

Toward self-reliant development

Capacity gap within the built environment of Mt. Elgon rural inhabitants

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Toward self-reliant development: Capacity gap within the built environment of Mt. Elgon rural inhabitants

Introduction

The author's overall research is situated on Mt. Elgon, rural Kenya. Articulating improved housing and general educational infrastructure for over a decade the community still seemed to struggle in achieving an improved Quality of Life (Cobb, Clifford, 2000). Out of all life necessities, housing is a crucial factor in reaching an improved Quality of Life (QoL) and is therefore the aim of this research. Moreover, due to its current level of development the communities have a relative less complicated housing situation in comparison urban or western contexts. Additionally, the Mt. Elgon locality proves an exemplary situation for comparable developing societies on the continent.

Research previously performed by the author (Smits, 2017) identified that an important factor to the decreasing level of inhabitant self-reliance¹ towards their housing; and thus, lowering the QoL; is the introduction of manufactured building materials and non-local building technologies. Not only do the inhabitants seem to lack the financial resources to afford such solutions, they also lack knowledge, skills and tools. In the previously performed research this lack is pinpointed as a fundamental shift from independent (local materials, tools and skills) towards dependent development (non-local materials, tools and skills). Here, the author presented the traditional housing knowledge as a collective and embedded knowledge, carried out within a community of practice.

As the (traditional) housing mainly deployed existing inhabitant capacities it enabled a high capability to maintain, extend or replicate the housing (Smits, 2017). On the other hand, the introduced building solutions to the inhabitants on Mt. Elgon seemed to ignore existing capacities and heavily rely on external capacities. Therefore, resulting in a low capability to maintain, extend or replicate the housing. Capacities which McKnight & Kretzmann called individual capacities, identify the richness of skills, talents, knowledge, and experience of people in low-income neighborhoods (1996, p.4).

As this disparity in capacities is only observed by the author (hypothesis) this article intends to identify if such a mismatch exists between the current and desired housing capacities of inhabitants on Mt. Elgon. Which is called the difference between what is and what it should be (2002, p3). Inhabitants know which house they desire, however, currently lack the capacities (materials, knowledge, skills and finance) to realize it. The rural area of Mt. Elgon proves a representative study area² in which communities with various income levels can be found. Identifying if a mismatch between current and desired housing could be a factor preventing inhabitants from improving their housing. To analyze current desired housing on Mt. Elgon, this research deployed an extensive survey amongst two hundred households, which was held in February 2017.

The survey focussed on three goals, firstly to investigate if the communities on Mt. Elgon struggle to articulate improved housing by themselves. Secondly, that they show a disparity between their current capacities and required capacities for articulating desired housing. Thirdly, that they lack knowledge on alternative solutions that would meet current capacities (thus also the knowledge gap and need for external help). The article is divided in four parts: why the context of Mt. Elgon and the targeted communities, are representative for Kenya and possibly for other rural Sub-Saharan communities; describing the methodology, followed by the preparations and implications for its execution in situ; elaborating the most important outcomes of the study; describing the conclusions and restrictions to the study.

The article confirms that the majority of inhabitants on Mt. Elgon live in challenging circumstances (physical and financial). They have a very similar notion of desired

¹ Self-reliance: the ability to independently provide a qualitative built environment on one's own powers, knowledge, materials and construction methodologies (UNHCR, 2005)

² Representative study area: the level of 'development' in the area is representative for many others.

housing; however, this house does not suit their current capacities. Almost half of all the participants estimate that they won't be able to afford their desired housing. Looking at the considerable differences between current and desired housing in relation to their capacities, this could largely explain their inability to realize improved housing. Furthermore, it poses significant restrictions in maintaining their housing in the future. Confirming that there is a disparity between existing inhabitant capacities and capacities they think they require to improve their housing situation. Suggesting that there is a need for housing solutions that fit the existing inhabitant capacities and offered (trained) to the community. However, this research aimed at identifying if a mismatch in inhabitant capacities existed in the targeted communities on Mt. Elgon. In consecutive articles the author articulates the framework in which required support is developed and tested in situ (Smits, 2019).

1. Significance Mt. Elgon area, sample size & targeted communities

Over 70% of the housing built worldwide, is built informally and often by the inhabitants themselves (UN-Habitat, 2013). South Asia and Sub-Sahara Africa will have one of the most significant shifts from rural to urban in the upcoming decades (UN-Habitat, 2015). This shift has posed a great threat to the wellbeing of vulnerable families in the past and can only predict the problems ahead. In Africa, projections are that over half of the urban population (61.7%) lives in slums and by 2050, Africa's urban dwellers are projected to have increased from 400 million to 1.2 billion (UN-Habitat, 2015; United Nations., 2012). Needless to say that it will be vital to understand a large contributor to the urbanization, namely: rural-urban migration (Tacoli, Mcgranahan, & Satterthwaite, 2014).

Therefore, this article focusses at understanding the current living situation of rural inhabitants in Sub-Sahara Africa as they contribute to the fastest urbanizing areas in the world. With 20-25% of the countries' population urbanizing in the next 20-30 years (World Bank, 2016) Kenya proves to be a representative case. In particular West Kenya has a large number of growing cities Kisumu, Eldoret, and Nakuru (World Bank, 2016), which is also called the 'western hub'. In the left image of Figure 1 this urbanization is shown. Here, Mt. Elgon is one of the rural areas that potentially hold rural-urban migrants.

