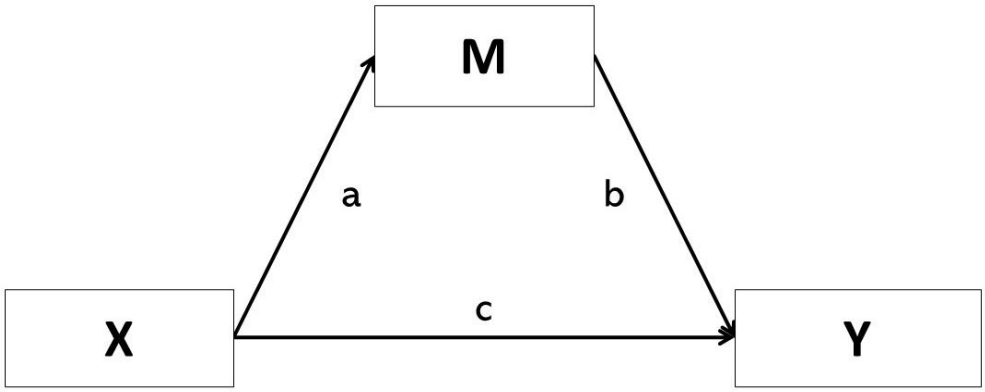


Figure 11. Generic mediation analysis pathways. X is the independent variable, Y is the dependent variable, and M is the mediator. 'a' and 'b' are multiplied to find the indirect effect, and c is the direct effect.

Aim IV. *Examine demographic factors as potential moderators of the mediation model(s).*

Demographic factors — zone, sex, marital status, hut tenure, and age — significantly correlated with the housing quality, housing satisfaction, health & well-being, or self-reliance variables will be analyzed as potential moderators of the mediation model(s) (Figure 12). Conditional mediation occurs when the mediation depends significantly on the level of the moderator. For example, in an agricultural study, we might find that heat stress (X) may reduce crop yields (Y) by causing the plants to lose water through their stomata (M), but this may be moderated (M*) by the crop variety if their transpiration rates vary. One crop variety may have different types or number of stomata, meaning the mediation pathway (X→M→Y) through transpiration is different for that variety than for another. In this example, the moderator directly affects the mediating variable, though the moderator may affect any or all the variables in the mediation

model. The jamovi medmod GLM Mediation module will be used to quantify the degree of moderation of the mediation pathways.

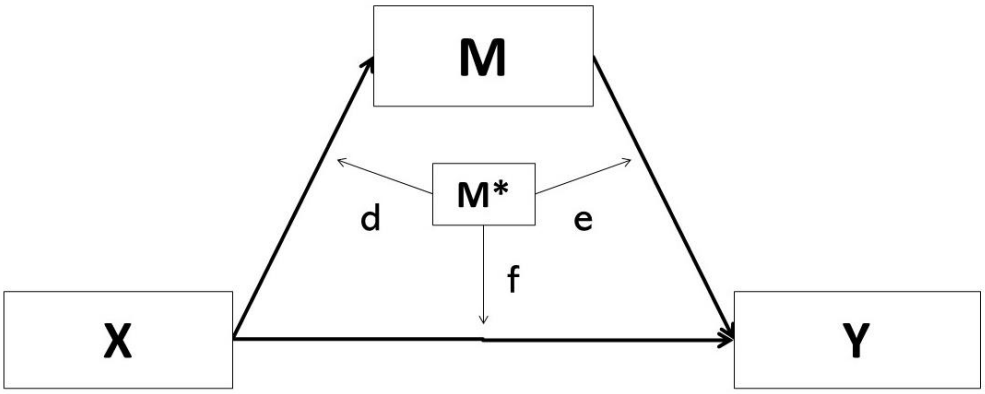


Figure 12. Generic conditional mediation analysis pathways. M* is the moderator, which is incorporated into the model to discover whether the mediation changes based on its value.

Chapter 3

Results

The results are organized based on the aims set forth in the Introduction using the method described in the Data Analysis Strategy.

Aim I. *Describe the housing of refugees residing in Bidibidi and describe the survey responses.*

Table 4. Hut characteristics.

Characteristic	No.	%
Structure type:		
Brick-based	77	93.9%
Frame-filled	4	4.9%
Tarp tent	1	1.2%
Roofing type:		
Thatch	70	85.4%
Metal	8	9.8%
Tarp	4	4.9%
Flooring:		
Earth	66	80.5%
Covered	16	19.5%
Hut Shape:		
Square	81	98.8%
Circular	1	1.2%
Windows:		
Yes	13	15.9%
No	69	84.1%
Indoor lighting:		
Yes	55	67.1%
No	27	32.9%
Door Lock:		
Front door with lock	12	14.6%
Front door without lock	70	85.4%

Photos of one participant's primary hut are shown in Figure 12. This hut was a brick-based structure smoothed over with additional plaster. The front door was made of sturdy framing with metal sheeting, and the roofing was thatched and held up by a frame of branches and twine. Interior photos, though limited due to COVID safety precautions, show clothing, sheets lining the walls (a common practice), and mosquito netting. Picture E shows the intentionally incorporated holes in the siding to allow air circulation. Picture F shows the kitchen hut used by the household exclusively for cooking.

As shown in Table 4, the mean number of huts per household was 4.09 (n=82, 1-7 huts, SD=1.37) and the mean number of household residents was 7.73 (n=82, 2-22 residents, SD=3.98). The mean primary hut size

Figure 13. Examples of some hut photos from a participant. A) front of hut, B) full household, C) interior ceiling, D) interior photo, E) back of kitchen hut, F) front of kitchen hut.

Figure 13 (cont'd). Examples of some hut photos from another participant. A) front of hut, B) household, C) side of hut, D) interior photo, E) interior side photo, F) front of kitchen hut.

was 11.80 m² (n=80, 6.20-25.30 m², SD=1.37), or 127 ft². Most huts surveyed were brick-based (93.9%), thatch roofed (85.4%), had bare floors (80.5%), and were square (98.8%) rather than circular (Table 4). All huts only had one entrance at the front of the home, and thirteen of the 82 homes had windows or ventilation openings in the sides of the hut.

Table 5 shows all independent variables in this research, each of which are aspects of housing quality. The most common rating for *crowding* (mean=2.45, SD=0.73) was 2.0, which equates to a "Disagree" response. Only eight individuals had a mean score of four or higher, meaning they agreed that they experienced crowding. *Hut densities* were high overall with a mean of 0.30 people/m^2 (SD=0.15), or three people per 10 m^2. To put this in perspective, a 600 square-foot apartment, or 55.7 m^2, would need nearly 17 occupants in order to have a density of 0.30 people/m^2. The responses for number of *windows, door lock,* and *indoor lighting* are summarized as continuous variables in Table 5 rather than categorical (Table 4). *Presence of pests* was high with an average of 3.9 (SD=0.78). Seventy out of 82 respondents (85.4%) agreed or strongly agreed that they had pests in their home. *Food storage* (mean=3.77, SD=0.61) was also a prevalent

Table 5. Descriptive statistics for all independent variables separated by category and Cronbach's alpha for each multi-item measure.

Measure	N	Mean	Min	Max	SD	α
Housing Quality:						
Crowding	82	2.45	1.33	4.33	0.73	.645
Density	80	0.30	0.09	0.82	0.15	-
Indoor Lighting	82	0.33	0	1	0.47	-
Presence of Pests	82	3.90	1	5	0.78	-
Door Lock	82	0.85	0	1	0.36	-
Indoor Smoke	82	3.05	1	5	0.89	-
Food Storage	82	3.77	1	5	0.61	-
# of Windows	82	0.28	0	3.5	0.79	-

problem with 65 out of 82 reporting that they agreed or strongly agreed that they needed more and better food storage containers. Indoor smoke (mean=3.05, SD=0.89) was more evenly distributed with 26 'Disagree's, 24 'Neutral's, and 30 'Agree's.

Table 6 shows descriptive statistics for each of the dependent and hypothesized mediating variables in this research. The majority (75.6%) of participants selected "good" for their o*verall health* (mean=2.79, SD=0.56). *Respiratory health* scores were low overall with a mean of 1.11 and a maximum value of 2 among all respondents, indicating positive perceptions of their respiratory health symptoms, with the worst possible respiratory health on this scale indicated by a value of 5. *Sleep quality* (mean=3.75, SD=0.51) showed the poor ratings overall; 48.1 percent of respondents had a mean sleep quality value between 4.0 and 4.2, with 5 being the worst possible score. *Well-being* (mean=1.48, SD=0.89) values were also quite low, which equates to low well-being ratings; 48.8 percent of participants had a mean well-being value of 1, which

Table 6. Descriptive statistics for all dependent and mediator variables separated by category and Cronbach's alpha for each multi-item measure from prior literature.

Measure	N	Mean	Min	Max	SD	α
Health & Well-Being:						
Health Overall	82	2.79	1	4	0.56	-
Respiratory Health	77	1.11	1	2	0.20	.858
Sleep Quality	77	3.75	2.6	5.0	0.51	.513
Well-Being	82	1.48	1	5	0.89	.905
Self-Reliance:						
Perceived Dependence	82	2.12	0	3	1.01	-
Food Security	77	10.44	0	24	7.06	.983
Resource Access	82	2.76	2.0	3.6	0.30	.655
Employment	82	0.09	0	2	0.32	-
Housing Satisfaction:						
HS Composite	82	2.79	1	4	0.56	.965
HS Overall	82	2.83	1	4	0.47	-

indicated “Some of the time” as a response to questions regarding their energy levels and feelings of relaxation.

The survey included four operationalizations of self-reliance: *perceived dependence, food security, resource access,* and *employment*. Most participants reported unemployment (92.7%), so *employment* was excluded from further analyses due to a lack of variation. Fifty percent of participants (41 out of 82) responded that they are “Completely Dependent” on aid from the UNHCR or other NGOs, and all but six participants reported at least some dependence for *perceived dependence*. The mean *food security* score was 10.44 out of 27 with higher scores indicating more severe instances of food insecurity. Based on the Household Food Insecurity Access Scale (HFIAS) scoring criteria (food secure is 0 or 1, mildly food insecure is between 2 and 7, moderately food insecure is between 8 and 14, and severely food insecure is between 15 and 27), 70.1 percent of participants were at least moderately food insecure, and 36.4 percent were severely food insecure. The mean *resource access* response was 2.76, which falls between “Agree”=2 and “Disagree”=3, and 74.4 percent of respondents had a mean response value between 2.6 and 3. The only item under resource access with which the majority disagreed was regarding education; 60.9 percent disagreed or strongly disagreed with the statement, “I have access to further education or job training.”

Housing satisfaction was operationalized in two ways, first with an eighteen-item measure regarding their satisfaction with individual aspects of their shelters and, second, with a one-item overall housing satisfaction measure. The *composite* scores (mean=2.79, SD=0.56) had a clustering of responses around 2.9-3.0, which corresponded to “satisfaction.” No items within the composite stood out from the rest – each had a mostly satisfactory response – and no items

considerably increased the internal consistency of the scale if excluded. The results for *overall* housing satisfaction were similar with a majority (81.7 percent) of participants reporting they were either satisfied or very satisfied with their shelters.

Aim II. *Examine the correlations among all housing quality, housing satisfaction, health & well-being, and self-reliance variables.*

Aim II sets forth the initial analysis to inform the support or rejection of hypotheses H1a, H1b, H2a, and H2b as well as examine the internal agreement of variables within the constructs. All correlations referenced below are held in Table 7.

- Within-construct correlations.

  First, quite a few **housing quality** variables are correlated with one another. *Indoor smoke*, which has the highest number of significant correlations with the other housing variables, is significantly correlated with *crowding* ($r=.23$, $p<0.05$), *indoor lighting* ($r=.30$, $p<0.01$), *presence of pests* ($r=.28$, $p<0.05$), and *food storage* ($r=.33$, $p<0.01$). Crowding is significantly correlated with *door lock* ($r=.25$, $p<0.05$. The highest and most significant correlation among housing quality variables is that of food storage with presence of pests ($r=.71$, $p<0.01$). For **health & well-being** measures, none of the four variables were significantly correlated, and the only pair of **self-reliance** variables with a significant correlation were *food security* and *perceived dependence* ($r=.27$, $p<0.05$). **Housing satisfaction** *composite* and *overall* are highly correlated ($r=.58$, $p<0.01$).

- **H1a.** Housing Quality is associated with Self-Reliance.

  Among the four self-reliance measures, both *perceived dependence* and *resource access* showed significant correlations with aspects of household quality. Perceived dependence was significantly correlated with presence of pests ($r=.25$, $p<0.05$) and food storage ($r=.27$,

$p<0.01$). Unexpectedly, perceived dependence was also significantly negatively correlated with crowding ($r=-.37$, $p<0.01$). In other words, a higher sense of household crowding was correlated with a greater sense of independence from humanitarian aid. Resource access was correlated with two housing quality variables: presence of pests ($r=.34$, $p<0.01$) and indoor lighting ($r=.26$, $p<0.05$).

- **H2a.** Housing Quality is associated with Health & Well-Being

The only health & well-being variable significantly correlated with the housing quality measures was sleep quality. Crowding ($r=.27$) and presence of pests ($r=.27$) were both significantly correlated with sleep quality at the $p<0.05$ level, and door lock ($r=.48$) was correlated with sleep quality at the $p<0.01$ level. There was an unexpected significant negative correlation between well-being and presence of pests ($r=-.27$, $p<0.05$).

- **H1b.** Health & Well-Being is a mediator of the Housing Quality – Self-Reliance relation.

For a health & well-being variable to qualify as a potential mediating pathway between housing quality and self-reliance, it must be significantly correlated with variables from both constructs. Health & well-being had three positive, significant associations with self-reliance variables: perceived dependence was associated with respiratory health ($r=.34$, $p<0.01$), food security was significantly correlated with well-being ($r=.37$, $p<0.01$) and sleep quality was associated with resource access ($r=.46$, $p<0.01$). Sleep quality is the only health & well-being variable significantly associated with variables from both housing quality (presence of pests, $r=.27$, $p<0.05$) and self-reliance (resource access, $r=.46$, $p<0.01$), which will be further analyzed in Aim III. See Figure 13 for a summary of the significant correlations between health & well-being variables and variables from housing quality and self-reliance.

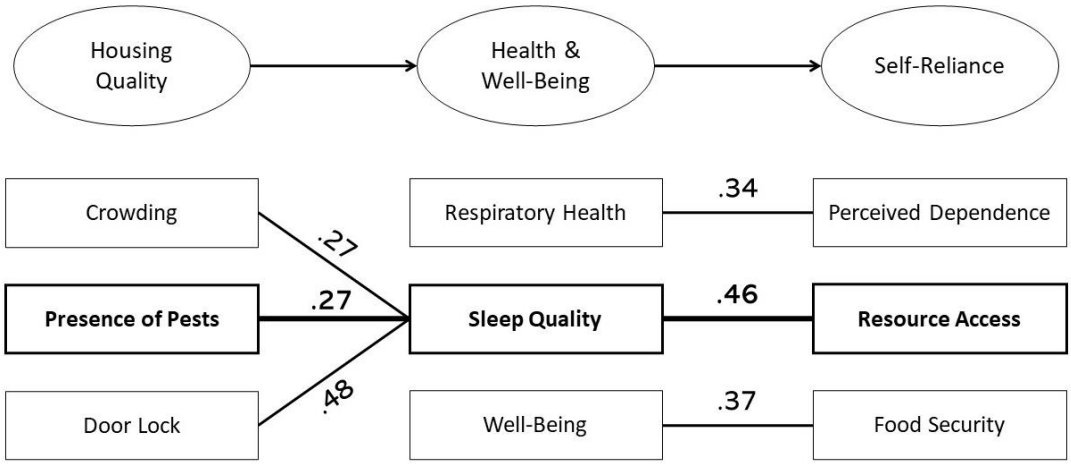


Figure 14. A summary of significant correlations between health & well-being variables and housing quality and self-reliance variables (H2a and H1b). The pathway between the bolded variables will be analyzed in Aim III.

Other than these, there were unexpectedly two significant negative correlations between health & well-being variables and self-reliance variables: perceived dependence was negatively correlated with sleep quality ($r=-.57$, $p<0.01$) and resource access was negatively correlated with well-being ($r=-.33$, $p<0.01$).

- **H2b.** Housing Satisfaction is a mediator of the Housing Quality – Health & Well-Being relation.

Likewise, for housing satisfaction to qualify as a potential pathway between housing quality and health & well-being, it must be significantly correlated with variables from both constructs. Neither the composite measure nor the overall one-item measures of housing

Table 7. Cross-sectional, zero-order correlation matrix between components of housing quality (1-9) and measures of health & well-being (10-14), self-reliance (15-18), and housing satisfaction (19,20). Bolded r values are significant at the 0.05 level, and underlined values are significant at the 0.01 level (2-tailed). Boxes within the table delineate correlations related to the Aims of this research.

Measure	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Housing Quality:																	
1. Crowding	1																
2. Density	.09	1															
3. Indoor Lighting	.09	.20	1														
4. Presence of Pests	-.05	.14	.15	1													
5. Door Lock	**.25**	-.15	.14	-.04	1												
6. Indoor Smoke	**.23**	.13	**<u>.30</u>**	**.28**	.13	1											
7. Food Storage	-.03	.10	.13	**<u>.71</u>**	-.16	**<u>.33</u>**	1										
8. # of Windows	.19	.14	.06	-.08	.02	-.03	-.10	1									
Health & Well-Being:																	
9. Health Overall	-.03	-.01	-.02	-.09	.09	-.17	-.17	-.10	1								
10. Respiratory Health	.01	-.12	.04	-.12	.06	-.12	-.26	.08	.07	1							
11. Sleep Quality	**.27**	-.17	.07	**.27**	**<u>.48</u>**	.09	.10	.01	-.11	.19	1						
12. Well-Being	.21	-.03	.09	**-.27**	-.11	-.09	-.13	-.04	.03	-.08	-.20	1					
Self-Reliance:																	
13. Perceived Dependence	**<u>-.37</u>**	.14	-.04	**.25**	-.19	-.03	**<u>.29</u>**	-.18	-2e-3	**<u>.34</u>**	**<u>-.57</u>**	.09	1				
14. Food Security	-.11	.14	.17	-.02	.05	.08	.06	-.10	-.17	-.05	.04	**<u>.37</u>**	**.27**	1			
15. Resource Access	-.04	.11	**.26**	**<u>.34</u>**	.18	.05	.06	.06	-.11	.14	**<u>.46</u>**	**<u>-.33</u>**	-.15	.12	1		
Housing Satisfaction																	
16. HS Overall	.11	**-.27**	-.13	-.09	-4e-3	-.05	-.05	.03	.10	**<u>.45</u>**	.18	.14	-.20	-.12	**-.35**	1	
17. HS Composite	.14	-.15	-.02	**-.31**	-.04	-.02	-.02	.12	.19	.21	**-.25**	.09	**-.27**	**<u>-.42</u>**	**.35**	**<u>.58</u>**	1

satisfaction were positively correlated with housing quality variables, and the only positively correlated health & well-being variables was respiratory health with overall housing satisfaction ($r=.45$, $p<0.01$). Housing satisfaction is therefore unable to serve as a mediator between housing quality and health & well-being in this data analysis, and hypothesis H2b is rejected. There was an unexpected significant negative correlation between composite housing satisfaction and sleep quality ($r=-.25$, $p<0.05$).

Aim III. *Examine hypothesized mediators of significant bivariate relations between the housing quality, housing satisfaction, health & well-being, and self-reliance variables and quantify the significance of direct and indirect effects.*

The presence of pests-sleep quality-resource access relation was the only variable series chosen for further analysis due to their significant correlations. Table 8 shows the direct, indirect, and total effects. Only the indirect effect, or the effect of pests on resource access via sleep quality, was significant ($p=0.35$) and explained 43.3 percent of the variance. Table 9 shows the pathway estimates between variables, which displays more detail about the indirect effect;

Table 8. Mediation estimates from jamovi mediation analysis with presence of pests as predictor, sleep quality as the mediator, and resource access as the dependent variable (Figure #). Conducted with bootstrapping (1000 repetitions).

			95% Confidence Interval				
Effect	**Estimate**	**SE**	**Lower**	**Upper**	**Z**	**p**	**% Mediation**
Indirect	0.115	0.055	0.026	0.244	2.113	0.035	43.3
Direct	0.151	0.189	-0.168	0.565	0.799	0.424	56.7
Total	0.266	0.174	0.012	0.702	1.529	0.126	100.0

Table 9. Pathway estimates of mediation analysis among pests, sleep quality, and resource access variables. Conducted with bootstrapping (1000 repetitions).

					95% Confidence Interval			
			Estimate	SE	Lower	Upper	Z	p
Pests	→	SlpQ	0.286	0.123	0.059	0.539	2.328	0.020
SlpQ	→	ResAcc	0.402	0.094	0.232	0.606	4.267	< .001
Pests	→	ResAcc	0.151	0.189	-0.168	0.565	0.799	0.424

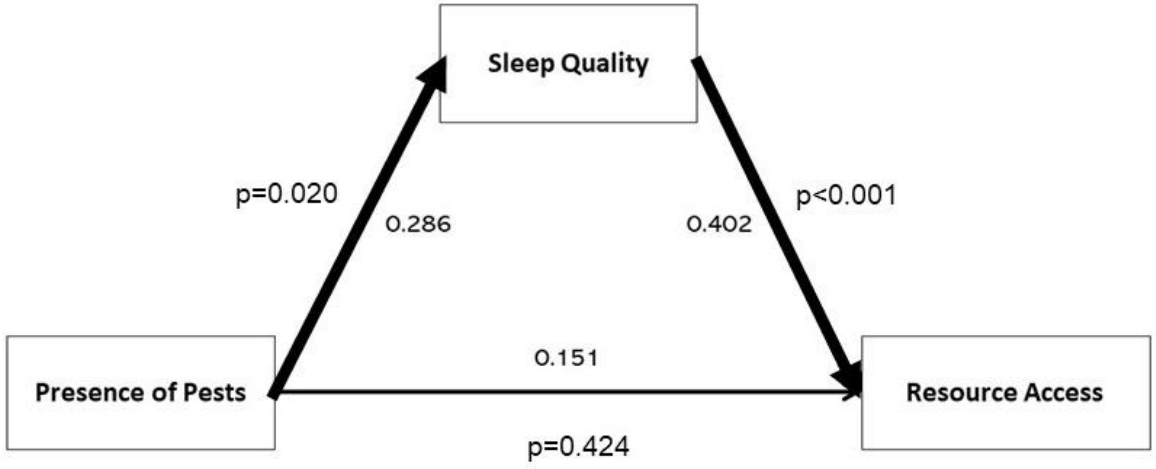


Figure 15. Mediation model with presence of pests, sleep quality, and resource access with the pathway estimates and p-values.

both the estimate between pests and sleep quality (β=0.286) and that between sleep quality and resource access (β=0.402) were significant (p=0.02 and p<0.001, respectively). The coefficient between pests and resource access (β=0.151) was not significant (p=0.424). Figure 14 shows the mediation model with the pathway estimates on each of the three pathways in a visual format.

Aim IV. *Examine demographic factors as potential moderators of the mediation model(s).*

Table 10 shows the correlations between demographic variables – Zone, sex, marital status, hut tenure, and age – and the three variables from Aim III: pests, sleep quality, and resource access. Zone was significantly correlated with two out of three of the mediation model variables – pests ($r=.23$, $p<0.05$) and resource access ($r=.24$, $p<0.05$). Therefore, Zone was analyzed as a moderator of the mediation model. Table 11 shows the results of the analysis.

Table 10. Pearson's correlations between demographic variables and the core mediation triad. Bolded r values are significant at the 0.05 level, and underlined values are significant at the 0.01 level (2-tailed). Boxes within the table delineate correlations related to the Aims of this research.

Measure	1	2	3	4	5	6	7	8
Controls:								
1. Zone	1							
2. Sex	-.05	1						
3. Marital Status	.03	-.18	1					
4. Hut Tenure	-.14	-.09	-.06	1				
5. Age	.06	.05	**.45**	-.06	1			
Mediation Pathway:								
6. Pests	**.23**	-.08	.09	.01	-.12	1		
7. Sleep Quality	.17	.09	-.02	.20	-.12	**.27**	1	
8. Resource Access	**.24**	.02	.04	.03	.001	**.34**	**.46**	1

None of the interactions within the model's pathways – pests with Zone on sleep quality, pests with Zone on resource access, or sleep quality with Zone on resource access – were significant with p values of 0.723, 0.912, and 0.367, respectively. Figure 14 shows the pathway estimates for each point of moderation in a visual format.

Table 11. Moderator effects and interactions within the mediation model between pests, sleep quality, and resource access. Conducted with bootstrapping (1000 repetitions).

Moderator	Interaction	Estimate	SE	Lower	Upper	β	z	p
Zone	Pests:Zone ⇒ SlpQ	0.066	0.186	-0.248	0.483	0.051	0.355	0.723
	Pests:Zone ⇒ ResAcc	0.026	0.234	-0.467	0.450	0.021	0.111	0.912
	Zone:SlpQ ⇒ ResAcc	-0.132	0.146	-0.461	0.112	-0.108	-0.903	0.367

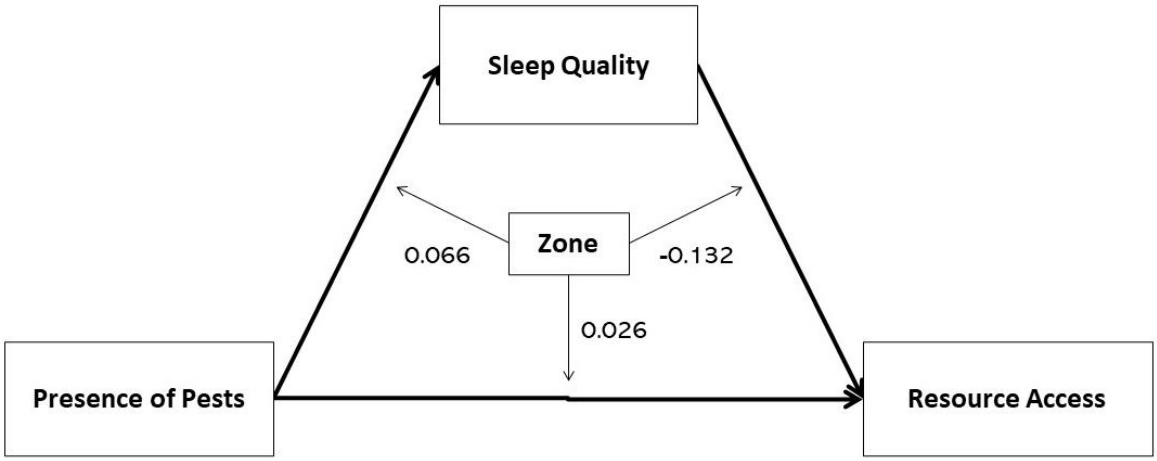


Figure 16. GLM Mediation Model presence of pests, sleep quality, and resource access with moderation by Zone. Moderation estimates displayed between Zone and each pathway.

Due to the non-significance of Zone as a moderator in this mediation model, more in-depth analysis of the differences in mediation depending on Zone is not needed. A detailed table with a breakdown of the mediation in each Zone can be found in Appendix H.

Chapter 4
Discussion

Conclusions

This study describes a set of common housing characteristics and configurations for the residents of Bidibidi Refugee Settlement. Multiunit households of small, square huts house large families on communal lots. These huts are generally brick-based, thatch roofed, have earth floors and single entrances. Some huts have door locks, coverings on the floors and walls, and windows or ventilation holes in their sides. In terms of their internal conditions, most huts have a source of indoor lighting, indoor pest problems, and unsatisfactory food storage. Some residents report experiencing indoor smoke, though not the majority.

The residents generally expressed satisfaction with their huts, both overall and regarding specific features (e.g., ventilation, materials, number of doors, etc.) of their huts. In terms of health and well-being, respiratory health and overall health ratings were positive, but the majority of the sample reported difficulty with sleep and low well-being. Both low sleep quality (Boynton et al., 2009; Greene & Chao, 2018; Jespersen & Vuust, 2012; Park et al., 2020) and poor mental health (Bukuluki et al., 2021; Hollifield et al., 2002; Li et al., 2016; Onyut et al., 2009; Silove et al., 2017) are common within refugee populations. Regarding self-reliance, nearly all study participants were unemployed, reported dependence on aid, also a common occurrence in refugee settlements (Betts, Omata et al., 2019; Betts et al., 2019a; Betts et al., 2020; Easton-Calabria & Omata, 2018; Omata, 2017). Food insecurity was high, which has been found in many other studies both within refugee settlements and among refugees who have resettled (Baer et al., 2021; Ghattas et al., 2015; Peterman et al., 2013). Overall, the sample reported moderate access to key resources (clean water; food; affordable, high quality healthcare), though most were not able to access education or vocational training.

This study offered partial support for H1a and H2a. Regarding the direct relationship between self-reliance and housing quality (H1a), perceived dependence was significantly correlated with presence of pests and food storage; resource access was correlated with two housing quality variables: presence of pests and indoor lighting. For H2a, which predicted an association between health & well-being and housing quality, sleep quality was significantly associated with three housing variables (crowding, presence of pests, and door lock). These three correlations were the only significant associations between housing quality variables and health & well-being variables. Mediation hypotheses (H1b and H2b, Figures 2 and 3) predicted linkages among the constructs and required a series of significantly correlated variables in order to conduct this analysis. Since no significant pathways were evident for H2b, this hypothesis was not supported. Only one pathway under H1b qualified for analysis with significant associations among three variables: presence of pests, sleep quality, and resource access.

Conditional mediation (i.e., moderated mediation) was also predicted based on demographic factors (H3), yet there were no significant moderators of the mediation model tested under H1b. With the *pests-sleep quality-resource access* mediation pathway identified; it is also important to consider how the independent variable – presence of pests – may be influenced. The highest correlation among all housing variables is between food storage and presence of pests, from which one could logically conclude that insufficient food storage leads to pest problems.

Some findings were unanticipated and contrary to the hypotheses. These were primarily instances where positive correlations between variables were expected, but findings indicated there was no significant association or a negative correlation. For instance, it was expected that hut density and psychological crowding would be correlated, yet their correlation was very low.

This may be indicative of how huts are used by this population; in many instances huts are primarily used as a sleeping and storage space as opposed to a place for daily living space. The residents of this region frequently adopt an outdoor lifestyle and distribute their activities across the household and among several huts, such as in the kitchen hut. The lack of significant correlation between crowding and well-being contrasts with numerous studies on crowding (Edwards et al., 2019; Evans et al., 1990; Lopoo & London, 2016; Shannon et al., 2018), though these studies were primarily conducted in housing layouts, cultures, and climates unlike those created in Bidibidi. The lack of correlation between indoor smoke and respiratory health is similarly surprising considering the number of studies documenting the effects of indoor air pollution on health (Clark et al., 2011; Duflo et al., 2008; Pérez-Padilla et al., 2010). Among the negative correlations that were hypothesized to be positive, perceived dependence was negatively correlated with sleep quality, and resource access was negatively correlated with well-being. Well-being and presence of pests as well as housing satisfaction and sleep quality showed significant negative correlations. In some instances, these negative correlations may indicate the types of tradeoffs that residents must make in difficult living circumstances. A negative correlation between perceived dependence and sleep quality, for instance, could be indicative of intense work hours required to support a family independent of aid, or it may indicate other high stress conditions in the absence of aid. These negative correlations could also be indicative of the wide range and complexity of factors contributing to an individual's survey responses in a relatively small sampling of this population. Though it is the goal of social science research to identify strong correlations between variables, it is important to remember the intricacies behind each answer to a question, and the hypothesized predictors are only few out of numerous unmeasured predictors that influence outcome variables for a particular individual.

Limitations

This study is not without limitations. The following text names and documents the threats to internal validity, construct validity, statistical validity, and external validity for this research.

Internal validity is the confidence with which we can conclude cause and effect, e.g. that variable A affects variable B. The cross-sectional, non-experimental nature of this study precludes making causal conclusions and instead offers correlational evidence. In other words, there is *ambiguous temporal precedence*, meaning it is not possible to know the direction of causality. While this study framed questions with a plausible causal direction in mind, it is important to acknowledge these findings cannot verify this directionality. In some cases, it is likely there is reverse causality or bidirectionality in the relations among these constructs – e.g., self-reliance enables a participant to pay for improved housing features, which leads to increased housing quality. The existence of reverse causality does not preclude the presence of the predicted causality, and both likely contribute to the significant hypotheses present in this study.

Construct validity relates to the ability of the operationalization of the research constructs to accurately measure their constructs. Since English is not uniform among the Bidibidi refugee population, some questions may have been misinterpreted. For example, the crowding item, "In my home, people get under foot, or in the way" was evidently interpreted differently than intended. There may have been other instances of misinterpretation although they were not easily identified. The accuracy of the translations used for the few Bari speaking participants was not confirmed by a third party. The significant negative correlations between constructs predicted to have positive correlations may partly indicate problems with the construct validity of the operationalizations. Other than translations, there were three primary threats to construct validity in this research: *self-report*, *mono-operation bias,* and *mono-method bias.* Self-

report was used throughout the questionnaire, and this method of measurement can be problematic due to its subjective nature. For instance, some of the data about the huts from the questionnaire had to be corrected based on photos, indicating potentially questionable validity of the other more factual housing characteristics not captured by the photos (e.g., sources of indoor lighting). In conjunction with self-report, there may be *shared method variance* where both the independent and dependent variables are measured similarly (i.e., in this case, via self-report) and therefore are subject to the same types of error.

Mono-operation bias occurs when variables are operationalized via only one item or instance. Health overall, perceived dependence, overall housing satisfaction, presence of pests, and indoor smoke were each single item operationalizations of a construct, which may underrepresent their complexity. Lastly, the questionnaire serving as the primary method of measurement for all variables leads to a threat of *mono-method bias*. When only one technique is used to capture a construct, the validity of that single measure may be questionable since there are no other types of measures to which you may compare. This bias was addressed in part by using numerous validated measures from other studies and including some objective measures to verify some survey responses.

Many challenges and limitations were presented by the COVID-19 pandemic during this data collection, largely in connection with the research constructs. COVID limited the research team's ability to enter the huts, which precluded more in-depth, rater-based housing assessment as well as verification of reported housing qualities such as lighting. Consequently, the housing quality measure was less holistic than planned and limited the scope of this research. Initially, the intricacies of interior partitioning of housing were going to be part of the household analysis, but this was not possible. Without a principal researcher on site, training and conducting research

remotely through a partner organization was an untried and unconventional approach that could have resulted in additional errors beyond these listed.

Statistical validity is how well the data analysis methods adequately and accurately support the conclusions of the research study. Threats to statistical validity result in either a false alarm where a significant correlation is incorrectly identified (i.e. Type 1 error) or missing a significant correlation between variables (i.e. Type 2 error). The most salient threat to statistical validity of this research was *low power design* due to *small sample size*, which can result in a missed significant relationship between variables due to an unrepresentative sample. This was partly ameliorated via bootstrapping during mediation analysis, a data analysis technique that repeatedly resamples a dataset to create additional simulated samples. Another factor limiting this research were restrictions on the available analyses due to homogeneity of the sample, most notably for employment and shelter types. Having to exclude these variables from analysis may have precluded potentially enlightening findings related to the hypotheses.

External validity refers to the generalizability of the study findings or the extent to which the findings apply to other settings, time periods, or groups. COVID-19 created exceptional circumstances that could have influenced the generalizability of these results, an impact that would be categorized as a *history x treatment* threat to external validity. The pandemic has had and will continue to have a significant effect on food insecurity in refugee settlements (Leddy et al., 2020; O'Grady, 2021), which likely influenced the degree of food insecurity experienced by the participants. Additionally, housing use patterns changed due to quarantining, which may have modulated residents' feelings about and investment in their housing. It is therefore possible that some findings from this study will not generalize to another point in time. In addition, as previously discussed, Bidibidi Refugee Settlement is an exceptional

settlement due to the freedoms residents experience and the housing types the residents build themselves (Dawa, 2018; Lubari & Towango, 2020; Muna et al., 2021; Strochlic, 2019), which means the findings with these participants may not be generalizable to other settlements and refugee populations.

Implications

The results of this study have the potential to inform aid projects and priorities within existing settlements as well as the design and planning for future refugee settlements. Due to the disaggregation of housing qualities in this study, a technique used in prior housing studies (e.g., Wells & Harris, 2007), specific components of housing for this population were identified as potentially more relevant to the outcome variables, specifically door locks, food storage containers, and indoor pests. Relatively small adjustments to address these housing features can be implemented as high impact interventions, and these changes can be distributed going forward via the materials provided to refugees in their shelter kits upon arrival in the settlement. The highest correlation among all housing variables is between food storage and presence of pests, which could indicate that insufficient food storage techniques attract indoor pests. Preventing pest problems within households by distributing food storage containers to the population could therefore be a potentially impactful aid project and form the basis for a future pre/post study using food storage devices as an intervention.

Since this study was focused on housing and not on the broader community, an aspect of self-reliance not well captured is the influence of the community surroundings on these outcome variables. Though Zone was not a significant moderator in the *pests-sleep quality-resource access* mediation model, it is prudent to consider the variations in the types of resources available to settlement residents in their areas. For instance, not all Zones have access to a

community center, which removes a significant point of resource access for this population (Lubari & Towango, 2020). Researchers, humanitarians, and refugee settlement planners must also be thinking about the influence of the surrounding resources on the ability of refugees to become self-reliant.

Research like the present study can inform further refugee housing improvements by supporting understandings of current problems and unmet needs within refugee populations. Research on settlements like Bidibidi with traditional, region-specific, low-tech building tendencies (i.e. vernacular) can inform settlement policies with similar style housing. Vernacular styles can sometimes be romanticized when in actuality there are, in many respects, non-optimal designs that are simply traditional and have not adapted to aspects of modern living that refugees also wish to adopt (Hamza, 2019; Mileto et al., 2014; Piesik, 2017; Watson, 2019). While cultural appropriateness is important, it is equally if not more important to refrain from sacrificing quality of life for residents with modern needs. Surveying these populations to identify areas of dissatisfaction with their current housing is an important step.

As with the Housing First Model for homelessness, providing thoughtful and appropriate accommodations for settlement residents globally can create a foundation for rebuilding livelihoods and generating self-reliance. Research to support these designs can include both collecting evidence of the current state of refugee housing as well as interventions and prototype testing. Researchers Mercader-Moyano, Porras-Pereira, & Levinton recently created an emergency housing prototype for a Turkish refugee settlement that uses a circular economy approach, thereby minimizing its contribution to construction waste. Their production process considered spatial, cultural, and economic factors and included a personalization phase for each resident (Mercader-Moyano et al., 2021).

Numerous designers and architects have risen to the challenge of meeting refugee needs within limited humanitarian budgets. Pritzker-price winning architect Shigeru Ban, for instance, has created many emergency housing designs that primarily use cardboard or other paper products to create structurally sound, relatively long lasting and cost minimizing structures (Ban, 2006; Canepa, 2018). Design competitions to meet refugee needs are abundant, such as that hosted by Prologos (*Prologos,* 2021). In *Open Architecture: Migration, Citizenship, and the Urban Renewal of Berlin-Kreuzberg by IBA,* Esra Akcan (2008) discusses the characteristics and practices of what she terms 'open architecture' – that which is "shaped by a new ethics of hospitality toward the immigrant" (p 6). This approach names key characteristics that must be included in refugee housing and settlement design – flexibility, adaptability, collaboration, and participation. Unfortunately, as Scott-Smith (2017) has described, collaboration between the humanitarian field and design professionals has frequently been stunted due to a fundamental divide between the pragmatic approaches of humanitarians and the visionary, aesthetically-focused approaches of architects endeavoring to meet humanitarian needs. It is necessary to combine the perspectives of multiple stakeholders from the field to formulate humanistic, thoughtful, and practical solutions that fully and sustainably provide for their residents (Scott-Smith, 2017 & 2019a).

One way of achieving these goals is to weave refugee perspectives throughout the design process (Betts, 2014; Dalal et al., 2018). Participatory design in refugee settlements would mean actively involving refugees in the management and creation of their communities (Sanoff, 2021), and advocacy planning is a method of participatory design that must be used more readily in refugee settings. Dr. Henry Sanoff, a staunch advocate of participatory design, describes this method:

> "Advocacy planning introduces the participation of non-professionals and non-designers in the process of decision-making. This means that the citizens ought to be heard, to be well informed about the reasons behind the planning proposals and be able to respond to them in the technical language of professional planners/designers" (Sanoff, 1988, p 28).

High quality approaches to settlement design call for treating refugees as more than passive consumers or 'reactors' to their conditions, which is much more than what has been accomplished in this study and in many other efforts to establish refugee-informed settlement design. The humanitarian sector must prioritize active involvement and incorporation of refugee community members in high level decision-making areas if the goal is to understand how and why these communities are struggling and find real solutions to meeting their needs.

Lastly, this research also has implications for a wider range of contexts beyond refugee settlements. Tukul housing is common across rural areas of Africa (Kumie & Berhane, 2002; Marsh & Kulshreshtha, 2021; Tamire et al., 2018; Tamire et al., 2020), which means these findings and the housing improvements they support could apply to additional populations outside of refugees.

Future Research

This study lays the foundation for further research both to address its own limitations and to expand upon these findings. The first main goal would be to collect the data we were unable to collect due to the pandemic. This would primarily include an extensive household assessment, a component of this study that was not possible since the huts could not be entered. Understanding how interior space is regularly used in the huts, such as the intricacies of privacy barriers and their division of space, can help inform design recommendations for housing in this population, particularly the design elements and housing uses that lead to feelings of crowding for this population if density does not influence psychological crowding. A larger sample size with

greater diversity collected across all five Zones of the Bidibidi settlement would create a higher power design with more decisive evidence regarding correlations and mediation.