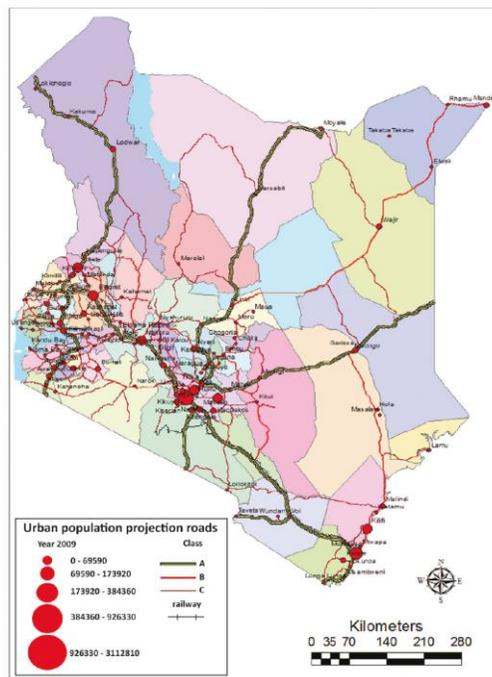


Figure 1 (left to right): Urbanization index (World Bank, 2016), location of Mt. Elgon in Western Kenya and location of selected communities

Sample size

Considering the available resources for this study, a total of 200 inhabitants could be interviewed. To have a representative sample size (Creswell, 2013) for the Mt. Elgon area, four communities with different: income levels, housing and ownership, were sought. To have a representative sample per community (around 50% of the population) communities were targeted of approximately 100-120 households. The communities on the North-eastern slope of Mt. Elgon seemed suitable due to the varied levels of income (areal employers include: Mt. Elgon Orchards, ADC Japata and ADC Suam), different typologies of housing.

Targeted communities

To identify the targeted communities in the Northeast area of Mount Elgon, a group of local researchers and a social worker deliberated with village elder and the areal chief. Here, twelve rural communities were sought according to previously mentioned criteria. The considered communities were (estimated inhabitants): Chepchoina (70), Cherubai (200), Habitat (94), Japata (90), Kaisheber (150), Kaptega (50), Koronga (550), Nabeki (420), Njoro (300), Sokomoko (100), Vamia (150) and Wangu (30). Finally, four communities in proximity to each other were selected and categorized by:

1. No/low income, doesn't own plot, mainly renting/self-build houses
2. Low/regular income, doesn't own plot, mainly/self-build renting houses
3. Low/regular income, owns plot, mainly self-build houses
4. Regular/high income, owns plot, mainly commercially build house.



Figure 2: Map of the selected communities on Mt. Elgon

The Japata settlement near Kaptega river was selected as group 1 (figure 2: red marker). This community of approximately 70 households, was allowed to temporarily settle as farm workers and since independence have been living there. They do not own the plot they live on, are not allowed to build permanently, and they have low/non-existent incomes.

Chepchoina village was selected as group 2 (figure 2: green marker). This community of approximately 110 households live around the Chepchoina village market. Most of its residents rent a house in this area. The families have a mixed income and often combine small business with farming, generating a low/regular income.

Famia was selected as the group 3 (figure 2: blue marker) consisting of approximately 120 households. The plots belong to the inhabitants and they mainly have a regular income combining a commercial position with farming their lands.

The Habitat community was selected as group 4 (figure 2: orange marker). Consisting of 94 households owning their plots. The majority works fulltime for a commercial farm and have a regular/high income.

With the four communities selected, the next section will elaborate on the methodology used to interview the communities and consecutive questionnaire.

2. Survey, mixed methodology: interview & questionnaire

In a previous article (Smits, 2019) the author elaborated how the Design Research Methodology (Blessing & Chakrabarti, 2009) offers a framework for empirical investigation on how introduced building solutions influence Mt. Elgon inhabitants' self-reliance in relation to their housing. This investigation intends to explain, predict and prescribe (Weggeman, 2001). This article is part of the Descriptive Study 1 phase (DS1-phase, see figure 3) which combines literature review and survey to confirm that the problem exists in practice. The literature review confirmed that professionals require support to articulate building solutions according to inhabitant capacities. The survey intends to evaluate inhabitant capacities in relation to their current and desired housing in order to understanding the communities' ability to articulate improved housing by themselves.

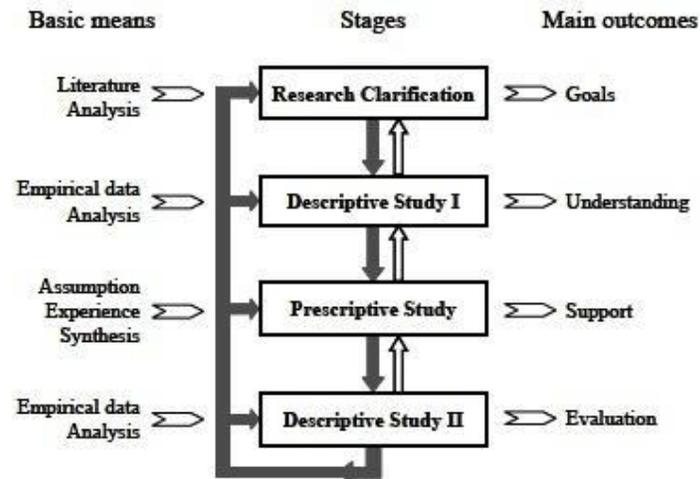


Figure 3: DRM Framework (Blessing & Chakrabarti, 2009)

Community capacity building has been an extensively studied topic, however, the practical application and applicability of academic findings remain little (Beckley, Martz, Nadeau, Wall, & Reimer, 2009). Articulated definitions, criteria, models, approaches and frameworks are often specifically developed for governments or larger organizations (Chaskin, 2001; Honadle, 1981; Norris, Stevens, Pfefferbaum, Wyche, & Pfefferbaum, 2008) or have limited applicability in developing countries (Mcknight & Kretzmann, 1996), and the majority of approaches which are applicable for developing countries mainly aim at community capacities in the context of post-disaster- and resilience aid (Berkes & Ross, 2013; Sherrieb, Norris, & Galea, 2010). Although community capacities are important in determining individual inhabitant capacities, the emphasis should be on the later. The specificity of both location and the inhabitants require a unique investigation as none of the available literature can provide the required information on inhabitant capacities on Mt. Elgon.

Studying inhabitant housing capacities, involves both quantitative and qualitative aspects. Quantitative capacities include measurable aspects such as: income, size of family, ages, etc., where, qualitative capacities include motives, opinions, experiences, etc. about their housing situation and what they would like to change. Resulting in the application of a mixed method approach (Creswell, 2013), where a questionnaire is combined with and interview setting within a survey framework. The questionnaire helps to structure the questions and allows easy registration of answers given by the interviewee. The structured interview enables the interviewer to gather detailed and in-depth understanding of the inhabitant's motives. In this setting the survey ensures that the same procedure is followed amongst all 200 participants of the survey. A similar approach was used by Magee, Scerri, & James (2012) in order to evaluate the opinion of communities towards sustainability. To get a balanced perspective of all households, 100 surveys were conducted with women and 100 surveys with men.

Survey team

Mt. Elgon is a vulnerable environment in which the inhabitants struggle to sustain their livelihood. Moreover, the majority lives in wattle and daub housing³ and often live rather traditionally. Therefore, it was essential to take preliminary precautions which would protect the respondents. Firstly, the community elder, chief and a local social worker (previously involved) informed the communities. Secondly, to prevent social/cultural dilemmas two female and two male researchers needed to be hired in order to interview women and men separately. Therefore, a local survey manager was hired to appoint the interviewers. Sophie E. Kibuywa, is head of a local development organization (Desece: Development Education Services for Community Empowerment) and has decades of experiences in conducting local researches. She recruited the interviewers (see figure below) and monitored the entire survey. Pauline Nabalayo was appointed as team leader as she was the most experienced.



Figure 4 (left-right): B. Sawenja, K. Humphrey, S. Kibuywa, P. Nabalayo and A. Nyangugu

During the survey the researchers were staying in proximity of the targeted communities. Two communities were within 5 minutes walking and two communities were in a short travelling distance (max. 5 minutes on motorbike). They had a field office arranged at the local hospital where they were able to work.

Interview instruction & guide

To prevent any inconsistencies in executing the surveys, a questionnaire instruction document was prepared for the researchers (see: Attachment A). The instruction guides interviewers' step by step how the survey should be performed and what the points of attention are. It starts by explaining the context, elaborates on the main objective and aim, followed by introduction of the target groups and explanation of the practicalities of the questionnaire: location, recruitment of the participants, picture/audio recording, venue, breaks and ethical issues. Ensuring that: the surveys are taken in a safe environment, with the participants of appropriate age and gender; not invading the privacy of the participant. The interview guide is meant to be read out loud to the interviewees by the interviewer, guaranteeing that every interview is conducted in exactly the same way and the same questions and order are being used. The guide (see: Attachment B) is written according to the proposed structure for an interview guide by: Qualitative Research Methods (Hennink, Hutter, & Bailey, 2010). According to the Delft code of ethics (Scientific Integrity Committee, 2012) informed consent should be used to enable the use of each survey after completion. Therefore, an informed consent form was added and physically signed by each interviewee. As a result, the questionnaire consists of four sections (Hennink et al., 2010,p.113):

Section 1, introduction: Introduces the research purpose and explains the attached consent-form. The researchers are asked to read the consent form and answer any questions of the participant. When all questions are addressed the interview is conducted.

³ wattle and daub housing: house composed of a wooden (branches) structure filled with a composite consisting of clay, mud, grass and cowdung.

Section 2, opening questions: The general information questions are closed questions that are relatively easy and comfortable to answer. Questions are meant to evaluate family size, occupations, ages, financial capacities and landownership. The answers help understanding the current general capacities of the family.

Section 3, key questions: The current housing questions try to identify how interviewee's current capacities have resulted in current housing. The questions emphasize: ownership, amount of structures, house size, in /outdoor functions, used materials, self-build practise, help by community members, satisfaction, maintenance and their (in)ability realising desired housing.

Section 4, closing questions: The desired housing questions focus on how current capacities prevent or enable realising the desired housing. The questions emphasize: what type of house they desire and what prevents them from realizing desired housing. The closing questions emphasize if they would be able to afford⁴ the desired house based on their current capacities.

Two hundred questionnaires were printed and used in the field to register personal information, gather answers to the survey (as backup) and confirm consent (signature participant). In addition, every interviewer had a printed version of the interview guide and instruction with them. The questionnaire was also made available via Google sheet and was accessible by smartphone (all researchers had one).

Pilot & Adjustments

On the 30th of January 2017 the researchers ran the pilot survey. Here, they tested the survey amongst themselves (using the printed English questionnaire, making audio recordings and pictures). The team concluded that there was a necessity of translating the questionnaire to Swahili as it was too difficult to do this simultaneously during the interview, moreover, would it allow discrepancies. The cross-cultural survey guidelines of Mohler et al. (2010) provided with an appropriate team translation model that suited the requirements of this study. Also called The Team Translation Model Procedures (TRAPD). The group researchers were divided in two teams and separately translated the questionnaire. In the review session they compared their translations, discussed the differences and made a concept translation. The results were reviewed by Sophie E. Kibuywa and returned to the team. They had a second adjustment session when they debated the review and made a final translation of the questionnaire which can be found in Attachment C.