In addition to addressing the limitations within this study and therefore deepening our understanding the relationships between these variables, future research can build upon the current study with other methods of data collection. These methods could include qualitative data like interviews and focus groups, daily activity logs, and randomized controlled trials (i.e. "true experiments" in which participants are randomly assigned to different levels of the independent variable). Interviews and focus groups would be the most useful expansion on this research to allow a constraint-free opportunity for participants to discuss their housing, what problems they experience, and how they think they could best be addressed. Daily activity logs could improve upon our knowledge of how the full square footage of indoor space is used regularly by the participants as well as how much time is spent indoors versus outdoors. Randomized controlled trials could be used to introduce housing improvement interventions as mentioned previously, such as with food storage containers or door locks. Prior to these trials, it would be prudent to conduct some interviews to understand more details regarding their typical food storage practices, what types of pest problems they experience, and their input regarding the type of assistance they would most desire in these areas. For household security, it is important to know more about the issues of security they experience and whether providing door locks would help ease any burdens. Randomized controlled trials would also help resolve ambiguous temporal precedence in this correlational study and provide clearer insight regarding causal relations.

Other areas of future research include expanding upon both time and space measures through longitudinal research and characterizing the surrounding areas. Successive waves of data collection with the same residents over time can correlate changes in housing conditions and

outcome variables, which can offer more substantial evidence for meaningful relations between variables. This may also turn into an exceptionally interesting longitudinal project as Bidibidi develops infrastructure and gains more permanent buildings. Additional contributing variables to desired outcome variables, such as surrounding resources, should be analyzed. In terms of the surrounding resources, it is important to generate measures for the settlement environment to see how neighborhoods and nearby resources may influence self-reliance and health and well-being. This could be accomplished via GIS analysis of settlement resources in relation to residents in connection with their survey responses.

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Appendices

Appendix A: Recruitment and Oral Consent Scripts

Bidibidi Settlement Housing Research
Recruitment Script - English

Hut Selection Protocol

- Select a hut to approach.
- Note the hut's GPS coordinates in the **Participant Information** data sheet.
- Greet the resident in their language with the Introductory Recruitment Script below.
- If they *are interested* in participating:
    1. Mark the initial time in the **Participant Information** data sheet.
    2. Read Part 1 of the **Consent Script** to the participant.
    3. If they express consent, circle Yes and initial the bottom of the **Consent Script** page. Save Part 2 Consent for later.
    4. Circle Yes in the **Participant Information** data sheet and enter their name.
    5. Follow the rest of the Data Collection Steps.
- If they *do not agree* to participate:
    1. Circle No on the **Participant Information** data sheet.
    2. Continue to the next hut.

Introductory Recruitment Script

Hello!
My name is _____.
I'm a research assistant with CTEN, the Community Technology Empowerment Network. You have been selected to participate in research about housing and well-being in Bidibidi.

Q1: Are you the head of this household?

*(If YES to **Q1**)* It will likely take about one hour. You will receive a bar of soap as a participation gift.
Q2: Are you interested in participating?
(If NO to Q2) Thank you for your time.
(If YES to Q2) Great! Let's find a quiet place to sit and talk more about how participation works.

*(If NO to **Q1**)* Q3: Would I be able to speak with the head of household?
*(If the head of household is busy or absent but may be interested in participating, ask if there is a better time to come back to speak with them. If they give you a time, enter their information on the **Delayed Participant Sign-Up** form. If they are uninterested, thank them for their time and depart.)*

Bidibidi Settlement Housing Research
Consent Script - English

Informed Oral Consent
To be read to every participant exactly as follows.

I'm from the Community Technology Empowerment Network, and we are working in partnership with researchers from Cornell University to understand residents' housing experiences all around Bidibidi.

The purpose of this research is to discover how residents feel about their houses in Bidibidi and how they could improve. If you choose to participate, we will take measurements of the exterior and interior of your hut, take interior and exterior pictures, and note its location. We will then ask you questions about your hut, your life in Bidibidi, and your feelings lately, and we will take note of your answers. Your participation today will likely take no longer than 1 hour. It is possible that some of the questions we ask may bring up emotions and memories that are painful. If at any point you wish to stop participating, you may do so. You can also skip individual questions if they create discomfort. In appreciation of your time and as a thank you, you will receive a bar of soap at the end of your participation. We must both wear masks over our nose and mouth for the entire length of this study to reduce the risk of COVID transmission.

Later, if you choose, you can also participate in "Part 2" - a follow-up interview. This would take place on another day and will be more conversational and will involve similar topics to the questionnaire but in more depth. You'll receive an additional bar of soap if you agree to a follow-up interview. You can decide about Part 2 later. Participation in any portion of this study is completely voluntary.

Your responses will be kept confidential and will only be accessible by the research team. We will keep track of your name, which will be logged securely in a separate file from the other data. The data from this research will be used in both academic and non-academic publications and presentations. You will not be personally identified at any time in these materials.

Do you have any questions I can answer?
(Make note of questions)

_____

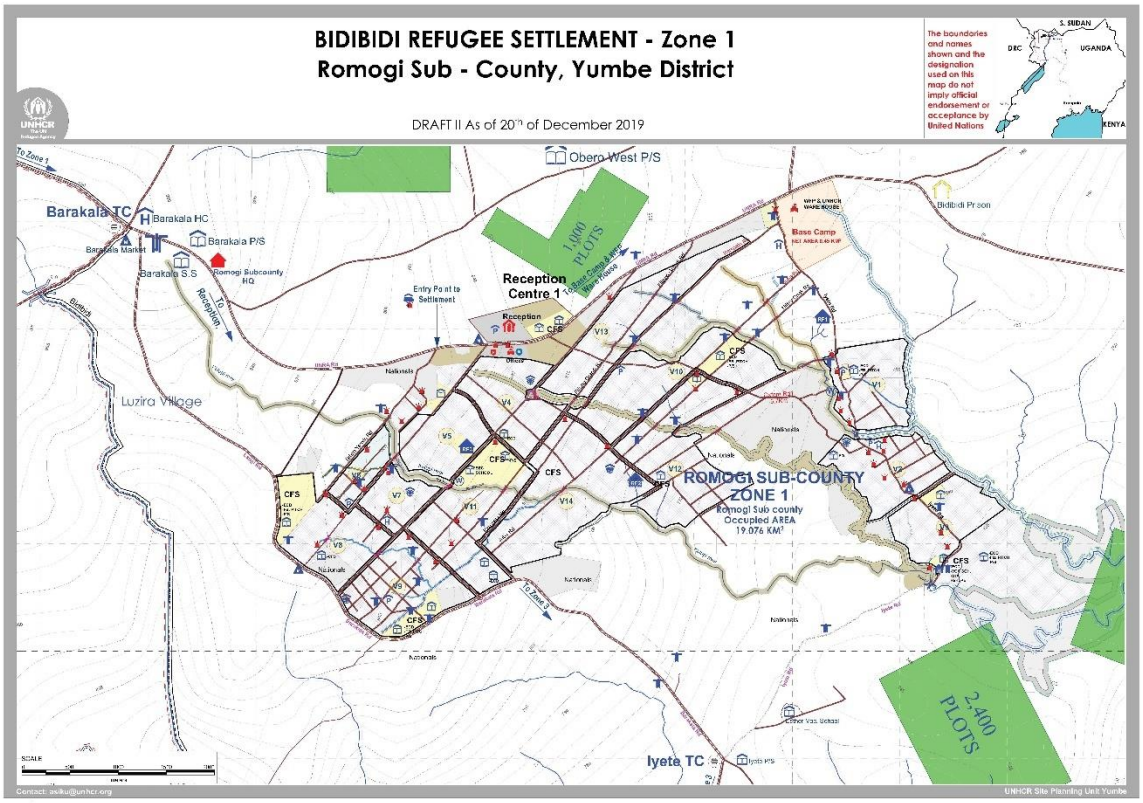
_____

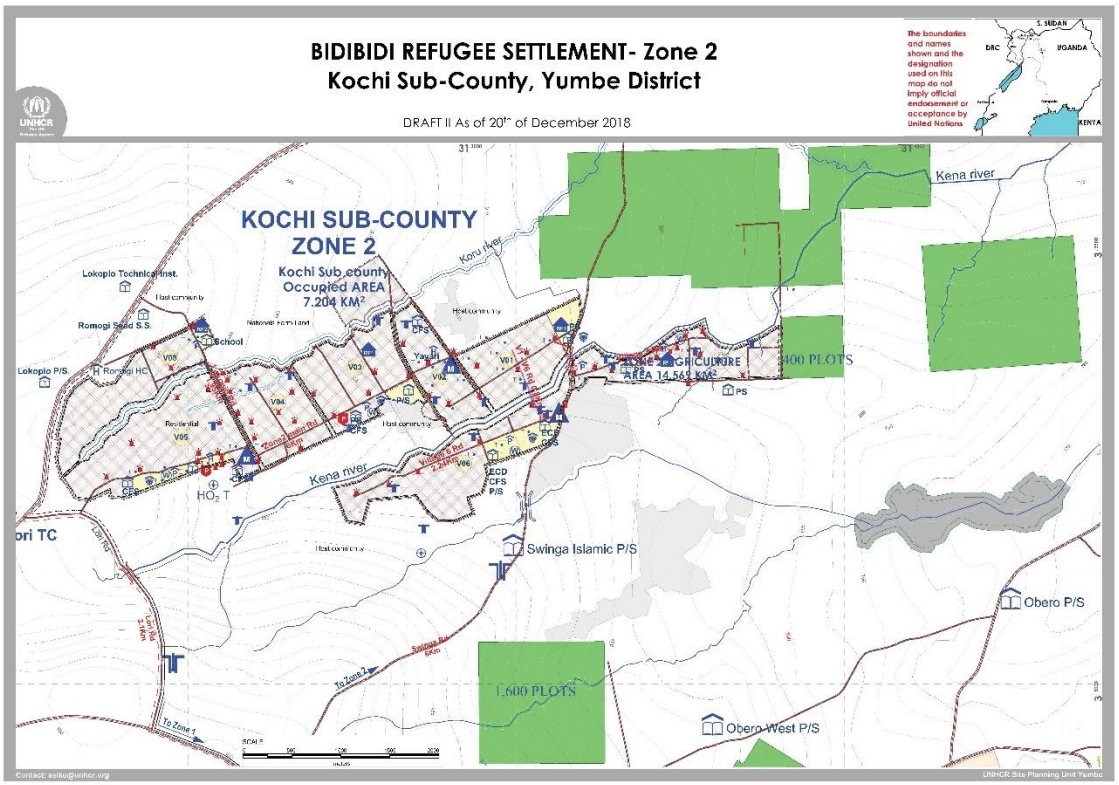
Are you willing to participate in Part 1 of this study?

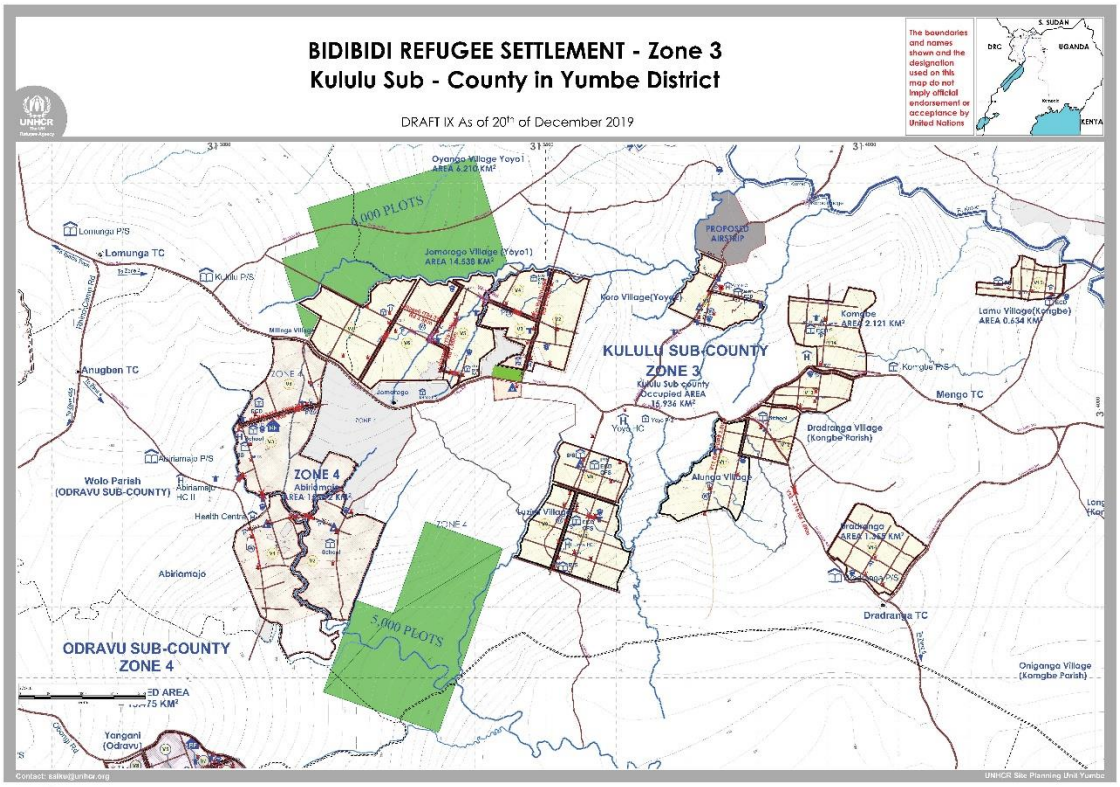
Yes No

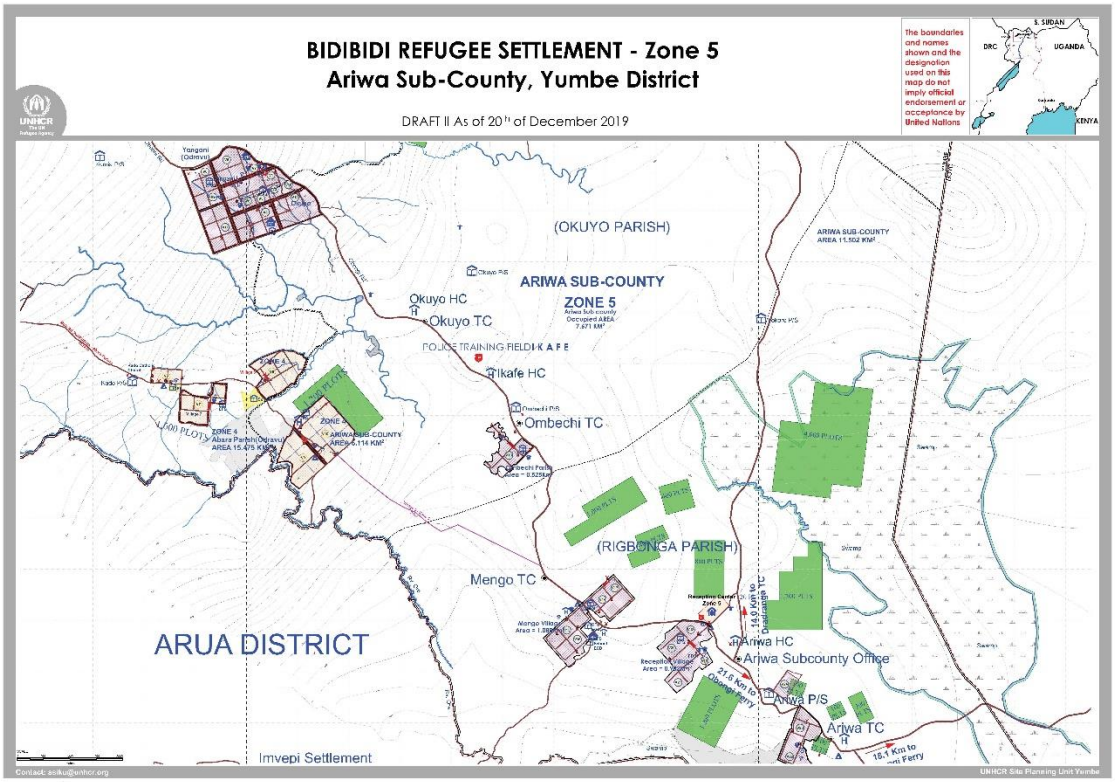
RA initial: _____ Date: ___/___/_____

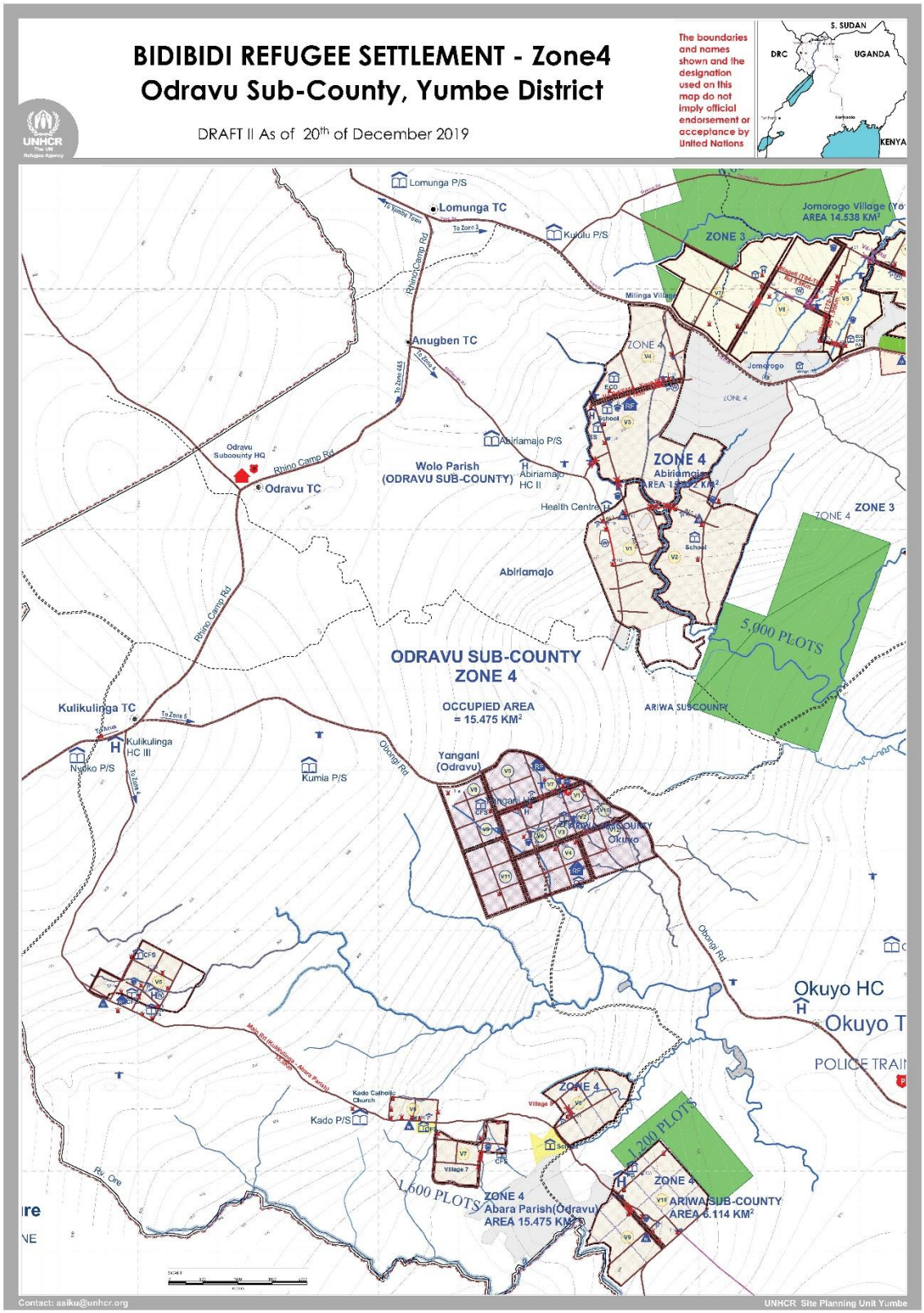
Appendix B. Bidibidi Refugee Settlement Zone Maps

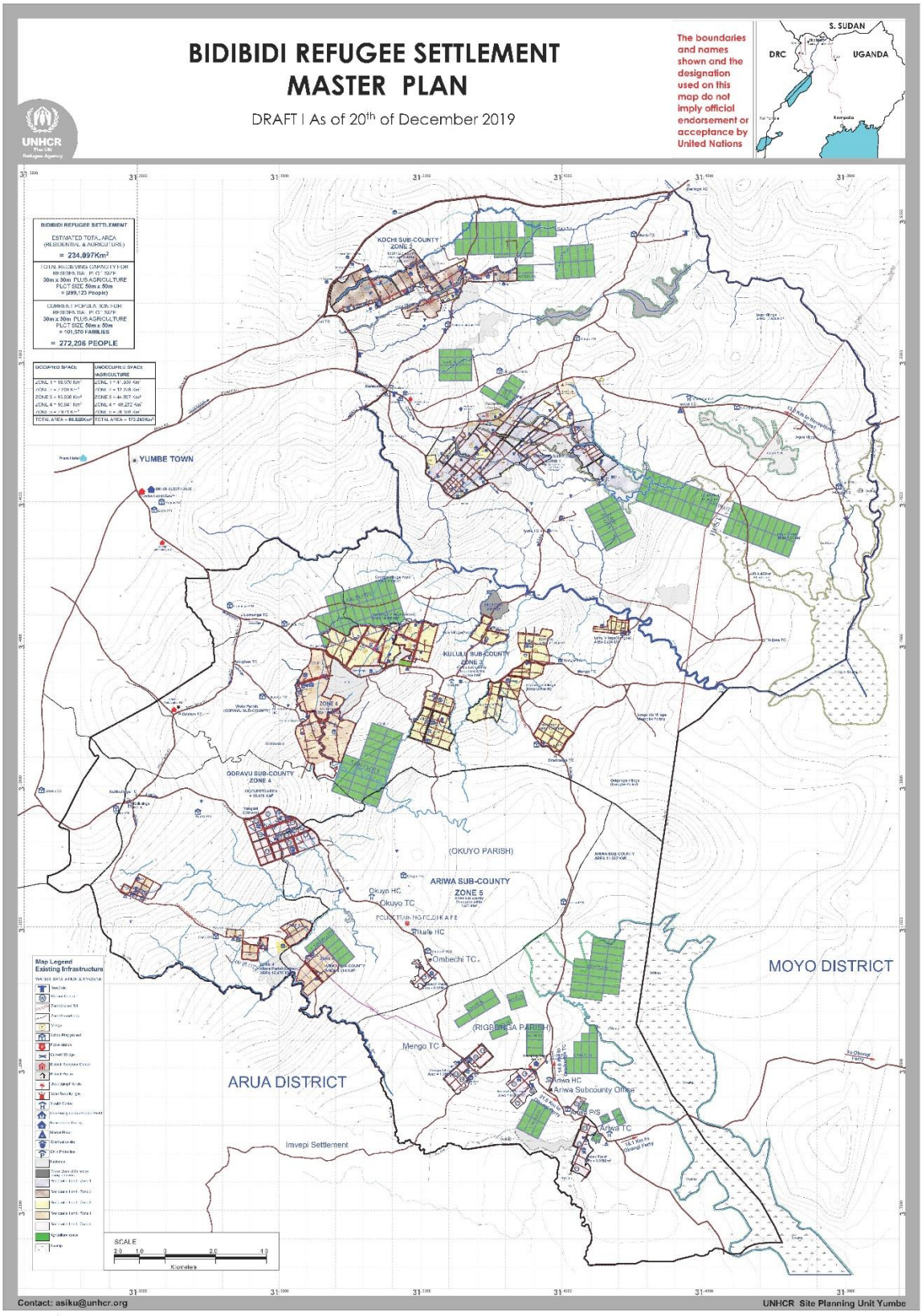





BIDIBIDI REFUGEE SETTLEMENT - Zone 3
Kululu Sub - County in Yumbe District
DRAFT IX As of 20th of December 2019
The boundaries and names shown and the designation used on this map do not imply official endorsement or acceptance by United Nations
S. SUDAN
DRC
UGANDA
KENYA
Oyanga Village Yoyo1
AREA 4.210 KM²
5,000 PLOTS
Lomunga P/S
Lomunga TC
Kululu P/S
Jomorogo Village (Yoyo1)
AREA 14.530 KM²
PROPOSED AIRSTRIP
Koro Village(Yoyo1)
Komgbe
AREA 2.121 KM²
Lamu Village(Komgbe)
AREA 0.634 KM²
KULULU SUB-COUNTY
ZONE 3
Kululu Sub-county
Occupied AREA
16.936 KM²
Komgbe P/S
Mengo TC
Anugbon TC
ZONE 4
Abiriamojo P/S
Wolo Parish
(ODRAVU SUB-COUNTY)
Abiriamojo
HC II
Health Centre
Yoyo HC
Dradranga Village
(Kongbe Parish)
Alunga Village
Dradranga
AREA 1.342 KM²
Dradranga P/S
Dradranga TC
Abiriamojo
5,000 PLOTS
ODRAVU SUB-COUNTY
ZONE 4
Onigango Village
(Komgbe Parish)
Yangani
(Odravu)
Contact: asiku@unhcr.org
UNHCR Site Planning Unit Yumbe


BIDIBIDI REFUGEE SETTLEMENT - Zone 5
Ariwa Sub-County, Yumbe District
DRAFT II As of 20th of December 2019
The boundaries and names shown and the designation used on this map do not imply official endorsement or acceptance by United Nations
S. SUDAN
DRC
UGANDA
KENYA
Yangani
(Odravu)
(OKUYO PARISH)
ARIWA SUB-COUNTY
AREA 11.102 KM²
ARIWA SUB-COUNTY
ZONE 5
Okuyo HC
Okuyo TC
POLICE TRAINING FIELD
I K A F E
Ikafe HC
Ombechi TC
1,000 PLOTS
ZONE 4
Abara Parish Odravu
AREA 15.475 KM²
ZONE 5
ARIWA SUB-COUNTY
AREA 4.114 KM²
(RIGBONGA PARISH)
Mengo TC
ARUA DISTRICT
Ariwa HC
Ariwa Subcounty Office
Ariwa P/S
Ariwa TC
Imvepi Settlement
Contact: asiku@unhcr.org
UNHCR Site Planning Unit Yumbe


BIDIBIDI REFUGEE SETTLEMENT - Zone4
Odravu Sub-County, Yumbe District
DRAFT II As of 20th of December 2019
The boundaries and names shown and the designation used on this map do not imply official endorsement or acceptance by United Nations
S. SUDAN
DRC
UGANDA
KENYA
Lomunga P/S
Lomunga TC
Kululu P/S
Jomorogo Village (Yo
AREA 14.538 KM²
ZONE 3
Milinga Village
Anugben TC
ZONE 4
Jomorogo
Abiriamajo P/S
Odravu Subcounty HQ
Rhino Camp Rd
Odravu TC
Wolo Parish
(ODRAVU SUB-COUNTY)
Abiriamajo HC II
Health Centre
ZONE 4
Abiriamajo
ZONE 3
Abiriamajo
5,000 PLOTS
ODRAVU SUB-COUNTY
ZONE 4
OCCUPIED AREA
= 15.475 KM²
ARIWA SUBCOUNTY
Kulikulinga TC
Kulikulinga HC III
Nyoko P/S
Kumia P/S
Obongi Rd
Yangani
(Odravu)
Okuyo
Okuyo HC
Okuyo T
POLICE TRAI
Kado Catholic Church
Kado P/S
ZONE 4
1,200 PLOTS
1,600 PLOTS
ZONE 4
Abara Parish(Odravu)
AREA 15.475 KM²
ZONE 4
ARIWA SUB-COUNTY
AREA 6.114 KM²
Rv. Ore
Contact: asiku@unhcr.org
UNHCR Site Planning Unit Yumbe


BIDIBIDI REFUGEE SETTLEMENT
MASTER PLAN
DRAFT I As of 20th of December 2019
UNHCR
The UN Refugee Agency
The boundaries and names shown and the designation used on this map do not imply official endorsement or acceptance by United Nations
S. SUDAN
DRC
UGANDA
BIDIBIDI REFUGEE SETTLEMENT
ESTIMATED TOTAL AREA (RESIDENTIAL & AGRICULTURE)
= 234,097Km²
= 272,206 PEOPLE
YUMBE TOWN
KOCHI SUB-COUNTY ZONE 2
KULULU SUB-COUNTY ZONE 3
ODRAVU SUB-COUNTY ZONE 4
(OKUYO PARISH)
ARIWA SUB-COUNTY ZONE 5
Okuyo HC
Okuyo TC
Ombechi TC
(RIGBONGA PARISH)
Mengo TC
Ariwa HC
Ariwa Subcounty Office
Ariwa TC
Imvepi Settlement
ARUA DISTRICT
MOYO DISTRICT
Map Legend
Existing Infrastructure
SCALE
Kilometers
Contact: asiku@unhcr.org
UNHCR Site Planning Unit Yumbe

Appendix C. Research Training Video Scripts.

1. Research Overview & Guidelines

Module A: Introductions and Research Overview

1. Title Slide
   Welcome to the Cornell-CTEN housing research project in Bidibidi.
   Thank you so much for being a part of this collaboration. This study is one of the first of its kind - examining the characteristics of housing in a refugee settlement and discovering how that relates to the health, success, and well-being of the residents. This project has the potential to be highly impactful research, and studies like this could inform settlement innovations in Bidibidi and other similar communities.

2. Introductions
   My name is Hannah Bidigare-Curtis, and I'm the principal investigator for this project. I am a Master's student at Cornell University studying Environmental Psychology. Also collaborating on this project is Dr. Nancy Wells, a professor at Cornell who has conducted numerous studies on housing and health. We are both very grateful to have you on the research team.

3. Training Overview
   These are the five parts of the training for this research project:
   I. Partnership and Research Summary
   II. Research Guidelines
   III. Data Collection Phase 1
   IV. Data Collection Phase 2
   V. Data Storage + Transfer

   In this video, we will be going over Part I - the basics of this project and what it is measuring and Part II - some fundamentals of conducting research. In following videos for Parts III, IV, and V we will cover the data collection steps and the data storage and transfer process.

   If available, please take out paper and a pen or pencil at this point to take notes on each of these modules.

4. PART I. Partnership & Research Summary
   First let's talk about our partnership and summarize this project.

5. Partnership
   This partnership between Cornell University and CTEN began when Peter and I were connected via our contacts at the UNHCR Innovation Service, and everything for this project started building from there. I was really excited to begin learning about Bidibidi because I think it is a great site for this research, and it has been great to be able to ask Peter, Mathew, and Moses questions about the settlement to get a better idea of how everything works there. It has been a long journey to figure out all of the logistics of coordinating this research remotely during a pandemic, but we have successfully made it through numerous obstacles and approval processes.

This entire project is a team effort, and we want to thank you so much for being a part of it. None of this could happen without your help. Your familiarity with the settlement, the trust and rapport you have with the residents, and your ability to communicate in many languages are all amazing strengths that this project needs.
You all will be receiving a stipend as compensation for your time working on this project, which will be passed on to you through Peter.
Also, if you ever have any questions, please feel free to reach out to me via email, and call or text if it is an urgent or timely question.

6. Research Summary

Now for the research summary. This study involves several main concepts, each of which will be measured. These are some of the key things we will be measuring: resident health and well-being, housing quality, housing participation, housing type, and self-reliance. With housing quality, we are assessing the huts in terms of their ability to meet basic requirements for protected indoor space. We also want to record hut type so that we have descriptions of the different kinds of housing elements that exist here. Both housing type and housing quality will be measured via photographs, diagrams, and notes.

Health and wellbeing, housing participation, and self-reliance are some of the concepts that will be assessed via the questionnaire. With health and well-being, we are hoping to characterize the overall state of the resident. With housing participation, we are interested in how involved they are and have been in the construction and maintenance of their housing. Lastly, the questionnaire will also assess their state of self-reliance since this is a key goal of the UNHCR.

pause here for you to write down any questions you have. Please email me to ask these questions at the end of this training. You will also have the chance to ask questions in our upcoming virtual call.

8. Research Guidelines

These are the fundamental aspects of research that are important to keep in mind when you are collecting data.

First is consent; the residents participating in the study need to know and understand what they are agreeing to by participating in this study. And, they need to know how their data will be used. This is why we have the consent script so that we ensure that each participant is informed in the same way, with the same details. So, for example, if someone does not want to sign the consent form, that is fine but you cannot proceed with the photographs or questionnaire or any other data collection. This is very important.

This ties into consistency: it is important to have the procedure be the same for each participant, in the same order, with everything said ideally the same way. This helps us control for outside factors influencing the results. For example, it might influence the results if the order of the questionnaire questions changes between residents. Therefore, the sections must be completed in the same order every time.

Safety: it is important that you remain comfortable and safe with whatever occurs while you are collecting data. If, for whatever reason, you are uncomfortable interacting with a certain participant, or uncomfortable entering a hut, etc., you can refrain from doing so. Your safety and well-being are critical, so be sure to prioritize that.

Randomization – the participants need to be selected in a way that minimizes the connections between them in order to get a truly representative sample of the population. This is why the villages you visit will be in a random order, which we will talk more about later. So, for example, we would not want all our participants to be from one zone or one area within a zone or to all be related to one another.

Mutually Exclusive Data: each participant must be unique with no repeat participants. We will record hut GPS and resident names to help us track which residents have participated, but it will also help us to rely on your memory. This is why each pair of research assistants will go to the same Zone every data collection day. Each participant's responses must also be independent, or uninfluenced by another's responses, such as by overhearing or listening to another participant, since this could create patterns of responses that are not true to their actual feelings. For example, if a respondent knows that a neighbor is listening to their responses, they may want to respond to personal questions in a more prideful way rather than being fully honest. To maximize participants' comfort and reduce the possibility that they will influence each other, do your best to have privacy from others when you are administering the questionnaire.

The last important piece of our research guidelines is Participant ID: we need to be able to keep track of all the participant's documents via the participant number. Their number needs to go at the top of ALL of their pages.

9. Training Overview

This brings us to the end of the first two Parts of our training. Thank you again for being part of this project and for watching these training videos. In the following videos, we'll be going over the data collection steps in two phases, then going over the data storage and transfer process in the last video.

2. Data Collection Steps Part 1

Module B: Data Collection Phase 1

1. Title Slide

Welcome back to the housing research training. This is the second video in the series out of a total of four.

2. Training Overview

In the last video, we covered Parts I and II about the Cornell-CTEN partnership and a summary of the research project, as well as overall guidelines for conducting research. In this video, we'll be covering Part III, Data Collection Phase I. As you can see, there will be two more training videos after this.
This training video will involve some points where you have to pause and practice the data collection scripts. If available, it may be beneficial to watch this video and practice with a partner. This practice

will take some additional time. While the video is approximately 18 minutes long, with the pauses for practice it may take closer to a couple hours.

3. Training Preparation

We will be going over several documents for data collection. These will be the Instruction Sheet, Recruitment Script in all three languages, Participant Information Sheet, Delayed Participant Sign-Up, and the first part of the Participant Packet in all three languages. It would be good to print these documents and have them in front of you while we go over them. You can pause the video here to gather these items.

4. Going to Your Zone: Procedure

Before you can execute the data collection steps, you need to know where you are going to collect data.

As mentioned before, we need people to go out to the huts in pairs so they can take measurements, split up data collection responsibilities so it takes less time per participant, and manage any difficult situations more easily should they arise.

Each team of two should be assigned two Zones. One team will be assigned one Zone and their second area will involve surveying Ugandan nationals.

The order of villages you visit should also be random. We have generated a random number order for each of the Zones as follows. Please make note of these orders in your notes. It is likely that you will only be able to visit a few villages within each Zone before the research quote is reached. Ideally, the participants in the research should be spread out amongst the villages. Our goal is to obtain complete sets of data from at least 35 people per Zone. Aim for 5 people per village at most. However, also try to make sure you are not upsetting residents by switching villages too quickly.

5. Instructions Sheet: Materials Checklist

Prior to collecting data, you also need to know what you are bringing with you.

At the top of the Instruction Sheet is your materials checklist of things you need before heading out to your zone.

One of the keys things you will need are printed documents which includes:

- This printed Instruction Sheet
- Participant Information data sheets
- The Recruitment Script
- Participant Packets for each participant, which includes the Consent Scripts, Hut Diagrams, Hut Notes, and Questionnaires.
- Post-Participation Contact handouts for each participant
- And multiple Participant Delayed Sign-up Sheets

Each of these documents will be found on our shared Box folder.

You will also need:

- Enough bars of soap for each participant that day as thank you gifts
- COVID PPE for yourself and participants
- The response cards for the questionnaire, which are also on Box
- Clipboards and pencils
- Measuring tapes
- A GPS device
- And a camera

6. Instructions Sheet

The Instruction Sheet is an important document. It serves as your home base and reference guide for the data collection procedure. In addition to the materials checklist, it also lists the data collection steps and the diagrams showing the angles of pictures that must be taken of the hut.

7. Data Collection Steps

Once you have collected everything you need and have headed out to your Zone, here are the steps you need to follow.

Step 1 is Recruitment and Consent where you find a resident to participate and obtain their consent after reading the script.

Step 2 is filling in their information on the Participant Information sheet.

Step 3 is completing all the measurements necessary for creating the hut diagram.

Step 4 has two parts where you and your partner RA split up. One of you takes the hut pictures and notes, and the other RA administers the questionnaire by reading the questions to the participants.

Then the concluding steps 5-7 wrap up the data collection.

Now let's review each of these steps in more detail. Please be sure to have the data collection documents ready.

8. Instructions Sheet: First Steps

All of these steps are listed on your Instructions Sheet. In this video, we will be going over Steps 1, 2, and 3: recruitment + consent, participant information sheet, and hut diagram..

9. Recruitment & Consent

Step 1. Follow the steps on the Recruitment Script to find a participant, including reading them the Consent Script. So let's take a look at the Recruitment Script document.

10. Recruitment: Hut Selection

After going to a village in your Zone, you can start anywhere to begin collecting data. At the top of this page is a list of steps to follow once you are there. So first, Select a hut to approach.

Before speaking to the occupants write down the GPS location of the hut. This will allow us to keep track of which huts in the settlement refuse to participate as well as agree. You will note the GPS coordinates in the Participant Information Sheet, which we will look at in a little bit.

Then, greet the resident in their language with the Introductory Recruitment Script below. Let's take a look at that now.

11. Recruitment: Introductory Script & Head of Household

On the bottom half of the Recruitment Script document, you will find this Introductory Script for approaching the resident.

It is important that each resident be approached the same way with the same words for consistency, as we talked about in the last training video.

Once you know in what language to deliver the script, read through this script beginning with Hello and saying your name.

We need the head of household to be the participant. By this we mean the resident who mainly maintains the hut - they are the primary caretaker of the hut, the person who makes decisions about it, repairs it, and so on. They also need to be 18 or older to be part of the study.
If the head of household is not present or is busy at the moment, you can use the Delayed Participant Sign-up form.

12. Recruitment: Delayed Participation

On this form, you can take down their information. Like I said, you can use this form if you visit someone at an inconvenient time and they would like you to return later. You can also use this form if someone asks you to participate but you are busy with another resident.
On the form you will mark the Date, their Name, the day and time when they can participate, and a description of their hut location. Make sure the description is good enough to be able to find their hut again. Once you have revisited them, you can check the checkbox in the Visited column.

13. Recruitment: Hut Selection

Back to the Recruitment document. If the resident is interested in participating, after reading them the introductory script, mark the time at the beginning of this data collection in the Participant Information sheet. Then, find a good place to read them the Consent Script. After reading them the Consent Script and they agree to participate, Circle Yes at the bottom of this page and Yes in the Participant Information Sheet, and then proceed with data collection. If they are not interested in participating, you Circle No on the Participant Information Sheet and continue to the next hut.

14. Pause

Let's pause the video here and read through each version of the Recruitment Scripts out loud. Be sure to practice this a few times in each language so that you can deliver it naturally. If you have someone nearby, have them pose as a resident and respond to your questions. If you are training with a partner, take turns being the script reader and resident.

15. Consent: Part 1 Script – Participant Packet

Now let's go over the Consent Script. This is the first couple pages of your Participant Packet, as you can see on the Participant Packet cover sheet. This packet contains all of the research documents that will have data on them – the consent script, the hut diagram and notes, and the questionnaire. These are the documents you will need to upload for each participant at the end of the day, as well as their hut pictures. The Participant Number goes on the front, and there is also a section here for notes regarding this participant should you feel it is important to note anything about them or the data collection. At the bottom of the cover sheet is the data upload checklist, which we will be talking about later in the training series.

16. Consent: Part 1 Script

So yes, the first part of the Participant Packet is the Consent Script. Like we talked about in the previous video, obtaining informed consent is very important for research. The participants need to consistently know what they are signing up for, what it will be like, and how the data will be used. They can stop participating at any time or skip questions they feel uncomfortable

answering. It is important that they understand, and please make note of any questions they may have.

After reading the script and they explicitly say Yes to participating, Circle Yes, initial and date the form, and then sign the bottom of the page as the script reader.
Also included in the packet is Part 2 Consent. You can ignore Part 2 for now – this will be for follow-up interviews later this year.
Double check that you put the Participant Number and date at the top of the document.
This completes Step 1 of data collection.

17. Pause

Please pause the video now to practice reading through the consent scripts in each language. If you are training with a partner, take turns. Be sure to practice all 3 languages.

18. Data Collection Steps

Now let's go over Step 2 about the Participant Information Sheet, and Step 3, creating the Hut Diagram.

19. Participant Information

After the participant has been successfully recruited and has given consent to what the study entails, the next step is to take a photograph of the completed Participant Information sheet. This will help us keep track of when the series of hut photos starts for this participant, so this should be taken with the same camera as the rest of the hut photos. Every hut that you approach, regardless of whether they consent to participate, should be listed in this sheet. Giving the participants a number rather than putting their name on the documents also helps with data security so that it is not immediately apparent whose data it is.