Executing the survey

The survey started on February 6th with one research team in the Japata ADC community and one in the Habitat community (see: figure 5). Every time locating one household that had a mother present and another that had a father available. According to the set target every team conducted between 8-10 interviews per day. The researchers used the printed questionnaire to write down the answers of the participants and asked participants to sign the consent form. The interviewers took a picture of the family in front of the house and made audio recordings of the interview. Due to the length of the survey (1 hour) and the vulnerability of the community, incentives were used to compensate the participants for their time.

⁴ Afford: to what extend the capacities enable or disable a realization



Figure 5 (top to bottom): Samples of the Japata ADC & Habitat community

Although, the use of incentives can boost response rates, bias and quality (Singer & Bossarte, 2006), due to the design of the survey this is kept to a minimum. The interviewers were aware of the survey purpose, however, the only target they had was to conduct the two hundred surveys. None of the interviewers met with the author in person nor were they aware of the sought survey results. The survey questions are not suggestive and do not propose a specific outcome or solution. Therefore, the use of incentives marginally influenced the survey's results. The interviewers suggested that one kilogram of sugar per household would be sufficient to compensate the participant's time. At the end of the week the researchers used three days to digitalize the 100 answer sheets (Google sheet), upload the pictures and audio recordings.



Figure 6 (top to bottom): Samples of the Famia & the Chepchoina community.

On February 16th the survey continued in the Famia and Chepchoina communities (see figure 6), following the same procedures as the Japata ADC and Habitat community. The research teams were able to finish the second round of 100 surveys by February 24th. The next section will address the outcomes of the survey.

3. Outcomes survey

In the following section the outcomes of the survey are compared between the four communities. This section uses the same structure as the survey and presents the most important findings, the dataset is enclosed in Attachment D.

3.1. General information questions

Table 1 presents shared income, income stability and the family size, between the communities. Although the Habitat and Chepchoina community had a higher average income, the majority of inhabitants (>50%) earned up to 25000 Ksh (roughly \$250) per month. Considering that the majority of the community had between 0-7 children this left the households with \$4 per person per day (2-person household), \$1,6 in a five-person household and worst-case \$0,8 in a nine-person household. With fluctuating incomes in at least 70% of the households; in three out of four communities; questions arise if the families were able to sustain basic life necessities (as they are far under the international poverty line: \$1,90 p.p.d.). It is

important to state that Japata has a significantly lower average income which could be explained by the high unemployment rate of this community.

Table 1. Shared income, Income stability & Family size

5. How much is your shared income?				
	Japata	Chepchoina	Vamia	Habitat
<1000	0,0%	4,7%	5,9%	0,0%
1000 to 2499	9,1%	4,7%	2,9%	2,0%
2 500 to 4 999	20,5%	9,3%	17,6%	3,9%
5 000 to 7499	40,9%	16,3%	17,6%	2,0%
7 500 to 9 999	13,6%	16,3%	5,9%	21,6%
10 000 to 2 4999	15,9%	37,2%	32,4%	60,8%
25 000 to 49 999	0,0%	9,3%	5,9%	7,8%
50 000 to 99 999	0,0%	2,3%	0,0%	0,0%
100 000 to 500 000	0,0%	0,0%	11,8%	2,0%
6. Is this stable, or does fluctuates seasonal or occasional? income?				
	Japata	Chepchoina	Vamia	Habitat
stable	18,4%	28,9%	19,5%	64,2%
fluctuates	81,6%	71,1%	80,5%	35,8%
8. Number of children				
	Japata	Chepchoina	Vamia	Habitat
from 0 to 3	42,9%	69,4%	36,6%	32,1%
from 4 to 7	38,8%	22,4%	43,9%	58,5%
from 8 to 11	18,4%	8,2%	17,1%	3,8%
12 and more	0,0%	0,0%	2,4%	5,7%

Table 2 shows that although most households did not state they are farmers (<15%) three out of four community had a majority which did have a farmland (>50%) which contributed to their daily livelihood. Current income capacities in the communities show that some of the households had been able to secure a stable and substantial income. However, the vast majority of the households had a daily budget below the poverty line and the income in most cases fluctuated frequently. This makes the households highly vulnerable and indicates that making ends meet is difficult. Suggesting that the majority of the Mt. Elgon households lacked the financial capacities to articulate desired housing (materials, tools, and labour). The next section will elaborate further on this correlation.

Table 2. Questions on: Farmland, Ownership and the contribution to livelihood.

12. Do you have a farmland (shamba)?				
	Japata	Chepchoina	Vamia	Habitat
Yes	38,8%	54,2%	80,5%	94,3%
No	61,2%	45,8%	19,5%	5,7%
13. Do you own this farmland?				
	Japata	Chepchoina	Vamia	Habitat
Yes	0,0%	34,7%	70,7%	84,9%
No: company land	79,6%	0,0%	0,0%	1,9%
Unknown	20,4%	22,4%	17,1%	1,9%
Family land	0,0%	12,2%	9,8%	7,5%
No	0,0%	24,5%	0,0%	3,8%
Rented	0,0%	6,1%	2,4%	0,0%
14. Does it generate income?				
	Japata	Chepchoina	Vamia	Habitat
Yes: Grow crops for family	36,7%	28,6%	63,4%	66,0%
Yes: Grow crops for family and Selling	2,0%	18,4%	14,6%	18,9%
Unknown	59,2%	22,4%	22,0%	1,9%
No	2,0%	30,6%	0,0%	13,2%

3.2. Questions on current housing

Ownership in the communities differentiated substantially (see figure 7). The Japata community did not own the land they lived on and were mainly workers of the Japata ADC farm. The community had an almost equal ownership and renting division. However, as they do not own the land it is questionable to what extent they were allowed to live there. The Chepchoina almost entirely consisted of renting residents (>95%) and therefore the majority had no land rights. The opposite was the case with the neighbouring Famia community. Here, the majority (>70%) owned both land and house. Despite the differences in these three communities, the vast majority (>90%) of their households lived in wattle and daub houses (mud houses) even though Chepchoina and Famia on average had a much higher income than Japata. Even renting did not seem to enable households with an (average) higher income to live in an 'improved' house, which could be explained by two factors: availability of brick houses and fluctuations in income. The latter could be due to the fact that 70-80% of households in these communities had seasonal/unstable jobs. The Habitat community was quite the contrary to the other three communities. Here, the land was privately owned, however, via a collective landownership structure. Considering the height and the stability of their income they were the only community who had the financial capacities to afford a brick house.