20. Participant Information Sheet

There are Participant Information sheets premade for each Zone in our shared Box folder.
On your data collection day for that sheet, fill out the start date at the top.
Both of your names as should also go on each of the sheets under Research Assistants.
For each entry, fill out the date you approach them, as well as the village you are in.
Then it lists the premade Participant Numbers.
Then you list the GPS coordinates of the hut, which should be filled out for every hut you approach. This will be done via the GPS devices I sent you. Make sure you are familiar with how they work before heading out for data collection. Ensure that they work properly and are calibrated for the area.
If they agree to participate, you will Circle Yes and then fill their name in the next column.
Lastly, be sure to fill in the start and end time for each data collection so that we get an idea of how long it took.
Once this is all filled out, take a picture of the form to complete Step 2.

21. Hut Diagram

In Step 3, you will Reinform the participant, then take all measurements needed for the Hut Diagram as described on that document. To reinform them, you can simply say something like "Now we will be taking measurements on the outside and inside of your hut" to make sure they are not startled when you begin doing so.

These diagrams will help us to understand the amount and partitioning of the intespace. This is another main reason you will need to visit the huts in pairs – it will be much easier to take the measurements if there are two of you there.

22. Hut Diagrams – Two Types

There are two different diagram options – square or circular. These are included in the next part of the Participant Packet, pages H1-H2. They are both views of the hut from above. Use your judgement to decide which one is most appropriate to use. You only must complete one diagram for each hut.
For the one you create, be sure to put the Participant Number and date at the top of the document

23. Hut Diagrams – Square Huts

Here is the set of instructions for the square huts.

First, you measure the length of each exterior walls.

Then measure and draw the interior hut spaces divided by a wall, a temporary divider like a curtain, or another type of divider.
If it is possible to enter the hut and obtain measurements, include measurements for each of the divided spaces.
On the diagram, mark the type of material of each partition.
Measure the interior height of the hut in the center and mark this below the diagram.
Record the total number of divided spaces below the diagram.
Mark the location of the cooking area on the diagram with a circled dot
And mark the location of any significant holes and water damage with an X. This is explained further in the Hut Notes section in Step 4.

24. Square Huts – example

Here is an example of a completed diagram. You can see the wall measurements on each side, as well as the measurements of interior spaces.

The type of partition is marked on the diagram, and the number of spaces is marked at the bottom, as well as the interior height in the center.

The cooking area to the side of the hut is marked with a circled dot, and a significant hole in the corner is marked with an X.

25. Hut Diagram – Circular Huts

The instructions for circular huts are very similar.

The key difference is that instead of measuring the length of each exterior walls, you will measure the exterior diameter of the hut.

26. Circular Huts – example

Here is an example a circular hut diagram. The diameter can be measured similar to how it is pictured here – by creating a straight line from the furthest edges and measuring the distance between those points.

27. Hut Diagrams

After finishing the hut diagram, be sure to sign your name at the bottom of the document.

Also double check that the participant number and date are at the top of the document.

28. Data Collection Steps

That covers Steps 1-3, the first phase of data collection. In the next video we will be covering Steps 4 – hut pictures and notes and the administration of the questionnaire - and Steps 5-7.

29. Training Overview + Videos

Thank you for watching this second training video and for practicing the data collection scripts. We have now completed the material for the first two videos. There will be two more training videos, one covering the rest of the Data Collection steps and one covering the Data Storage and Transfer Process.

3. Data Collection Steps Part 2

Module C: Data Collection Phase 2

1. Title Slide
   Welcome back to the housing data collection training. This is the third video in the series.

2. Training Overview
   In the previous video (video #2), we covered the first half of the data collection steps. In this video, we will be covering Part IV, the second half of Data Collection, which focuses on Steps 4-7 of the data collection process. In the final training (#4) we will discuss Data Storage and Transfer.

3. Data Collection Phase 2
   We will be going over several documents for data collection during this video. These include: the Instruction Sheet, the Participant Packet in all three languages, within which we will be going over the Hut Notes and the Questionnaire, the Response Cards and the Contact Forms – both in all 3 languages. Be sure that you have these documents in front of you now. If you do not have them, please pause the video to gather these items. Also, be sure to have a pen or pencil so you can take notes.

4. Data Collection Steps
   So today, we will be talking about Steps 4A and B, and then the wrap-up Steps 5-7. Step 4 is split into two parts because this is when you and your partner (or partners, if you work in a team of 3) will split up and take on different tasks. One RA will complete Step 4A --taking the hut pictures and writing the responses to the hut notes. At the same time, the other RA will complete Step 4B --administering the questionnaire to the resident. Within each pair, decide who will complete which step (4A and 4B), and stick with that role moving forward. That way, you will specialize in that role and follow a consistent protocol.

5. Instruction Sheet
   Now, please have the Instruction Sheet in front of you, which is shown here on the left. Each of the steps is listed on this document, as before. Remember that this page serves as your guide to the Data Collection Process. Here you can see Step 4A with all the picture diagrams underneath. Let's take a closer look.

6. Step 4A: Hut Pictures & Hut Notes

Step 4A is for RA1 and goes as follows: Reinform the participant about the pictures, then take the following 15+ pictures of their hut. Then, complete the Qualitative Hut Notes and take any necessary additional pictures.
These pictures are important for measuring the housing quality. We will use them to rate the hut features to characterize each hut, which can then be analyzed as a variable in comparison with the questionnaire responses. In each of the picture angles, we want to be able to see specific features, which I will say more about in a moment. All of these photos should be taken in the landscape orientation with the long side of the camera or phone on the top and bottom of the photos. Depending on the amount of light inside the hut, you may have to use flash to obtain pictures. Let's talk through each of the photo angles and what we are looking for.

7. Hut Pictures – Exterior
   Pictures A-D are capturing the exterior siding of the hut. In these photos, it is critical for us to capture the protective surface of the outer walls, their structural quality, and the presence or lack of hut maintenance. These pictures also help us to get a sense of the surroundings of the hut, such as the ground and the proximity of other huts and trees.
   This means you should not be too close to the walls when you take these pictures. If you are taking pictures of a circular hut, take enough pictures to be able to view the entirety of the exterior siding.

8. Hut Pictures – Exterior Example
   Here is a set of good examples of pictures A-D from the pilot test of a round hut's exterior. You can see that they capture the siding as well as some of the surroundings of the hut.

9. Hut Pictures – Interior Space
   Picture E is a picture facing the interior of the hut from the entrance that captures as much of the interior as possible. This gives an overall impression of the living space and how objects and partitions may be laid out inside.

10. Hut Pictures – Interior Space Example
    Here is a good example of Picture E, first interior hut picture. It captures an impression of the space as you walk through the door. As best you can, work with the available lighting to make as much of the interior space visible as possible.

11. Hut Pictures – Interior Walls
    The following four pictures, F-I, capture the interior walls. Similar to the exterior siding pictures, these pictures seek to characterize the protective surface of the walls, their structural quality, and their presence or lack of maintenance. Depending on how far away you can get from the walls, this may require more than one photo per wall – one capturing the upper part, and one capturing the lower part of the wall.

12. Hut Pictures – Interior Walls Examples
    The pictures of the interior here from the pilot test are good examples of pictures F-I. It is great that each section of the wall is included. Again, it may be difficult to get these pictures due to cramped interior spaces and difficult lighting. Do the best that you can, and please take as many pictures as you need to capture the entire surface of the wall top to bottom.

13. Hut Pictures - Floor

Pictures J-M are to capture the interior floor. This helps us analyze the degree and types of objects and clutter, and the amount of floor coverage. These pictures also help to assess the floor quality and potential water damage or pooling on the floor of the hut. You may have to take more than four photos in order to capture the entire floor.

14. Hut Pictures - Floor Example
    Here are two examples of floor pictures. These could be improved by making sure each photo is connected to the next for us to be able to piece together a full impression of the floor. The point of these photos is to see what kind of walking space there is, as well as see what kind of floor covering they have, such as dirt or carpet.

15. Hut Pictures - Exterior View
    The next picture, picture N, should be taken from the interior facing out of the hut through the door. This will allow us to assess what the residents of the hut see when they exit their hut, whether it is a road, other huts, forest, etc. Try to capture as much of their view as possible with this photo. Though there were no example pictures of this from the pilot test, this is an important photo, so please be sure to capture it.

16. Hut Pictures - Ceiling
    Picture O is a photo facing the ceiling of the hut. To capture as much of the ceiling as possible, aim the camera up from the center of the floor and take the picture. This will help to characterize the ceiling's material, quality, and potential holes or gaps that may exist.

17. Hut Pictures – Ceiling Example
    Here is an example of a ceiling picture, which is quite good. Seeing the ceiling material is important for this picture. Simply capture as much of the ceiling as you can by getting the camera close to the floor.

18. Hut Notes Document
    After taking all the hut pictures, turn to the Hut Notes document in the Participant Packet. Here you will find a list of questions you must answer about the hut, the data collection process, and the overall conditions of the day.
    Many of these questions are asking for your subjective opinions. We greatly value your judgment due to your familiarity with these huts and the settlement. It is also critical that we understand details of your experience of data collection with this resident that might not be communicated via the other research documents. Please provide details and descriptions in your answers that you think are helpful.
    As with all the documents, clear handwriting is very important so that we can easily decipher your notes. Please write your answers as clearly as you can.

19. Hut Notes Questions
    Let's go through the Hut Notes questions that RA1 will be answering.

1. Were there any unusual circumstances during data collection? Please describe anything that stood out or was a disruption throughout the process.
   This will help us understand the conditions of the data collection and if anything may have impacted the results. For example, making note of children's disruptions or heavy winds is good, as was noted for the pilot test. Other potential notes could be about nearby commotion or noise, feeling as though the resident was rushing through the process because they wanted

to do something else, and so on. Feel free to communicate what you think would be good for us to know.

2. What is the front door's material? Is there a visible lock? Does it latch without a gap?
   These are questions that are difficult to capture with the pictures.

3. Are there any significant holes in the hut walls or roofing? Please list them, how large they are, and where they are located (e.g. 15cm diameter, left hand wall near ceiling). If possible, take a picture of these areas.
   You will need the tape measure again for this question, and it is referring to the interior of the hut.
   Holes larger than 10 centimeters in diameter should be considered significant.
   If there are an excessive number of holes, take 5 pictures of the most evident holes and then note here an estimate of the number of holes.
   Here is an example of a list of the holes you identify with a number, size, and location.

   Questions 4 and 5 are questions where we would like your perspective. Since you have a closer experience with this type of housing, it would be so useful to hear your subjective opinion on the conditions of the huts surveyed.
4. Does this hut seem well maintained? Why or why not?
5. In your opinion, is this a good quality hut overall? Why or why not? What characteristics stand out?
   For these questions, be sure to provide details about the hut that make you say your answers. For example, please do not simply say "this hut is not well maintained." Provide a description of features that cause you to say this, such as gaps in the roof or deteriorated siding.
   For question 4, a good example could be "This hut is fairly well-maintained, though it lacks grass for roofing. Otherwise, it seems as though the residents spend time maintaining their hut, such as by redoing the walls each rainy season."
   For question 5, a good response could be "Yes, this is a good quality hut. It has a sturdy door that locks. However, it would leak in the rainy season."

6. Does the home have an odor, such as mold or mildew? Please describe. Is it mild, bad, or very bad?
   This is another aspect of the huts that cannot be captured by pictures, and this information will be useful for our assessment.
   An example of a response could be "This hut did not seem to have an interior odor." Or "This hut had a mild mildew smell that I immediate detected when I entered the hut."

7. Is there water damage or water accumulation evident anywhere inside - ceiling, floors, walls? Please describe where and how severe, and take pictures of these areas.
   Similar to holes, you can count puddles or stains greater than 10 centimeters in diameter. If there are many points of water damage, take pictures and list 5 of the most significant points and then estimate how many there are total.

8. What is the weather like today? Has it been rainy or dry, hot or cold? Please describe.

This will help us know whether the recent weather may impact the hut conditions or the resident's responses to the questionnaire. Letting us know about that day as well as the prior few days would be great.
For example, a good response could be "It rained overnight, and today has been partly cloudy. The prior few days have been mostly sunny with one day of rainfall."
Or "It has been very rainy and cloudy lately. There has been rain for the last few days and it was raining all day today."

Be sure to sign the document at the bottom when you are finished.

20. Step 4B: Administer Questionnaire
    Now we'll turn to Step 4B. This will be the role of the second RA, but all the RA's should complete the training for both roles and understand how to complete all tasks. In the English questionnaire, there are 13 Sections with about 12 questions each. In the Bari and Juba Arabic versions, the questionnaire is shortened to 5 Sections. Some sections are very short while others are quite long. It is important to read the questions aloud to the participant, exactly as they are written.
    Most questions have numbered response options below the question that you will read aloud to the participant, then circle their selected response. There are also some questions that are fill in the blank or for which you select multiple options.

    Pacing, clarity, and patience are important when you are administering the questionnaire. It is essential that they understand and are thinking about the questions. Give the participant time and do not speed through it but communicate in your manner that they should give the questions their best answer and not overthink them too much.
    If the questionnaire is difficult for the participant or is taking a very long time for another reason, use your judgement to decide if a break midway through the questionnaire is necessary.

    During the questionnaire, do your best to minimize distractions so that both you and the participant can remain focused on the questions and responses. For instance, if there are children around, it is a good idea to have the RA who is taking the pictures and notes to preoccupy them while the head of household is completing questionnaire. For example, the children might be able to help with measurements. If there is noise, try to find a quieter place. Remember to write the hut number and date at the top of each document

21. Administer Questionnaire: Example Section
    Here is an example section of the English questionnaire, Section 10. To introduce the sections of questions, you will read the bold text. Then you will read each question and remind the participant of the response options.
    Here is what this completed section would look like. Each of the response options are circled, and the participant number and date are at the top of the document. It is very clear which option is selected, which is important. If a resident happens to change their mind after you already circled an option, make sure you clearly cross out the wrong response and circle the correct option.

22. Administer Questionnaire: Response Cards
    Now let's turn to the response cards document. These response cards are available to assist with the participants' selection of response. They are labeled with the appropriate section

numbers and are available in each of the languages. This would only help participants who are able to read, so only offer the cards if you deem it appropriate. Otherwise, you will simply read the response options to them.

23. Administer Questionnaire: Housing History
    One unique section of the questionnaire is Housing History near the end. In this section, you will ask the resident about their living circumstances for the last 5 years. For each year – 2015-2020, first you ask them the location where they lived – town, state or district, and country. Then, ask what their housing was during this time. They can describe in their own words the type of housing they had. In the last column, ask their average income during that year. If they express discomfort with this last column, you are allowed to skip it.

24. Administer Questionnaire: Comfort Rating and Notes
    The last page of the questionnaire is for **your use only** – these are NOT questions you read to the participant. The first question provides a rating for your opinion of their overall comfort answering the questions, which gives us some context for the responses. Then the notes section provides a space for you to note anything that may have been unusual about the data collection, such as if there were noises and distractions.
    Another example of a good note is to say if there were points of confusion, such as noting whether certain words were not clear to the resident.
    Once finished, sign your name at the bottom as the RA who administered the questionnaire.

25. Administer Questionnaire: Practice

Pause the video here to practice reading through the questionnaires and have a partner role play as a resident. This should be at least the second time you are reading through these questions. While you are reading through them, please identify a few questions you think may be confusing and difficult for the residents and why. When you are finished with this video, please send me an email at hnb34@cornell.edu listing these questions along with an explanation of why they may be confusing.

26. Instruction Sheet: Last Steps
    That concludes Step 4 of data collection. Back on the Instruction Sheet, you can see the final steps 5 through 7. These steps are for wrapping up the data collection process. Let's talk about them together.

27. Step 5-7: Contact Form & Soap

Step 5 – Once all data is collected ensure that the top of every document has the Participant Number. Please double check this on every document as this is critical to tracking participants' information.

Step 6: Finish data collection by taking a picture of the completed Hut Diagram. This allows us to create a clear point within the camera's storage to provide an end to the Hut's Pictures for uploading.

Step 7: Thank the participant and give them the Post-Participation Contact handout and the Soap. The soap is a thank you gift for their participation, and the contact form allows them to reach out afterwards if they have any questions.

The Contact Form document is formatted to have multiple copies on each page. These will need to be printed and cut before data collection.

28. Data Collection Steps

Congratulations – this is the end of the data collection process. We covered every step all the way from recruitment to wrapping up with the gift.

29. Training Overview

This concludes the third video on the second phase of data collection. The fourth and final video will be covering the storage and transfer of the data you collect.

4. Data Storage, Transfer, and Upload

Module D: Data Collection Phase 2

1. Title Slide

   Welcome back to the housing data collection training. This is the fourth and final video in the training series.

2. Training Overview

   We have now covered research overview and all the data collection steps in the last three videos. In this video, we will be covering the data storage and transfer process via Box.

3. Training Preparation

   For this training, you will need to look at the Participant Packet Coversheet and access the link to the Box Folder. Here is a short URL for accessing the folder. You can also find the link to the folder in the email this video was attached to.

4. What is Box?

   Box is a shared file folder similar to Google Drive, but it offers more security for our data.
   Each of you are editors on this folder called "CTEN-CU Bidibidi Housing Research" which means you can upload and download files.
   Here you will find these folders: Maps and Village Orders, the results of the pilot test last month, all the research documents, and a folder for each of the Zones, 1 through 5. You will only upload data to the folder for your Zones.
   In addition to the Zone folders, I wanted to briefly go over the other resources here on Box.

[Screen Recording Video] Resources on Box – Maps and Village Orders

Maps and Village Orders includes maps of the whole settlement as well as each Zone, and the final file in the list includes the randomly generated village orders for each Zone. These are for your reference – please follow these village orders during data collection.

[Screen Recording Video] Resources on Box – Research Documents

In the research documents folder, you can find all the documents you need for data collection which we have discussed in prior videos. This includes the contact forms in each language, the delayed participant sign-up sheet, the instruction sheet, and participant information sheets for each Zone. The participant packets come in two forms for each language – one for using an online questionnaire and one that includes a paper form of the questionnaire. It is good to have some backup copies of the packet with the paper questionnaire with you during data collection in case the digital questionnaire is not working. Lastly, you can find the questionnaire response cards and recruitment scripts in each language. Each of these documents can be downloaded and printed whenever you need more of them.

5. Participant Packet
   The participant packets have coversheets that look like this. On the top half of the sheet, you can see the language listed as well as its contents, a prominent space for the participant number, and a section for notes about this participant. This packet includes everything that will be uploaded for this participant except for two things: 1) the questionnaire, which will be administered via KoBoCollect; and 2) the participant information sheet, which is uploaded separately.

6. Items to Upload
   To be clear, here is the full list of items that should be uploaded for each participant:
   All the pictures from the data collection. This should include the initial picture of the participant information sheet that serves as the beginning of the photo series, the household and kitchen pictures, every angle for the bedroom pictures, any additional pictures for holes or damage in the hut notes, and the ending picture of the hut diagram that concludes the photos for that hut.
   The signed consent
   Your scanned hut diagrams and notes documents
   A scanned version of the participant information sheet
   And the questionnaire rating sheet
   If there happens to be a malfunction with KoBoCollect and you must administer it via paper, then that document must also be uploaded.

7. Participant Packet - Data Upload Checklist
   On the bottom half of the coversheet is the Data Upload Checklist. This lists all the steps you must follow at the end of every data collection day for every participant.
   First, check that all the pages have the participant number at the top and that all the documents are present as listed in the table of contents.
   Scan each of the pages in the packet and name these files with the participant number and what they are. Examples are listed here with participant number 4016 underscore consent or hut diagrams and notes.
   Then you must also scan the Participant Information sheet with this participant's information on it.
   Once you have scanned everything, you will create a new folder within your Zone on Box and name it this participant's number.
   Then, you upload each of the scanned documents into the folder.
   Lastly, you create a folder here for the pictures and upload every picture for this participant.
   Let's go through the steps you will take on Box in more detail.

8. Data Upload on Box – Creating New Folder
   After scanning your documents for a participant, go into the correct Zone folder and click on New, then click Folder. This box will appear, and you will name the folder with the Participant Number. Then simply click create.
   Within your participant folder, you will follow this procedure again to create a folder for their pictures.

9. Data Upload on Box – Creating New Folder [Pause]

If you would like, it may be good to pause the video here to practice creating a new folder in the right place, as well as the pictures folder within it if you have not done this before. Title this folder “Test” followed by your name.

10. Data Upload on Box – Uploading Files
    Within this participant’s folder, upload the scanned documents by clicking Upload, then File. Find the files on your computer, then select them and press ok. You can also drag and drop the files into Box if you prefer.
    You can use this same procedure to upload the pictures from data collection in the pictures folder.

11. Data Upload on Box – Finished Participant
    This is what this participant’s folder should look like when you are finished. Here you can see that each document starts with the participant number and then the type of document - consent, hut diagrams and notes, participant information sheet, and questionnaire rating. And there is a separate folder here for all the pictures for this participant.