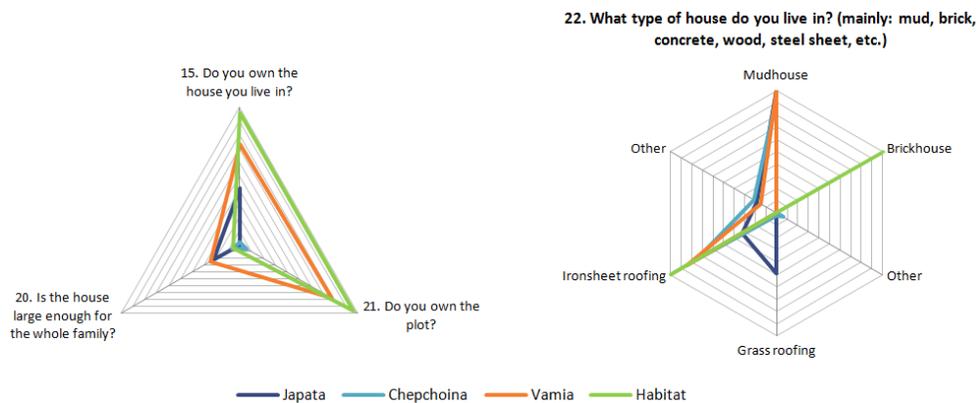


Figure 7. Left: House ownership and Land ownership, Size suitability; right: Type of current house (other represents all other mentioned materials).

Although the Habitat community lived in brick housing, they had insufficient living space for the entire family, which was also a main problem for the other communities (see Figure 8). As previously mentioned, the majority of the households had between 0-7 children. With housing sizes varying between 5,7 to 13,7 square meters this confirms the lack of living space.

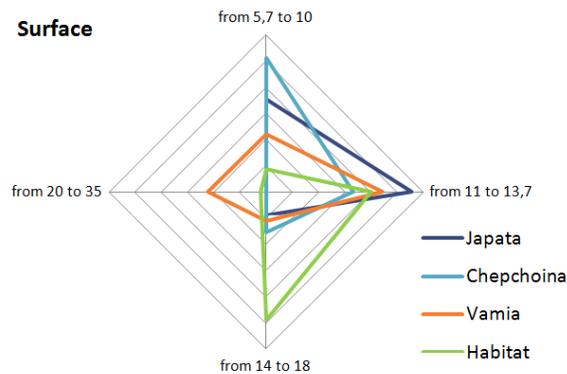


Figure 8. Surface of current house

In the case of Japata and Famia the majority of the materials (75-100%) were not paid for but were collected. The only costs made were to for covering transportation.

Table 3 shows the large amount of natural materials used in constructing current housing, which made the materials affordable, especially amongst the communities with a low income.

Table 3. Material cost & availability

If yes: a. Did you have to pay for the materials or are there other ways of collecting/ acquire these materials				
	Japata	Chepchoina	Vamia	Habitat
Pay	14,8%	0,0%	0,0%	100,0%
Free	7,4%	14,3%	0,0%	0,0%
Collected	14,8%	4,8%	0,0%	0,0%
Collected and paid for transportation	63,0%	19,0%	100,0%	0,0%
N/A	0,0%	61,9%	0,0%	0,0%

25. Are those materials local natural resources (e.g. mud or straw) or Manufactured (e.g. cement, iron sheet)?				
	Japata	Chepchoina	Vamia	Habitat
Natural	100,0%	78,3%	90,0%	0,0%
Industrial	0,0%	21,7%	10,0%	0,0%
Both	0,0%	0,0%	0,0%	100,0%

Looking at the self-built practice (see Figure 9) especially in Japata and Famia this influences the maintainability of the house. The opposite happens in the Habitat community where more than 90% is not able to maintain the house by themselves. A more worrying trend seems to be the ability to afford maintenance in case income becomes low or stops altogether. The Japata community actually has the most positive score in this section. Here, over 65% of the households think they will be able to pay for the maintenance on the house, due to the availability of materials.

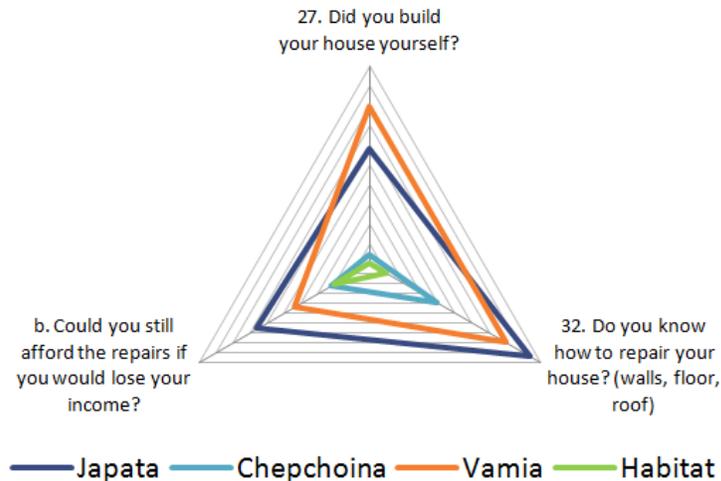


Figure 9. Self-build practice, repair ability and affdance

Although the capacities and living situations differ strongly, they all resulted in a dissatisfaction on the current housing (Figure 10). The Habitat community seemed a little more content with their current house, however, >80% still preferred to build the house differently. When asked why, the majority answered: due to the lack of funds, which has a strong relation with the type of materials, tools and skills they would have preferred to build with (>80%). Moreover, when asked if they would have known how to build this house by themselves, more than 64% of all respondents did not think they would be able to do so.

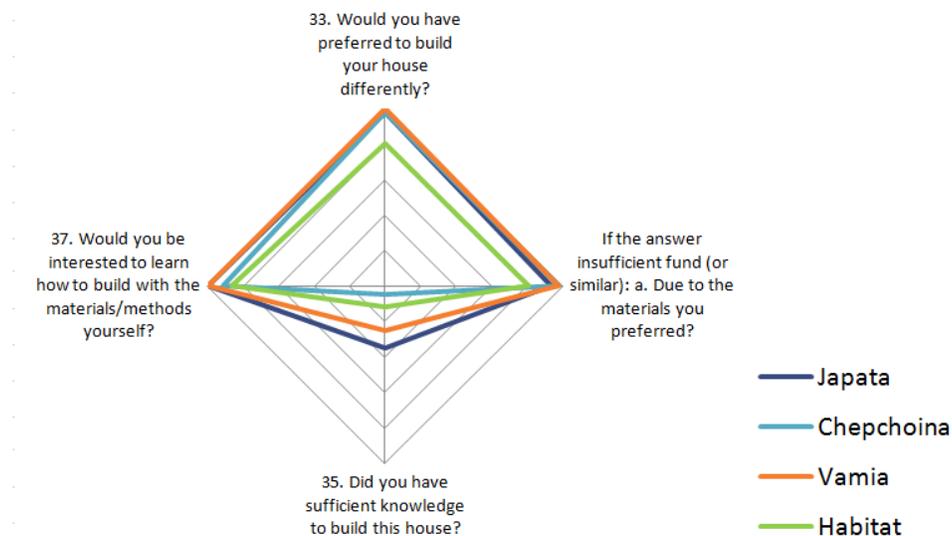


Figure 10. House preference, sufficiency of funds, building knowledge and willingness to build by oneself

The last question on the housing inquired if the inhabitants would have been interested to learn how to build their desired house. However, they answered that they did not have the funds to afford such materials. Although the willingness to self-build desired housing is high, it remains questionable to what extent inhabitants could actually be trained with materials they can't afford, which they do not have the tools for and would require substantial vocational training to learn. Such an extensive training would be difficult to teach in a short time, moreover, it would jeopardize the already vulnerable income situation of the families.

The survey results on current housing show that the majority of the households live in extreme poverty and their income fluctuates. They mainly live in wattle & daub-based houses and are generally too small in relation to their family size. That the two communities that built their own houses can repair the house by themselves and that they could afford them even if their income decreases. In their case resulting to relative high levels of self-reliance, which is opposed by the communities who did not build the houses by themselves. However, all communities would have preferred to build their houses differently and lack the knowledge to do so by themselves.

3.3. Paradox of the roofing sheet

A small section of the survey focused on a previously made observation in the area by the author. Here, the houses built with thatch seemed cooler during the day and warmer during the evening, which the opposite was the case with iron sheets (see Figure 11). When it rains the roofing-sheets produce a lot of noise in comparison to the thatched roof. Despite those obvious disadvantages the iron sheets are still the desired roofing finish. Therefore, to better understand the motives of inhabitants a short section was included in the survey.



Figure 11 (left to right): roofing sheet Chepchoina, thatched roof Famia

Figure 12 shows the results on the current housing (left image). With the majority of the communities having roofing sheets (Japata >32%, Chepchoina, Famia & Habitat 75-100%) they had sufficient user experience to reflect on the effects of using the roofing sheet. Results show that the majority of the households found the roofing sheet radiating heat when the sun is shining (>90%) and making noise during rains (50-95%), confirming the initial observation. Despite these disadvantages the majority of the household still uses roofing sheets. Which could be explained by the fact that the majority does not know any cheaper alternatives (50-90%). The respondents did point out that thatched roofs were an alternative. Respondents admitted that those alternatives would react better to sun (50-90%) and rain (80-100%). However, the majority of the respondents did not know any alternative roofing solutions.

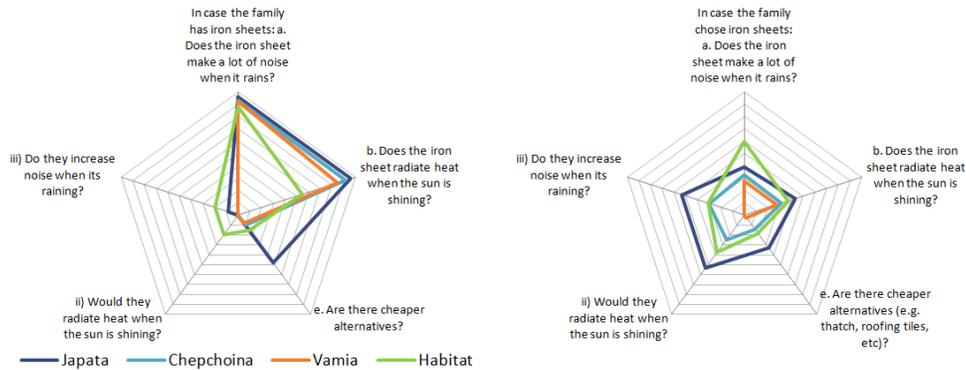


Figure 12. Left: Opinion about existing roofing sheet; Right: Opinion about desired roofing sheet