12. Participant Packet - Data Upload Checklist
    Once all this is done , that completes data upload for this participant and you can check off the data upload checklist. Until we indicate that they can be destroyed, please keep the hard copies of these documents together in one secure location.

Appendix D. Data collection original schedule (A) and extension (B).

A)

CTEN-Cornell University Research Project: Data Collection on Shelter in Bidibidi Refuegee Settlement

PROGRAM ACTIVITY	Site(Location)		Jul-21											Aug-21										
			Wk2 - 16th - 17th		Wk3 - 19th - 23rd					Wk4 - 26th - 30th					Wk2 - 12th - 16th					Wk3 - 19th - 23rd				
	Zone	Village	Fri	Sat	Tue	Wed	Thur	Fri	Mon	Tue	Wed	Thur	Fri	Mon	Tue	Wed	Thur	Fri	Mon	Tue	Wed	Thur	Fri
1.0 Planning of meeting Data collection on Shelter																							
2.0 Meeting																							
2.1 Review Meeting with Hannah and RA's	Virual																						
2.2 Meeting with RWC's	Zone 4	5&6, 7&8, 9&10, 1&4																					
	Zone 3	1&2, 3&5, 6&8, 12&16																					
	Zone 5	23&19 1&2, 20&21, 1&11																					
3.0 Actual data collection in the settlement	Zone 4	5&6, 7&8, 9&10, 1&4																					
	Zone 3	1&2, 3&5, 6&8, 12&16																					
	Zone 5	23&19 1&2, 20&21, 1&11																					

B)

CTEN-Cornell University Research Project: 3 Days Data Collection on Shelter in Bidibidi Refuegee Settlement								Comments
PROGRAM ACTIVITY	Site(Location)		Aug-21					
			Wk4 - 23th - 27rd					
	Zone	Village	Mon	Tue	Wed	Thur	Fri	
2.0 Meeting								
2.1 Review Meeting	Virual							
3.0 Data collection in the settlement	Zone 4	6						Team 1
	Zone 3	3						Team 2
		5						Team 1
	Zone 5	10						Team 2
		12						Team 1
		13						Team 2

Appendix E: Questionnaire Summary

Section 1 – 5 questions

1. How long have you lived in your current hut?
2. How many adults live in your hut? How many children?
   What is the material of your hut?

3. Style of Shelter (circle one)	4. Roofing (circle one)	5. Flooring (circle one)
Brick-based hut	Grass	Mud (bare)
Frame-filled hut	Metal sheeting	Carpet
Tarp shelter	Tarp-covered	Other
Other	Other	

Section 2 – 8 questions

Did others help to build your shelter?

a. If so, who helped build your shelter? Check all that apply.
   - ○ Paid laborers.
   - ○ UNHCR Staff
   - ○ NGO Staff.
   - ○ Settlement Residents (unpaid).
   - ○ Other

2. Did you participate in the construction of your shelter?
   a. If so, in what ways did you participate? Check all that apply.
      - O Decided on the location of the shelter
      - O Planned the shelter's size
      - O Decided which way the shelter would face
      - O Decided the shelter's size
      - O Decided how to build the shelter
      - O Decided what materials to use
      - O Collected materials for construction
      - O Built the shelter
      - O Other
3. How do you mainly use your shelter? Check all that apply.
      - O A place to sleep
      - O A place to be alone
      - O A place to store personal belongings
      - O A place to store food
      - O Other
4. Are you able to lock your door?
   a. If yes, how frequently do you lock it?
5. Have you ever experienced a burglary of your home?
   If yes, how many times in the last year?
6. Do you have a source of lighting that you use within your hut?
   a. If yes, what type of light do you use?
   b. Which lighting source do you most often use?
7. What type of cooking fuel(s) do you use?
8. What type of food storage containers do you use?

Section 3: 14 questions
Housing Participation, Crowding, Other
#6-9 Crowding questions original:
- *Your home is crowded. Do you… 4=strongly agree… 0=strongly disagree*
- *When everyone is home, I feel crowded. 4=strongly agree…*
- *Your home is cramped. 4=strongly agree…*
- *In your home, people get under foot, or in the way. 4=strongly agree…*

Changed response options to match rest of section.
Changed "Your" to "My" to match rest of questionnaire.
5 item measure, 5 point scale 1=Strongly Disagree, 2=Disagree, 3=Neutral, 4=Agree, 5=Strongly Agree.

1. I maintain and repair my shelter.
2. I feel a sense of ownership of my shelter.
3. I alter my shelter to meet my needs.
4. I personalize my shelter to reflect my identity.
5. I make decisions about what happens to my shelter.

-

6. My home is crowded.
7. When everyone is home, I feel crowded.
8. My home is cramped.
9. In my home, people get under food, or in the way.

-

10. Pests (roaches, mice, etc.) are frequently in my home.
11. Pests affect my food stored within my hut.
12. I need more space for food storage.
13. I need better food storage containers.
14. I experience indoor smoke from cooking.

Section 4: 18 questions
Housing Satisfaction (from Aigbavboa & Thwala, 2012)
Adaptations: Took out questions from their list that did not apply, changed the wording when necessary to apply to huts, and added a few items for standalone structures (e.g. roofing, structural quality)
18 item measure on 4 point scale, 1=Very Dissatisfied and 4=Very Satisfied. "How satisfied are you with…" was repeated every three questions.

1. Ventilation and air flow in the hut
2. Exterior material of your hut
3. Interior material of your hut
4. Amount of space in your hut
5. Position of cooking area
6. Temperature conditions of hut
7. Size of the hut
8. Noise levels in the hut
9. Layout of the hut
10. Noise level around the hut
11. Privacy in the hut
12. Safety in the hut

13. Safety around the hut
14. Position of door(s)
15. Number of door(s) in your hut
16. Number of windows in your hut
17. Roofing quality of your hut
18. Structural quality of the hut

Section 5: 5 questions
WHO Well-Being (from Topp et al., 2015)
Adaptations: None
5 item measure on 6 point scale
0=At no time, 1=Some of the time, 2=Less than half of the time, 3= More than half of the time, 4=Most of the time, 5=All of the time.
"Over the past 2 weeks…." repeated after question 3

1. …I have felt cheerful and in good spirits.
2. …I have felt calm and relaxed.
3. …I have felt active and vigorous.
4. …I have woken up feeling fresh and rested.
5. …my daily life has been filled with things that interest me.

Section 6: 24 questions

Overall Health (from Miilunpalo et al., 1997; described fully in Wardle et al., 2003)
1 item measure
"Would you say that, for someone of your age, your health is: excellent, good, fair, or poor?" with answer options Excellent, Good, Fair, Poor
+ control questions about COVID and smoking

Respiratory Health (from Monz et al., 2010)
Adaptations: Took out examples of public places (Q7 & 19 e.g. movie theaters) and usual activities (Q8 & 20 e.g. driving).
Response options range from ''never'' to ''always'' OR from ''not at all'' to ''a lot/extremely'' depending on the question. 1-5 scale between them.
"Over the last 7 days…" repeated every three questions

1. How much did you cough when you woke up in the morning?
2. How often did you cough during the day?
3. How often did you have coughing bouts?
4. How often were you tired after coughing?
5. How often did coughing make you short of breath?
6. How annoyed were you by your cough?
7. How often did you avoid going to public places because of your cough (for example, your local community center)?
8. How often were your usual activities interrupted by your cough?
9. How often did your cough interrupt your conversations with others (for example, phone conversations and face-to-face)?
10. How often did your cough wake you up, prevent you from falling asleep or falling back to sleep?
11. How often were you uncomfortable about bothering other people while coughing?
12. How thick was your phlegm?
13. How often did you bring up phlegm?
14. How often did your phlegm make it difficult for you to breathe?

15. How difficult was it for you to bring up phlegm?
16. How often did you feel uncomfortable about bothering other people while bringing up phlegm?
17. How annoyed were you by your phlegm?
18. How often did your phlegm interfere with your ability to speak?
19. How often did your phlegm prevent you from going to public places (for example, your local community center)?
20. How often did you have to interrupt your usual activities to get rid of your phlegm?

Also included a couple questions about COVID-19 – diagnosed or believe they had it, yes/no.
Smoking question: "How often do you smoke tobacco, cannabis, or any other substance?" with answer options Never, A few times per month, Once per week, A few times per week, Daily, Multiple times per day

Section 7: 5 questions
Sleep Quality (from ASCQ-ME v2.0; used in Bonham et al., 2019)
Adaptations: flipped numbering order of responses for Q2 (need to flip coding later)
5 item portion of the ASCQ-ME. Response options 5=Never, 4=Rarely, 3=Sometimes, 2=Often, or 1=Always.

1. In the past 7 days, how often did you stay up most of the night because you could not fall asleep?
2. In the past 7 days, how often was it very easy for you to fall asleep?
3. In the past 7 days, how often did you have a lot of trouble falling asleep?
4. In the past 7 days, how often did you stay up all night because you could not fall asleep?
5. In the past 7 days, how often did you stay up half of the night because you could not fall asleep?

Section 8: 10 questions
General Perceived Self-Efficacy (from Schwarzer, 1999; http://userpage.fu-berlin.de/~health/engscal.htm)
Adaptations: None
10 item measure on 4 point scale - 1=Not at all true, 2=Hardly true, 3=Moderately true, 4=Exactly true.

1. I can always manage to solve difficult problems if I try hard enough.
2. If someone opposes me, I can find the means and ways to get what I want.
3. It is easy for me to stick to my aims and accomplish my goals.
4. I am confident that I could deal efficiently with unexpected events.
5. Thanks to my resourcefulness, I know how to handle unforeseen situations.
6. I can solve most problems if I invest the necessary effort.
7. I can remain calm when facing difficulties because I can rely on my coping abilities.
8. When I am confronted with a problem, I can usually find several solutions.
9. I am in trouble, I can usually think of a solution.
10. I can usually handle whatever comes my way.

Section 9: 32 questions
SEE Constructs
Made with help of reDirect focus group
Response options are 1=Strongly Disagree, 2=Disagree, 3=Neutral, 4=Agree, 5=Strongly Agree

Meaningful Action:
I feel listened to by others.
I feel respected by others within my community.
My input is not taken into account in my community. -

I am able to contribute to my community.
I am not able to meaningfully engage with my community. -
I feel as though I am able to make a difference in my community.
I feel like I am part of something larger than myself.
I do not feel connected to others in my community. -
I am not able to make change happen in my community. -
I do not have an influence over what happens in my community. -

Model Building
I can generally predict what life will be like a couple weeks from now.
I have an understanding of how to accomplish my goals here.
I can usually figure out how to solve my problems here.
I do not know who to ask for assistance. -
I have an organized understanding of how things work here.
Life is too unpredictable here. -
When I need information, I know who I can turn to.
If I need to deal with a problem here, I am unsure of how to find help. -
I do not know how things work around here. -
I have a clear understanding of procedures here.

Being Capable (questions adapted from Kaplan, 2001 - Effective Functioning)
Adaptations: ordering. Removed "on top of the world" question because it likely would not translate.
Please answer the following questions with the past two weeks in mind.
Life is interesting and challenging.
I feel focused.
I feel energetic and excited about what I am doing.
I feel effective.
I feel positive.
I am able to get readily absorbed in a task.
I feel satisfied with how things are going lately.
I feel alert.
I feel like I have a good sense of where I am going.
I feel competent.
I feel attentive.
I can keep my mind on what I am doing.

Section 10: 11 questions

10A: Land, Village, and Residence Satisfaction
Response options are 1=Very Dissatisfied, 2=Dissatisfied, 3=Satisfied, 4=Very Satisfied.

1. Overall, how satisfied are you with the amount of land you can cultivate?
2. Overall, how satisfied are you with your village?
3. Overall, how satisfied are you with your shelter?

10B: Cultivation & Neighborhood Attachment (NA scale from Comstock et al., 2010)
Adaptations: changed from "neighborhood" to "village." Changed order of questions.
NA is 6 item measure on 4 point scale: 1=Strongly Disagree, 2=Disagree, 3=Agree, 4=Strongly Agree.

Cultivation:

4. I wish I had more land to cultivate.

5. My quality of life would improve substantially if I had more land for cultivation.

Neighborhood Attachment - 6 item measure

6. This is the ideal village to live in.
7. Now this village is a part of me.
8. I would willingly leave this village.
9. It would be hard for me to leave this village.
10. There are places in the village to which I am very emotionally attached.
11. I would not willingly leave this village for another.

Section 11: 10 questions

Neighborhood Social Ties (adapted from Kuo et al.. 2013)

NST Original

Socializing at Taylor

- *Do you have many visitors every day?*
- *Do you socialize a lot within the building?*

Nearby Neighbors

- *How well do you know the people on your floor*
- *How well do you know people living near you that are not your family members?*

Local Sense of Community

- *Are people here concerned with helping and supporting one another?*
- *Do people here acknowledge one another when passing one another in the hallway?*
- *Is there a strong feeling of belonging here?*

Uchita additions

- *How many close neighbors do you have? (meaning people that you feel at ease with, can talk to about private matters, and can call on for help)*
  ___None ___1 ___2 ___3 ___4 ___5 ___6 ___7 or more
- *How many of these close neighbors do you see or talk to on the telephone at least once every two weeks?*
  ___None ___1 ___2 ___3 ___4 ___5 ___6 ___7 or more
- *How many of your neighbors do you visit or talk to at least once every two weeks? (not including the once that you listed in the previous question)*
  ___None ___1 ___2 ___3 ___4 ___5 ___6 ___7 or more

Changed "Do you socialize a lot within the building?" to "in or near your home?"
Changed "Do you have many visitors every day?" to add "to your home?"
Took out question "How well do you know the people on your floor?"
Added "How well do you know people living near you that are not your family members?"
Changed question "Do people here acknowledge one another when passing one another in the hallway?" to "...when passing by?"
Changed last Uchita question to say "less close neighbors" without following clarification

10 item measure with response options 0=Not at all, 1=A little, 2=A medium amount, 3=Quite a lot, and 4=Very much.

1. Do you have many visitors to your home every day?
2. Do you socialize a lot in or near your home?
3. How well do you know the people who live in the huts near you?
4. How well do you know people living near you that are not your family members?
5. Are people here concerned with helping and supporting one another?

6. Do people here acknowledge one another when passing by?
7. Is there a strong feeling of belonging here?

#8-10 response options:
None ___ 1___ 2___ 3___ 4___ 5___ 6___ 7 or more____

8. How many close neighbors do you have? (meaning people that you feel at ease with, can talk to about private matters, and can call on for help)
9. How many of these close neighbors do you see or talk to on the telephone at least once every two weeks?
10. How many of your less close neighbors do you visit or talk to at least once every two weeks?

Section 12: 9 questions
Food Security (HFIAS from Coates et al., 2007; Salarkia et al., 2014).
"Each of the questions in the following table is asked with a recall period of four weeks (30 days). The respondent is first asked an occurrence question – that is, whether the condition in the question happened at all in the past four weeks (yes or no). If the respondent answers "yes" to an occurrence question, a frequency-of-occurrence question is asked to determine whether the condition happened rarely (once or twice), sometimes (three to ten times) or often (more than ten times) in the past four weeks."

1. In the past 4 weeks, did you worry that your household would not have enough food?
   A. _____ Yes _____ No
   B. (If yes) How often did this happen?
   ____ Rarely (1-2 times in the past four weeks)
   ____ Sometimes (3-10 times in the past four weeks)
   ____ Often (more than 10 times in the past four weeks)
2. In the past 4 weeks, were you of any household member not able to eat the kinds of foods you preferred because of a lack of resources?
3. In the past 4 weeks, did you of any household member have to eat a limited variety of foods due to a lack of resources?
4. In the past 4 weeks, did you or any household member have to eat some foods you really did not want to eat because of a lack of resources to obtain other types of food?
5. In the past 4 weeks, did you or any household member have to eat a smaller meal than you felt you needed because there was not enough food?
6. In the past 4 weeks, did you or any household member have to eat fewer meals in a day because there was not enough food?
7. In the past 4 weeks, was there ever no food to each of any kind in your household because of a lack of resources to get food?
8. In the past 4 weeks, did you or any household member go to sleep at night hungry because there was not enough food?
9. In the past 4 weeks, did you or any household member go a whole day and night without eating anything because there was not enough food?

Section 13
Self-Reliance: 1-5, 10, 11
1. I have access to enough clean water.
2. I have access to enough food.

3. I have access to affordable healthcare.
4. I have access to good quality healthcare.
5. I have access to further education or job training.
6. How long have you lived in Bidibidi?
7. Do you have official refugee status?
   Are you classified as a Person with Specific Needs (PSN)?
8. Of which tribe are you a member?
9. Do you have documentation showing that you own this home / land plot?
10. Are you currently employed?
    If so, what is your job?
    Average hours per week
11. How dependent do you think your household is on support from the UNHCR, or any other NGO?
    Independent, Somewhat Dependent, Moderately Dependent, Completely Dependent
12. What do you consider to be your home country?

Housing History

2015-2020:
Where did you primarily live (town, state/district, country)
What was your housing during this time?
What was your average income during this time?

Background

13. In what country did you spend your childhood?
14. In what type of housing did you live as a child?
15. What was your father's occupation?
16. What was your father's level of formal education?
17. What was your mother's occupation?
18. What was your mother's level of formal education?
19. What is your date of birth?

Appendix F. Participant Packet Example.

Cornell University

Bidibidi Housing ResearchParticipant Packet

English

Contents

Consent Scripts .....(page C1-C2)

Hut Diagrams, Notes. ..... (page H1-H6)

Questionnaire Rating..... (page Q1)

Participant Number: _____

Notes:

_____

_____

Data Upload Checklist

At the end of each day of data collection, complete the following steps.

- ☐ All pages have participant number at top.
- ☐ All documents are present for the participant.
- ☐ Scan each of the documents in this packet and name them with the Participant Number.
  For example:

  4016_consent

  4016_hut_diagrams&notes
- ☐ Also scan the Participant Information sheet with this participant's information on it.
- ☐ Within the Zone folder on Box (shorturl.at/blrI7), create a New Folder named as the Participant Number.
- ☐ Upload each of the scanned documents into the folder.
- ☐ Upload all hut pictures to a folder here.

Participant Number (Head of Household): _____ **Today's Date___/___/_____**

Bidibidi Settlement Housing Research
Consent Script - English

Informed Oral Consent
To be read to every participant exactly as follows.

I'm from the Community Technology Empowerment Network, and we are working in partnership with researchers from Cornell University to understand residents' housing experiences all around Bidibidi.

The purpose of this research is to discover how residents feel about their houses in Bidibidi and how they could improve. If you choose to participate, we will take measurements of the exterior and interior of your hut, take interior and exterior pictures, and note its location. We will then ask you questions about your hut, your life in Bidibidi, and your feelings lately, and we will take note of your answers. Your participation today will likely take no longer than 1 hour. It is possible that some of the questions we ask may bring up emotions and memories that are painful. If at any point you wish to stop participating, you may do so. You can also skip individual questions if they create discomfort. In appreciation of your time and as a thank you, you will receive a bar of soap at the end of your participation. We must both wear masks over our nose and mouth for the entire length of this study to reduce the risk of COVID transmission.

Later, if you choose, you can also participate in "Part 2" - a follow-up interview. This would take place on another day and will be more conversational and will involve similar topics to the questionnaire but in more depth. You'll receive an additional bar of soap if you agree to a follow-up interview. You can decide about Part 2 later. Participation in any portion of this study is completely voluntary.

Your responses will be kept confidential and will only be accessible by the research team. We will keep track of your name, which will be logged securely in a separate file from the other data. The data from this research will be used in both academic and non-academic publications and presentations. You will not be personally identified at any time in these materials.

Do you have any questions I can answer?
(Make note of questions)

_____

_____

_____

Are you willing to participate in Part 1 of this study?

Yes No

RA initial:_____ Date:___/___/_____

Part 1 Oral Consent Administered by (RA Name):_____ **C1**

Participant Number (Head of Household): _____ **Today's Date___/___/_____**

Participant Number (Head of Household): _____ **Today's Date___/___/_____**

Part 2: Consent script for before follow-up interview:

Thank you for your interest in the follow-up interview about your housing experiences in Bidibidi. This portion of the study will be more conversational and will be about similar topics to the questionnaire - your hut, your life in Bidibidi, and your feelings lately – but in more depth. It will likely take between one and two hours. An additional bar of soap will be provided for your time in this follow-up interview. It is possible that some of the questions we ask may bring up emotions and memories that are painful. Participation is completely voluntary, and you may stop participating at any time. You can also skip individual questions if they create discomfort. We must both wear masks over our nose and mouth for the entire length of this interview to reduce the risk of COVID transmission.

The recording of the interview will be kept confidential and will only be accessible by the research team. We will log your name, which will be kept on a list separate from the interview recording. The transcript from the interview recording will be used in both academic and non-academic publications and presentations. You will not be personally identified at any time in these future materials. If at any point you wish to end the interview, you are allowed to do so.