The same section and questions were repeated at the end of the survey, just after the section about desired housing. Here, between 70-90% of the households (figure 11, right image) answered that they preferred using iron sheet roofing. When asked if the iron sheets made noise during rain or radiated heat when the sun was shining, the answers were quite the opposite to their current housing. Here, the majority of the households (rain noise: 40-70% & sun radiation: 55-70%) stated that the iron sheets do not have this effect. In the interviews many households stated that the main reason for lacking cheaper alternatives was the difficulty they had in finding grass locally. Due to this shortage people started to sell grass as a building product. The available 'free' grass has to come from such a distance that the transport costs are almost equal to buying roofing sheets. Moreover, in their opinion the grass roofing required more maintenance and leaked more often. Other reasons for preferring roofing sheets, were its characteristics such as: fire resistance and insect-proof.

(Adjustment 3). These findings suggest that the inhabitants do understand material characteristics. However, they prioritise differently choosing materials in current and desired housing situation. Even though they can list the negative aspects and the unsuitability in accordance to their current capacities, they still prefer roofing sheets.

3.4. Questions on the desired house

The questions in the third section of the questionnaire focused on desired housing. In the Japata and Chepchoina community respondents would all have preferred to own both their house and land. On average 95%-100% of all the households would have preferred to own the house and the land they live on (see Table 4).

Table 4. Desired house/land ownership.

39. Would you prefer to own or to rent the house?				
	Japata	Chepchoina	Vamia	Habitat
Own	98,0%	100,0%	100,0%	100,0%

Rent	2,0%	0,0%	0,0%	0,0%
44. Would you prefer to own a plot or rent a plot?				
	Japata	Chepchoina	Vamia	Habitat
own	100,0%	97,9%	100,0%	100,0%
rent	0,0%	2,1%	0,0%	0,0%

When asked which materials they would have preferred to build their desired house from (see figure.13) the majority chose bricks (45%-75%) and iron sheets (70%-95%). Most households stated that these preferred materials were perceived as expensive (see Table 5).

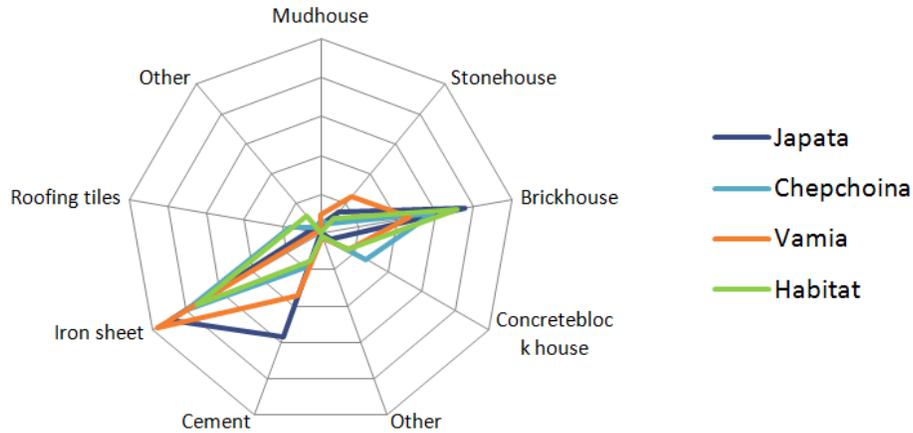


Figure 13. Preferred materials, material costs (other represents all other mentioned materials).

Figure 14 shows that the inhabitants preferred to build the house by themselves (75%-95%) and if they couldn't or wouldn't build the house themselves, they would need to hire labour (90%-100%). Japata and Vamia thought that their community would help most of them in building the house (>95%), which in Chepchoina (mainly renting) and Habitat (formed community) was quite the contrary. It could be argued that these communities are differently organised and therefore inhabitants are reluctant to help each other. Which is strange considering the fact that the habitat community owned the land communally. What is very worrying, is that three out of four communities would not be able to make house repairs when they would lose their income.