Do you have any questions I can answer?
(Make note of questions)

_____

_____

_____

_____

_____

Are you willing to participate in Part 2 of this project, the follow-up interview?

Yes No

Do you consent to have the interview audio recorded?

Yes No

RA initial:_____ Date:___/___/_____

Part 2 Oral Consent Administered by (RA Name):_____ **C2**

Participant Number (Head of Household): _____ **Today's Date**___/___/_____

Bidibidi Housing Data Collection
Full Household

Household Diagram Directions

☐ Ask the participant the following questions:

1. *How many huts are included in your household? Include huts occupied by you and your immediate family (spouse, children).*
2. *What is the main use for each of these huts? For example, kitchen, sleeping, etc.*
3. *Who mainly uses each hut? In which hut do you sleep? Please list the primary users of each of these huts, their ages, and how they are related to you. If the kitchen hut is used by multiple families, how many?*

☐ Put this household information in the table below:

Hut Number	Primary Use	Primary Users (relation, age)	Bedroom of HoH?
Example 1	*Sleeping*	*Daughters, 14 and 16*	*No*
1			
2			
3			
4			
5			
6			

Sample Filled Table

Hut Number	Primary Use	Primary Users	Bedroom of HoH?
1	Bedroom	HoH and two youngest children ages 4 and 6 years old	Yes
2	Bedroom	2 teenage children ages 14 and 17	
3	Kitchen	Shared by three families	
4			
5			

☐ On the next page, draw an approximate diagram showing the locations of all huts the Head of Household manages or shares use with others in his or her family.

☐ Number each hut (same as Table above) and star hut(s) where Head of Household sleeps.

☐ If paths between the huts are evident, include these in the diagram.

☐ Capture all huts for this household in a picture. If needed, take more than one picture.

☐ Take one exterior and one interior picture of the kitchen hut.

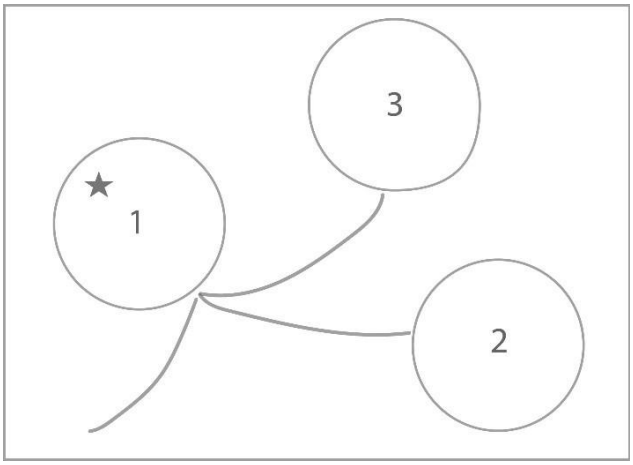
☐ Next, diagram and photograph the Head of Household's bedroom (pages H3-H4)

Participant Number (Head of Household): _____ **Today's Date**___/___/_____

Full Household Diagram

Total number of huts in this household: _____

Sample Full Household Diagram



Total number of huts in this household: 3

Participant Number (Head of Household): _____ **Today's Date**___/___/_____

Bidibidi Housing Data Collection
Bedroom Hut Diagram - Square

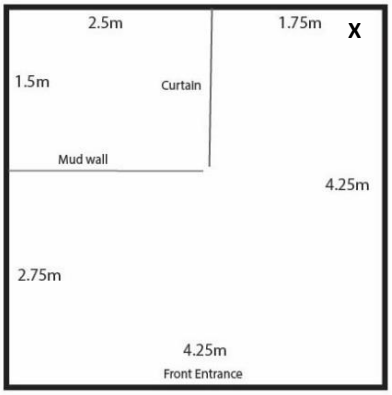
Front Entrance

Total Number of Spaces: _____

Directions

- ☐ Measure the length of each exterior wall of the head of household's bedroom hut.
- ☐ Measure and draw a diagram of the interior hut spaces divided by:
  - A. a wall, or
  - B. a temporary divider (e.g. curtain or wood panel), or
  - C. another type of divider that provides visual obstruction.
- ☐ If possible, include measurements for the dimensions of each space.
- ☐ Identify the type (material) of partition in the diagram.
- ☐ Measure the interior height of the hut in the center.
- ☐ Record the total number of divided spaces below the diagram.
- ☐ Mark the location of any significant holes and water damage with an X.

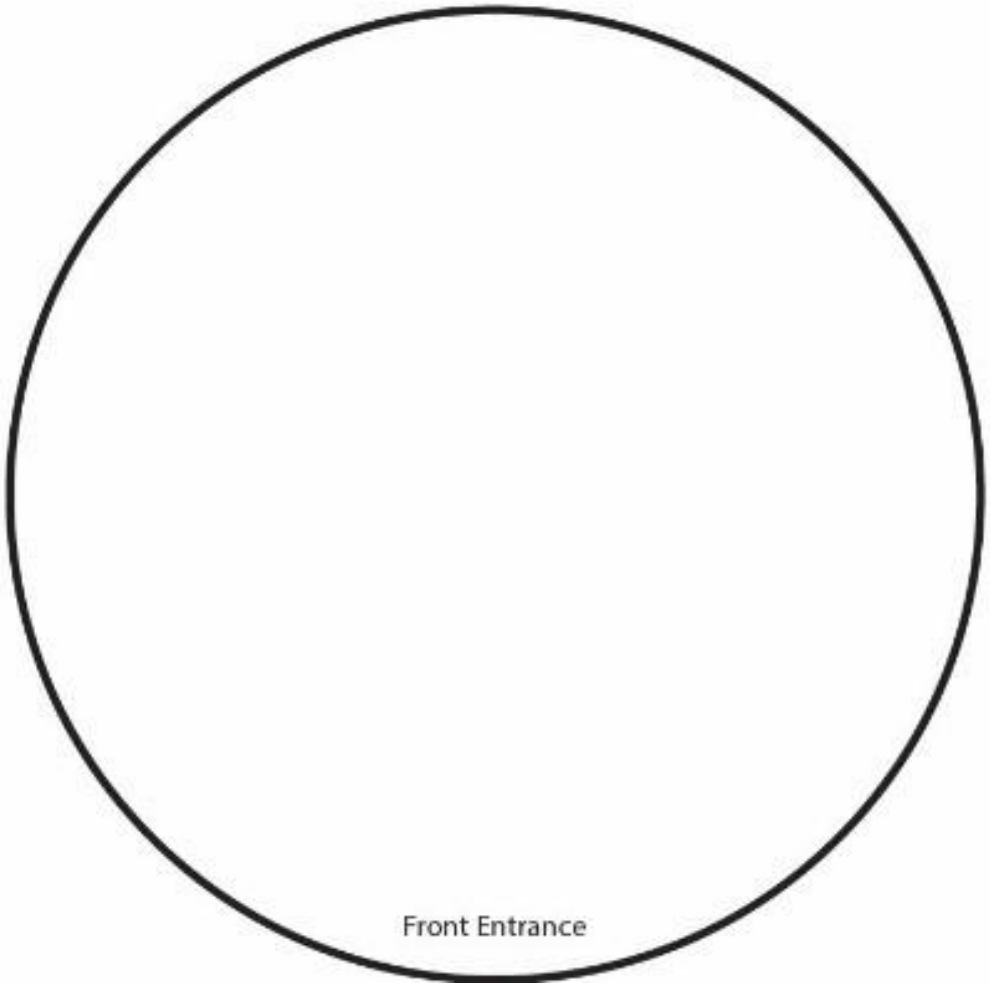
Sample Hut Diagram



Total Number of Spaces: 2

Participant Number (Head of Household): _____ **Today's Date**___/___/_____

Bidibidi Housing Data Collection
Bedroom Hut Diagram - Circular

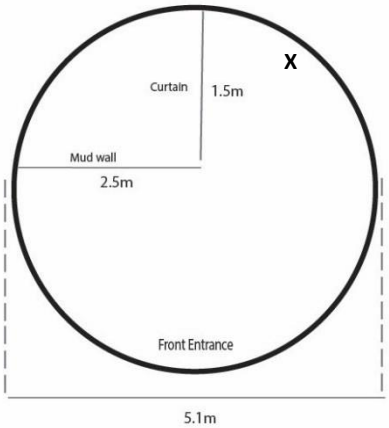


Total Number of Spaces: _____

Directions

- ☐ Measure the exterior diameter of the head of household's bedroom hut.
- ☐ Measure and draw a diagram of the interior hut spaces divided by:
  - A. a wall, or
  - B. a temporary divider (e.g. curtain or wood panel), or
  - C. another type of divider that provides visual obstruction.
- ☐ If possible, include measurements for the dimensions of each partition.
- ☐ Identify the type (material) of partition in the diagram.
- ☐ Measure the interior height of the hut in the center.
- ☐ Record the total number of divided spaces below the diagram.
- ☐ Mark the location of any significant holes and water damage with an X.

Sample Hut Diagram



Total Number of Spaces: 2

Participant Number (Head of Household): _____ **Today's Date**___/___/_____

Hut Notes

1. Were there any unusual circumstances during data collection? Please describe anythingthat stood out or was a disruption throughout the process.

2. What is the front door's material? Is there a visible lock?

3. Are there any significant holes in the hut walls or roofing? Please list them, how large they are, and where they are located (e.g. 15cm diameter, left hand wall near ceiling). Ifpossible, take a picture of these areas.

4. Does this hut seem well maintained? Why or why not?

5. In your opinion, is this a good quality hut overall? Why or why not? What characteristicsstand out?

6. Does the home have an odor, such as mold or mildew? Please describe. Is it mild, bad,or very bad?

7. Is there water damage or accumulation evident anywhere inside - ceiling, floors, walls?Please describe where and how severe, and take pictures of these areas.

8. What is the weather like today? Has it been rainy or dry, hot or cold? Please describe.

Participant Number (Head of Household): _____ **Today's Date**___/___/_____

Bidibidi Housing Data Collection
Questionnaire - English

Participant Information

Sex (circle one): Female Male Other

Marital Status (circle one): Single Married Widow/Widower Other

---

Section 1

I would like to learn about your housing here in Bidibidi. The next few questions are about your hut.

1. How long have you lived in your current hut?_____years_____months
2. How many people live in your hut?_____adults,_____children (<18 yrs old)
3. What is the material of your hut?

4. Style of Shelter (circle one)	**5. Roofing (circle one)**	**6. Flooring (circle one)**
Brick-based hut	Grass	Mud (bare)
Frame-filled hut	Metal sheeting	Carpet
Tarp shelter	Tarp-covered	Other _____
Other_____	Other _____	

Section 2

I would like to learn more about your hut. The next questions ask about the construction and maintenance of your shelter.

1. Did others help to build your shelter? Yes No

    a. If so, who helped build your shelter? Check all that apply.
        - ○ Paid laborers
        - ○ UNHCR Staff
        - ○ NGO Staff
        - ○ Settlement Residents (unpaid)
        - ○ Other _____

2. Did you participate in the construction of your shelter? ___ Yes ___No

a. If so, in what ways did you participate? Check all that apply.
   - O Decided on the location of the shelter
   - O Planned the shelter's size
   - O Decided which way the shelter would face
   - O Decided the shelter's size
   - O Decided how to build the shelter
   - O Decided what materials to use
   - O Collected materials for construction
   - O Built the shelter
   - O Other _____

3. How do you mainly use your shelter? Check all that apply.
   - O A place to sleep
   - O A place to be alone
   - O A place to store personal belongings
   - O A place to store food
   - O Other _____

4. Are you able to lock your door?_____Yes_____No

   a. If yes, how frequently do you lock it?
      - O Every time I leave home
      - O Most of the time
      - O Sometimes
      - O Very Infrequently
      - O Never

5. Have you ever experienced a burglary of your home?_____Yes_____No

   If yes, how many times in the last year? _____

6. Do you have a source of lighting that you use within your hut?_____Yes_____No

   a. If yes, what type of light do you use? Check all that apply.
      - O Electric light installed in hut
      - O Portable solar light
      - O Portable battery-powered light
      - O Gasoline
      - O Kerosene
      - O Paraffin
      - O Burning wood
      - O Other _____

   b. Which lighting source do you most often use? _____

7. What type of cooking fuel(s) do you use? _____

8. What type of food storage containers do you use? _____

Section 3

The next section of questions asks more about your shelter. (If you would like, turn to the Section 3 response card). Here, the response options are 1=Strongly Disagree, 2=Disagree, 3=Neutral, 4=Agree, 5=Strongly Agree.

1. I maintain and repair my shelter.

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

2. I feel a sense of ownership of my shelter.

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

3. I alter my shelter to meet my needs.

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

4. I personalize my shelter to reflect my identity.

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

5. I make decisions about what happens to my shelter.

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

6. My home is crowded.

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

7. When everyone is home, I feel crowded.

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

8. My home is cramped.

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

9. In my home, people get under food, or in the way.

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

10. Pests (roaches, mice, etc.) are frequently in my home.

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

11. Pests affect my food stored within my hut.

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

12. I need more space for food storage.

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

13. I need better food storage containers.

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

14. I experience indoor smoke from cooking.

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

Section 4

The next section asks about how satisfied or dissatisfied you are with components of your hut. (If you would like, turn to the Section 4 response card). The response options are 1=Very Dissatisfied, 2= Dissatisfied, 3=Satisfied, and 4=Very Satisfied.

"How satisfied are you with…"

1. Ventilation and air flow in the hut

1	2	3	4
Very Dissatisfied	Dissatisfied	Satisfied	Very Satisfied

Participant Number (Head of Household): _____ **Today's Date___/___/_____**

2. Exterior material of your hut

1	2	3	4
Very Dissatisfied	Dissatisfied	Satisfied	Very Satisfied

3. Interior material of your hut

1	2	3	4
Very Dissatisfied	Dissatisfied	Satisfied	Very Satisfied

"How satisfied are you with…"

4. Amount of space in your hut

1	2	3	4
Very Dissatisfied	Dissatisfied	Satisfied	Very Satisfied

5. Position of cooking area

1	2	3	4
Very Dissatisfied	Dissatisfied	Satisfied	Very Satisfied

6. Temperature conditions of hut

1	2	3	4
Very Dissatisfied	Dissatisfied	Satisfied	Very Satisfied

"How satisfied are you with…"

7. Size of the hut

1	2	3	4
Very Dissatisfied	Dissatisfied	Satisfied	Very Satisfied

8. Noise levels in the hut

1	2	3	4
Very Dissatisfied	Dissatisfied	Satisfied	Very Satisfied

9. Layout of the hut

1	2	3	4
Very Dissatisfied	Dissatisfied	Satisfied	Very Satisfied

10. Noise level around the hut

1	2	3	4
Very Dissatisfied	Dissatisfied	Satisfied	Very Satisfied

"How satisfied are you with…"

11. Privacy in the hut

1	2	3	4
Very Dissatisfied	Dissatisfied	Satisfied	Very Satisfied

12. Safety in the hut

1	2	3	4
Very Dissatisfied	Dissatisfied	Satisfied	Very Satisfied

13. Safety around the hut

1	2	3	4
Very Dissatisfied	Dissatisfied	Satisfied	Very Satisfied

14. Position of door(s)

1	2	3	4
Very Dissatisfied	Dissatisfied	Satisfied	Very Satisfied

"How satisfied are you with…"

15. Number of door(s) in your hut

1	2	3	4
Very Dissatisfied	Dissatisfied	Satisfied	Very Satisfied

16. Number of windows in your hut

1	2	3	4
Very Dissatisfied	Dissatisfied	Satisfied	Very Satisfied

17. Roofing quality of your hut

1	2	3	4
Very Dissatisfied	Dissatisfied	Satisfied	Very Satisfied

18. Structural quality of the hut

1	2	3	4
Very Dissatisfied	Dissatisfied	Satisfied	Very Satisfied

Section 5

The next section of questions asks about your feelings lately. (If you would like, turn to the Section 5 response card). Here, the response options are 5=All of the time, 4=Most of the time, 3= More than half of the time, 2=Less than half of the time, 1=Some of the time, 0=At no time.

Over the past 2 weeks….

1. I have felt cheerful and in good spirits.

5	4	3	2	1	0
All of the time	Most of the time	More than half the time	Less than half the time	Some of the time	At no time

2. …I have felt calm and relaxed.

5	4	3	2	1	0
All of the time	Most of the time	More than half the time	Less than half the time	Some of the time	At no time

3. …I have felt active and vigorous.

5	4	3	2	1	0
All of the time	Most of the time	More than half the time	Less than half the time	Some of the time	At no time

Over the past 2 weeks….

4. …I have woken up feeling fresh and rested.

5	4	3	2	1	0
All of the time	Most of the time	More than half the time	Less than half the time	Some of the time	At no time

5. …my daily life has been filled with things that interest me.

5	4	3	2	1	0
All of the time	Most of the time	More than half the time	Less than half the time	Some of the time	At no time

---

Section 6

Section 6 questions ask about your physical health.

1. Would you say that, for someone of your age, your health is: excellent, good, fair, or poor?
   Excellent ____ Good ___ Fair____ Poor____

2. Have you been diagnosed with COVID-19? ____ Yes ____ No

3. Do you believe you have COVID-19? ____ Yes ____ No

4. How often do you smoke tobacco, cannabis, or any other substance?
   - ____ Never
   - ____ A few times per month
   - ____ Once per week
   - ____ A few times per week
   - ____ Daily
   - ____ Multiple times per day

The next set of questions ask specifically about your respiratory health. (If you would like, turn to the Section 6 response card). Response options range from ''never'' to ''always'' OR from ''not at all'' to ''a lot/extremely'' depending on the question.

Over the last 7 days…

5. How much did you cough when you woke up in the morning?

Not at all 1 2 3 4 5 A lot/Extremely

6. How often did you cough during the day?

Never 1 2 3 4 5 Always

7. How often did you have coughing bouts?

Never 1 2 3 4 5 Always

Over the last 7 days…

8. How often were you tired after coughing?

Never 1 2 3 4 5 Always

9. How often did coughing make you short of breath?

Never 1 2 3 4 5 Always

10. How annoyed were you by your cough?

Not at all 1 2 3 4 5 A lot/Extremely

Over the last 7 days…

11. How often did you avoid going to public places because of your cough?

Never 1 2 3 4 5 Always

12. How often were your usual activities interrupted by your cough?

Never 1 2 3 4 5 Always

13. How often did your cough interrupt your conversations with others?

Never 1 2 3 4 5 Always

Over the last 7 days…

14. How often did your cough wake you up, prevent you from falling asleep or falling back to sleep?

Never 1 2 3 4 5 Always

15. How often were you uncomfortable about bothering other people while coughing?

Never 1 2 3 4 5 Always

16. How thick was your phlegm?

Not at all 1 2 3 4 5 A lot/Extremely

Over the last 7 days…

17. How often did you bring up phlegm?

Never 1 2 3 4 5 Always

18. How often did your phlegm make it difficult for you to breathe?

Never 1 2 3 4 5 Always

19. How difficult was it for you to bring up phlegm?

Not at all 1 2 3 4 5 A lot/Extremely

Over the last 7 days…

20. How often did you feel uncomfortable about bothering other people while bringing up phlegm?

Never 1 2 3 4 5 Always

21. How annoyed were you by your phlegm?

Not at all 1 2 3 4 5 A lot/Extremely

22. How often did your phlegm interfere with your ability to speak?

Never 1 2 3 4 5 Always

Over the last 7 days…

23. How often did your phlegm prevent you from going to public places?

Never 1 2 3 4 5 Always

24. How often did you have to interrupt your usual activities to get rid of your phlegm?

Never 1 2 3 4 5 Always

Section 7

The following questions ask in more detail about your sleep quality. Please indicate how often the following occur. (If you would like, turn to the Section 7 response card). The response options now are Never, Rarely, Sometimes, Often, or Always.

1. In the past 7 days, how often did you stay up most of the night because you could not fall asleep?

5	4	3	2	1
Never	Rarely	Sometimes	Often	Always

2. In the past 7 days, how often was it very easy for you to fall asleep?

5	4	3	2	1
Never	Rarely	Sometimes	Often	Always

3. In the past 7 days, how often did you have a lot of trouble falling asleep?

5	4	3	2	1
Never	Rarely	Sometimes	Often	Always

4. In the past 7 days, how often did you stay up all night because you could not fall asleep?

5	4	3	2	1
Never	Rarely	Sometimes	Often	Always

5. In the past 7 days, how often did you stay up half of the night because you could not fall asleep?

5	4	3	2	1
Never	Rarely	Sometimes	Often	Always

Section 8

Now, I am going to read some statements about your life in Bidibidi. I would like to know how true these statements are for you. (If you would like, turn to the Section 8 response card). The response options here are 1=Not at all true, 2=Hardly true, 3=Moderately true, 4=Exactly true.