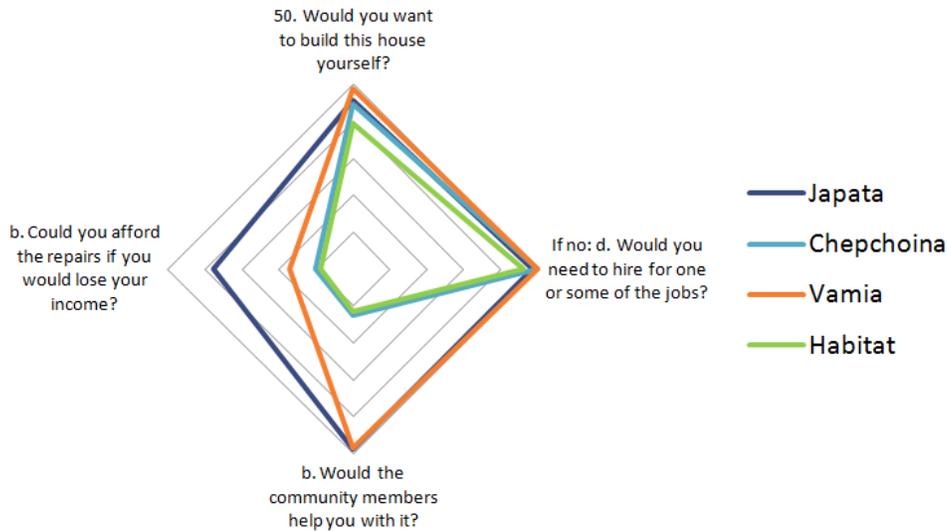


Figure 14. Self-build preference, community help and affordability

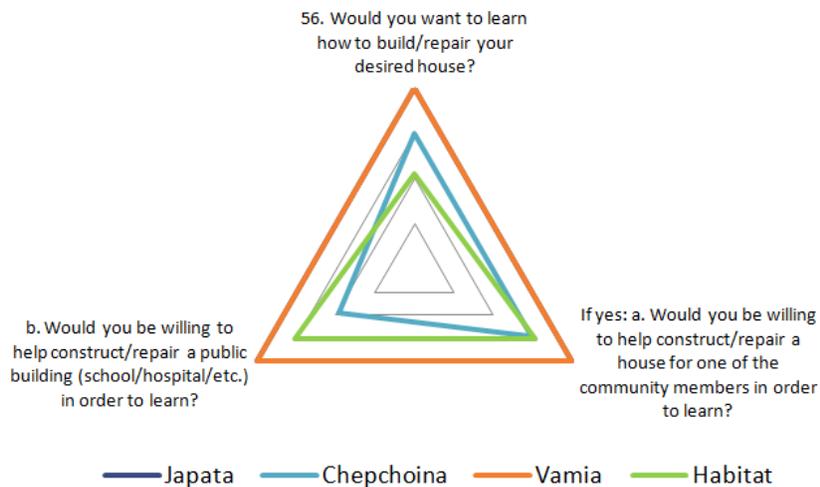


Figure 15. Repair preference house, help of community members and willingness to build community infrastructure

The willingness to learn how to build desired housing was very strong (see figure 15) amongst all households: 95%-100%. Although in some communities there were doubts if community members would be willing to help build a new house, almost all households were willing to help (95%-100%) a community member if they could learn how to build in return. What might be even more interesting is that again the vast majority of the households were willing to help constructing a public building in order to learn how to build in an 'improved' way.

This last section of the outcomes confirms the findings of section 3.3. Inhabitants prefer materials the majority can't afford, and desire houses they can't build by themselves. Resulting in houses they can't repair and can't afford to repair in case their income decreases. However, there is a high willingness to learn, although is impossible without a full vocational education in construction. Even if they could be trained to self-build their house, they wouldn't have the financial capacities to afford the desired materials and required transport (see section 3.1).

4. Conclusion

This study had three goals, firstly to prove that the communities on Mt. Elgon struggle to articulate improved housing by themselves. Secondly, that there is a disparity between their current capacities and required capacities for articulating improved housing. Thirdly, that they lack knowledge on alternative solutions that would meet current capacities and would require external help to articulate suitable housing solutions.

The survey results show that the majority of the interviewed households were living in small wattle & daub-based houses, often in challenging financial conditions (below international poverty-line). That, even though the households know which housing they desired, they lack the financial and knowledge capacities to do so. Confirming that the communities on Mt. Elgon indeed struggle to articulate improved housing by themselves.

The majority of the interviewed households have more than sufficient financial and knowledge capacities to build traditional (wattle & daub-based) housing by themselves. Furthermore, that wattle & daub-based housing was a communally practised building method, which the families had the required tools and knowledge for. However, that almost all households desired a different type of housing. Confirming that there is a disparity between the capacities required for their desired housing and their existing capacities.

The survey showed that the inhabitants lack knowledge on alternative building solutions. Section 3.3 exposed inconsistencies on how inhabitants prioritise building solutions according to their environmental suitability in relation to their existing capacities. Exposing major threats and vulnerabilities if inhabitants continue housing development without professional support. Moreover, that inhabitants would not be able to articulate alternative building solutions without a substantial knowledge base, which makes the formulation of 'improved' or 'desired' housing by the inhabitants themselves difficult. Despite what the research shows, that there is a high willingness to build or to learn to realise housing by oneself, help each other and/or help to build community infrastructure.

For these reasons this research concludes that there is a need for external help that can help inhabitants to mediate between desired and alternative building solutions. Moreover, that this external help needs to consider current and future inhabitant capacities in articulating building solutions. Not only to prevent a disparity in capacities, but more importantly to sustain or increase the family's self-reliance towards their housing.

5. Recommendations

Although the investigation confirms that the communities require external support in articulating improved housing, additional research is essential. This research would need to focus on retrieving more detailed information on inhabitant reasoning, motivation, and decision-making processes in relation to their current and desired housing.

As the overall research intends to articulate applied support which helps Mt. Elgon families to realise improved housing, it is recommended to include an in-depth interview with the inhabitants, where family members can elaborate on the problems, they experience in securing an improved housing and what they require to enable them. The mismatch in capacities between current and desired housing is a vital factor in articulating self-reliant improved housing, which should be evaluated, discussed and addressed within the articulated support.

Due to the high willingness of the communities to learn to build using improved housing solutions by themselves, this should be a crucial factor of the articulated support. As some inconsistencies have been noticed in the reasoning of the inhabitants it would be important that inhabitants participate in the decision-making process however supported by external help.

For measuring the impact of the articulated support, it is recommended to conduct a separate interview cycle which helps comparing current and desired housing before the experiment with articulated improved housing after the experiment.

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8. Attachment A

Attachment A_Inhabitant dwelling capacity evaluation on Mount
Elgon_questionnaire_instructions.docx

9. Attachment B

Attachment B_Inhabitant dwelling capacity evaluation on Mount
Elgon_questionnaire_guide_English.docx

10. Attachment C

Attachment C_Final Questionnaire Swahili - Google Forms.pdf

11. Attachment D

Attachment D_Dataset_Mt Elgon Survey_2017.xlsx