1. I can always manage to solve difficult problems if I try hard enough.

1	2	3	4
Not at all true	Hardly true	Moderately true	Exactly true

2. If someone opposes me, I can find the means and ways to get what I want.

1	2	3	4
Not at all true	Hardly true	Moderately true	Exactly true

3. It is easy for me to stick to my aims and accomplish my goals.

1	2	3	4
Not at all true	Hardly true	Moderately true	Exactly true

4. I am confident that I could deal efficiently with unexpected events.

1	2	3	4
Not at all true	Hardly true	Moderately true	Exactly true

5. Thanks to my resourcefulness, I know how to handle unforeseen situations.

1	2	3	4
Not at all true	Hardly true	Moderately true	Exactly true

6. I can solve most problems if I invest the necessary effort.

1	2	3	4
Not at all true	Hardly true	Moderately true	Exactly true

7. I can remain calm when facing difficulties because I can rely on my coping abilities.

1	2	3	4
Not at all true	Hardly true	Moderately true	Exactly true

8. When I am confronted with a problem, I can usually find several solutions.

1	2	3	4
Not at all true	Hardly true	Moderately true	Exactly true

9. If I am in trouble, I can usually think of a solution.

1	2	3	4
Not at all true	Hardly true	Moderately true	Exactly true

10. I can usually handle whatever comes my way.

1	2	3	4
Not at all true	Hardly true	Moderately true	Exactly true

Section 9

Next, I have some questions about what it is like in your community. (If you would like, turn to the Section 9 response card). The response options now are 1=Strongly Disagree, 2=Disagree, 3=Neutral, 4=Agree, 5=Strongly Agree.

1. I feel listened to by others.

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

2. I feel respected by others within my community.

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

3. My input is **not** taken into account in my community.

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

4. I am able to contribute to my community.

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

5. I am **not** able to meaningfully engage with my community.

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

6. I feel as though I am able to make a difference in my community.

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

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7. I feel like I am part of something larger than myself.

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

8. I do **not** feel connected to others in my community.

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

9. I am **not** able to make change happen in my community.

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

10. I do **not** have an influence over what happens in my community.

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

-

11. I can generally predict what life will be like a couple weeks from now.

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

12. I have an understanding of how to accomplish my goals here.

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

13. I can usually figure out how to solve my problems here.

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

14. I do **not** know who to ask for assistance.

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

15. I have an organized understanding of how things work here.

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

16. Life is too unpredictable here.

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

17. When I need information, I know who I can turn to.

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

18. If I need to deal with a problem here, I am unsure of how to find help.

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

19. I do **not** know how things work around here.

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

20. I have a clear understanding of procedures here.

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

Please answer the following questions (21-32) with the past two weeks in mind.

21. Life is interesting and challenging.

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

22. I feel focused.

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

23. I feel energetic and excited about what I am doing.

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

24. I feel effective.

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

25. I feel positive

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

26. I am able to get readily absorbed in a task.

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

27. I feel satisfied with how things are going lately.

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

28. I feel alert.

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

29. I feel like I have a good sense of where I am going.

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

30. I feel competent.

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

31. I feel attentive.

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

32. I can keep my mind on what I am doing.

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

Participant Number (Head of Household): _____ **Today's Date**___/___/_____

Section 10

10A. Next, I have some questions about your satisfaction with your land, village, and your residence here in the settlement. Please indicate your response to the following questions. (If you would like, turn to the Section 10A response card). The response options are 1=Very Dissatisfied, 2=Dissatisfied, 3=Satisfied, 4=Very Satisfied.

1. Overall, how satisfied are you with the amount of land you can cultivate?

1	2	3	4
Very Dissatisfied	Dissatisfied	Satisfied	Very Satisfied

2. Overall, how satisfied are you with your village?

1	2	3	4
Very Dissatisfied	Dissatisfied	Satisfied	Very Satisfied

3. Overall, how satisfied are you with your shelter?

1	2	3	4
Very Dissatisfied	Dissatisfied	Satisfied	Very Satisfied

10B. Now, please indicate how much you agree or disagree with each of the following statements. (If you would like, turn to the Section 10B response card). The response options now are 1=Strongly Disagree, 2=Disagree, 3=Agree, 4=Strongly Agree.

4. I wish I had more land to cultivate.

1	2	3	4
Strongly Disagree	Disagree	Agree	Strongly Agree

5. My quality of life would improve substantially if I had more land for cultivation.

1	2	3	4
Strongly Disagree	Disagree	Agree	Strongly Agree

The next set of questions asks you about how you view your village with the same response options.

6. This is the ideal village to live in.

1	2	3	4
Strongly Disagree	Disagree	Agree	Strongly Agree

7. Now this village is a part of me.

1	2	3	4
Strongly Disagree	Disagree	Agree	Strongly Agree

8. I would willingly leave this village.

1	2	3	4
Strongly Disagree	Disagree	Agree	Strongly Agree

9. It would b*e* hard for me to leave this village.

1	2	3	4
Strongly Disagree	Disagree	Agree	Strongly Agree

10. There are places in the village to which I am very emotionally attached.

1	2	3	4
Strongly Disagree	Disagree	Agree	Strongly Agree

11. I would not willingly leave this village for another.

1	2	3	4
Strongly Disagree	Disagree	Agree	Strongly Agree

Section 11

The next set of questions asks you about how your social ties in your community. (If you would like, turn to the Section 11 response card). Your response options are now 0=Not at all, 1=A little, 2=A medium amount, 3=Quite a lot, and 4=Very much.

1. Do you have many visitors to your home every day?

0	1	2	3	4
Not at all	A little	A medium amount	Quite a lot	Very much

2. Do you socialize a lot in or near your home?

0	1	2	3	4
Not at all	A little	A medium amount	Quite a lot	Very much

3. How well do you know the people who live in the huts near you?

0	1	2	3	4
Not at all	A little	A medium amount	Quite a lot	Very much

4. How well do you know people living near you that are not your family members?

0	1	2	3	4
Not at all	A little	A medium amount	Quite a lot	Very much

5. Are people here concerned with helping and supporting one another?

0	1	2	3	4
Not at all	A little	A medium amount	Quite a lot	Very much

6. Do people here acknowledge one another when passing by?

0	1	2	3	4
Not at all	A little	A medium amount	Quite a lot	Very much

7. Is there a strong feeling of belonging here?

0	1	2	3	4
Not at all	A little	A medium amount	Quite a lot	Very much

8. How many close neighbors do you have? (meaning people that you feel at ease with, can talk to about private matters, and can call on for help)

None ___ 1___ 2___ 3___ 4___ 5___ 6___ 7 or more____

9. How many of these close neighbors do you see or talk to on the telephone at least once every two weeks?

None ___ 1___ 2___ 3___ 4___ 5___ 6___ 7 or more____

10. How many of your less close neighbors do you visit or talk to at least once every two weeks?

None ___ 1___ 2___ 3___ 4___ 5___ 6___ 7 or more____

Section 12

The following questions ask about your household's food security. (If you would like, turn to the Section 12 response card). First, indicate Yes or No for the question. Then, if yes, indicate how often this occurred from the following options: Rarely (1-2 times in the past four weeks), Sometimes (3-10 times in the past four weeks), or Often (more than 10 times in the past four weeks).

1. In the past 4 weeks, did you worry that your household would not have enough food?

A. _____ Yes_____No

B. (If yes) How often did this happen?
____ Rarely (1-2 times in the past four weeks)
____ Sometimes (3-10 times in the past four weeks)
____ Often (more than 10 times in the past four weeks)

2. In the past 4 weeks, were you of any household member not able to eat the kinds of foods you preferred because of a lack of resources?

A. _____ Yes_____No

B. (If yes) How often did this happen?
____ Rarely (1-2 times in the past four weeks)
____ Sometimes (3-10 times in the past four weeks)
____ Often (more than 10 times in the past four weeks)

3. In the past 4 weeks, did you of any household member have to eat a limited variety of foods due to a lack of resources?

A. _____ Yes_____No

B. (If yes) How often did this happen?
____ Rarely (1-2 times in the past four weeks)
____ Sometimes (3-10 times in the past four weeks)
____ Often (more than 10 times in the past four weeks)

4. In the past 4 weeks, did you or any household member have to eat some foods you really did not want to eat because of a lack of resources to obtain other types of food?

A. _____ Yes_____No

B. (If yes) How often did this happen?
____ Rarely (1-2 times in the past four weeks)
____ Sometimes (3-10 times in the past four weeks)
____ Often (more than 10 times in the past four weeks)

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5. In the past 4 weeks, did you or any household member have to eat a smaller meal than you felt you needed because there was not enough food?

A. _____ Yes_____ No

B. (If yes) How often did this happen?
____ Rarely (1-2 times in the past four weeks)
____ Sometimes (3-10 times in the past four weeks)
____ Often (more than 10 times in the past four weeks)

6. In the past 4 weeks, did you or any household member have to eat fewer meals in a day because there was not enough food?

A. _____ Yes _____ No

B. (If yes) How often did this happen?
____ Rarely (1-2 times in the past four weeks)
____ Sometimes (3-10 times in the past four weeks)
____ Often (more than 10 times in the past four weeks)

7. In the past 4 weeks, was there ever no food to each of any kind in your household because of a lack of resources to get food?

A. _____ Yes_____No

B. (If yes) How often did this happen?
____ Rarely (1-2 times in the past four weeks)
____ Sometimes (3-10 times in the past four weeks)
____ Often (more than 10 times in the past four weeks)

8. In the past 4 weeks, did you or any household member go to sleep at night hungry because there was not enough food?

A. _____ Yes_____No

B. (If yes) How often did this happen?
____ Rarely (1-2 times in the past four weeks)
____ Sometimes (3-10 times in the past four weeks)
____ Often (more than 10 times in the past four weeks)

9. In the past 4 weeks, did you or any household member go a whole day and night without eating anything because there was not enough food?

A. _____ Yes_____No

B. (If yes) How often did this happen?
____ Rarely (1-2 times in the past four weeks)
____ Sometimes (3-10 times in the past four weeks)
____ Often (more than 10 times in the past four weeks)

Section 13

Please answer the following questions about the resources available to you. (If you would like, turn to the Section 13 response card). The response options are 1=Strongly Disagree, 2=Disagree, 3=Agree, 4=Strongly Agree.

1. I have access to enough clean water.

1	2	3	4
Strongly Disagree	Disagree	Agree	Strongly Agree

2. I have access to enough food.

1	2	3	4
Strongly Disagree	Disagree	Agree	Strongly Agree

3. I have access to affordable healthcare.

1	2	3	4
Strongly Disagree	Disagree	Agree	Strongly Agree

4. I have access to good quality healthcare.

1	2	3	4
Strongly Disagree	Disagree	Agree	Strongly Agree

5. I have access to further education or job training.

1	2	3	4
Strongly Disagree	Disagree	Agree	Strongly Agree

Now, I would like to learn more about your life here and your personal history.

6. How long have you lived in Bidibidi?_____years_____months

7. Do you have official refugee status?_____Yes_____No

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Are you classified as a Person with Specific Needs (PSN)?_____Yes_____No

8. Of which tribe are you a member? _____

9. Do you have documentation showing that you own this home / land plot?_____Yes_____No

10. Are you currently employed?_____Yes_____No

    If so, what is your job? _____

    Average hours per week: _____

11. How dependent do you think your household is on support from the UNHCR, or any other NGO?
    - ○ Independent
    - ○ Somewhat Dependent
    - ○ Moderately Dependent
    - ○ Completely Dependent

12. What do you consider to be your home country? Check one.
    - ○ South Sudan
    - ○ Democratic Republic of the Congo
    - ○ Uganda
    - ○ Other _____

Now I would like to know about where you've lived in the last 6 years.

Year	Where did you primarily live? (Town, State/District, Country)	What was your housing during this time?	What was your average income during this time? (currency per year)
2015			
2016			
2017			
2018			

2019			
2020			

Lastly, I have a few questions about your childhood.

13. In what country did you spend your childhood? _____
14. In what type of housing did you live as a child?_____
15. What was your father's occupation? _____
16. What was your father's level of formal education? _____
17. What was your mother's occupation? _____
18. What was your mother's level of formal education? _____
19. What is your date of birth?____/___/_____
    (If you would rather not to share this, you can simply give your age: ____

- End of Questionnaire -

Participant Comfort:

How comfortable do you think the participant was with responding to these questions?

1	2	3	4	5	6	7	8	9	10
Very Uncomfortable				Neutral					Very Comfortable

RA Notes:

Please note anything that may have disrupted this questionnaire's administration. Also note anymajor points of confusion for the participant.

_____

_____

_____

_____

_____

_____

Questionnaire Administered by (RA Name): _____

Appendix G. Factor Analyses for Multi-item Measures.

WHO-5 Well-Being

Correlation Matrix

		Felt good	Felt calm	Felt active	Felt fresh	Felt interest
Correlation	Felt good	1.000	.779	.657	.806	.626
	Felt calm	.779	1.000	.667	.683	.544
	Felt active	.657	.667	1.000	.643	.567
	Felt fresh	.806	.683	.643	1.000	.645
	Felt interest	.626	.544	.567	.645	1.000

Total Variance Explained

	Initial Eigenvalues			Extraction Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.656	73.122	73.122	3.656	73.122	73.122
2	.490	9.801	82.923			
3	.399	7.978	90.901			
4	.289	5.774	96.675			
5	.166	3.325	100.000			

Extraction Method: Principal Component Analysis.

Component Matrix[a]

	Component 1
Felt good	.911
Felt fresh	.888
Felt calm	.863
Felt active	.824
Felt interest	.783

Extraction Method: Principal Component Analysis.

a. 1 components extracted.

Housing Satisfaction:

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	11.343	63.014	63.014	11.343	63.014	63.014
2	1.003	5.571	68.586			
3	.850	4.723	73.309			
4	.757	4.205	77.513			
5	.702	3.903	81.416			
6	.538	2.988	84.403			
7	.473	2.629	87.033			
8	.381	2.115	89.147			
9	.351	1.947	91.095			
10	.305	1.693	92.787			
11	.301	1.673	94.460			
12	.256	1.420	95.880			
13	.222	1.234	97.114			
14	.171	.951	98.065			
15	.125	.696	98.762			
16	.096	.535	99.297			
17	.073	.404	99.701			
18	.054	.299	100.000			

Extraction Method: Principal Component Analysis.

Component Matrix[a]

	Component 1
Door Number	.868
Structural Quality	.858
Window Number	.851
Exterior Material	.845
Safety Around	.845
Ventilation	.828
Interior Material	.824
Hut Size	.804
Temperature	.800
Noise Around	.794
Position of Cooking Area	.794
Hut Layout	.792
Safety	.788
Amount of Space	.781
Privacy	.746
Position Door	.737
Noise Levels	.669
Roofing Quality	.620

Extraction Method: Principal Component Analysis.

a. 1 components extracted.

Crowding:

Correlation Matrix

		Crowded	Everyone Home Crw	Cramped	Under foot
Correlation	Crowded	1.000	.831	.720	-.077
	Everyone Home Crw	.831	1.000	.718	.003
	Cramped	.720	.718	1.000	-.056
	Under foot	-.077	.003	-.056	1.000

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.518	62.938	62.938	2.518	62.938	62.938	2.513	62.824	62.824
2	1.001	25.014	87.952	1.001	25.014	87.952	1.005	25.127	87.952
3	.316	7.911	95.863						
4	.165	4.137	100.000						

Extraction Method: Principal Component Analysis.

Component Matrix[a]

	Component	
	1	2
Crowded	.932	
Everyone Home Crw	.928	
Cramped	.884	
Under foot		.996

Extraction Method: Principal Component Analysis.

a. 2 components extracted.

Rotated Component Matrix[a]

	Component	
	1	2
Everyone Home Crw	.931	
Crowded	.930	
Cramped	.883	
Under foot		.999

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 3 iterations.

Resource Access:

Correlation Matrix

		Clean Water	Food	Affordable Healthcare	Quality Healthcare	Education
Correlation	Clean Water	1.000	-.164	.130	-.098	.213
	Food	-.164	1.000	.533	.365	.359
	Affordable Healthcare	.130	.533	1.000	.485	.421
	Quality Healthcare	-.098	.365	.485	1.000	.206
	Education	.213	.359	.421	.206	1.000

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.205	44.095	44.095	2.205	44.095	44.095	2.153	43.054	43.054
2	1.191	23.813	67.908	1.191	23.813	67.908	1.243	24.854	67.908
3	.719	14.386	82.293						
4	.526	10.524	92.818						
5	.359	7.182	100.000						

Extraction Method: Principal Component Analysis.

Participant Number (Head of Household): _____ **Today's Date___/___/_____**

Component Matrix[a]

	Component 1	Component 2
Affordable Healthcare	.848	
Food	.770	
Quality Healthcare	.682	
Education	.651	.426
Clean Water		.920

Extraction Method: Principal Component Analysis.

a. 2 components extracted.

Rotated Component Matrix[a]

	Component 1	Component 2
Food	.811	
Affordable Healthcare	.805	
Quality Healthcare	.729	
Clean Water		.907
Education	.538	.563

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 3 iterations.

Resource Access:

Correlation Matrix

		Maintain	Ownership	Alter	Personalize	Decide
Correlation	Maintain	1.000	.942	.709	.693	.796
	Ownership	.942	1.000	.707	.691	.819
	Alter	.709	.707	1.000	.720	.732
	Personalize	.693	.691	.720	1.000	.786
	Decide	.796	.819	.732	.786	1.000

Total Variance Explained

	Initial Eigenvalues			Extraction Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	4.043	80.852	80.852	4.043	80.852	80.852
2	.428	8.562	89.414			
3	.294	5.880	95.293			
4	.179	3.577	98.870			
5	.056	1.130	100.000			

Extraction Method: Principal Component Analysis.

Component Matrix[a]

	Component 1
Ownership	.929
Maintain	.925
Decide	.921
Personalize	.862
Alter	.857

Extraction Method: Principal Component Analysis.

a. 1 components extracted.

Sleep Quality:

Correlation Matrix

		Cannot sleep	Hard sleep	Trouble sleep	Up all night	Up half night
Correlation	Cannot sleep	1.000	-.797	.868	.800	.755
	Hard sleep	-.797	1.000	-.773	-.701	-.669
	Trouble sleep	.868	-.773	1.000	.805	.798
	Up all night	.800	-.701	.805	1.000	.890
	Up half night	.755	-.669	.798	.890	1.000

Total Variance Explained

	Initial Eigenvalues			Extraction Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	4.145	82.904	82.904	4.145	82.904	82.904
2	.407	8.136	91.040			
3	.211	4.229	95.269			
4	.138	2.758	98.027			
5	.099	1.973	100.000			

Extraction Method: Principal Component Analysis.

Component Matrix[a]

	Component 1
Trouble sleep	.934
Cannot sleep	.928
Up all night	.923
Up half night	.904
Hard sleep	-.862

Extraction Method: Principal Component Analysis.

a. 1 components extracted.

Appendix H. Conditional mediation of pests-sleep quality-resource access by Zone.

Moderator levels					95% C.I. (a)				
Zone	Type	Effect	Estimate	SE	Lower	Upper	β	z	p
Mean-1·SD	Indirect	Pests ⇒ SlpQ ⇒ ResAcc	0.0875	0.1169	-0.1715	0.287	0.0813	0.748	0.454
Mean-1·SD	Component	Pests ⇒ SlpQ	0.1819	0.2318	-0.3405	0.568	0.1691	0.785	0.433
Mean-1·SD		SlpQ ⇒ ResAcc	0.4809	0.1243	0.2491	0.736	0.4807	3.869	< .001
Mean-1·SD	Direct	Pests ⇒ ResAcc	0.0950	0.2281	-0.3664	0.528	0.0883	0.417	0.677
Mean-1·SD	Total	Pests ⇒ ResAcc	0.1693	0.2031	-0.2289	0.567	0.1646	0.833	0.405
Mean	Indirect	Pests ⇒ SlpQ ⇒ ResAcc	0.0882	0.0644	-0.0560	0.197	0.0859	1.368	0.171
Mean	Component	Pests ⇒ SlpQ	0.2347	0.1432	-0.0782	0.483	0.2182	1.639	0.101
Mean		SlpQ ⇒ ResAcc	0.3756	0.1013	0.1553	0.552	0.3938	3.707	< .001
Mean	Direct	Pests ⇒ ResAcc	0.1157	0.1467	-0.2118	0.363	0.1128	0.789	0.430
Mean	Total	Pests ⇒ ResAcc	0.1937	0.1244	-0.0502	0.438	0.1884	1.557	0.119
Mean+1·SD	Indirect	Pests ⇒ SlpQ ⇒ ResAcc	0.0777	0.0859	-0.1039	0.233	0.0779	0.904	0.366
Mean+1·SD	Component	Pests ⇒ SlpQ	0.2875	0.1815	-0.0575	0.654	0.2672	1.584	0.113
Mean+1·SD		SlpQ ⇒ ResAcc	0.2702	0.1861	-0.1529	0.577	0.2917	1.452	0.147
Mean+1·SD	Direct	Pests ⇒ ResAcc	0.1364	0.2698	-0.4586	0.599	0.1369	0.506	0.613
Mean+1·SD	Total	Pests ⇒ ResAcc	0.2182	0.1341	-0.0447	0.481	0.2122	1.627	0.104

Note. Confidence intervals computed with method: Parametric bootstrap

Note. Betas are completely standardized effect sizes