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ANALYSIS OF HOUSING AFFORDABILITY AND THE IMPACT OF HOUSING STRESS ON WELL-BEING

IN THE CASE OF SELECTED BLOCKS OF YEKA ABADO CONDOMINIUM
ADDIS ABABA.

BY

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HOUSING STRESS ON WELL-BEING:

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ADDIS ABABA.

MASTER'S THESIS

A thesis submitted to the Ethiopian Institute of Architecture, Building Construction, and City Development (EiABC) Postgraduate Program Office in partial fulfillment of all requirements for the Degree of Master of Science in Housing and Sustainable Development.

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This thesis is submitted to the Graduate Programs Director of the Ethiopian Institute of Architecture, Building Construction and City Development (EIABC), Addis Ababa University, in partial fulfillment of the requirements for the Masters of Science degree in Housing and Sustainable Development

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I declare that this thesis is prepared for the partial fulfillment of the requirements for the degree of Masters of Science in Housing and Sustainable Development entitled "ANALYSIS OF HOUSING AFFORDABILITY AND THE IMPACT OF HOUSING STRESS ON WELL-BEING: IN THE CASE OF SELECTED BLOCKS OF YEKA ABADO CONDOMINIUM. ADDIS ABABA. is my original research work. It is prepared independently by my own effort with the close advice and guidance of my advisor. I also declare that this thesis has not been presented at any university and all sources that I have used or quoted have been indicated and acknowledged by means of complete references.

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CONFIRMATION

The thesis can be submitted for examination with my approval as an institute's advisor.

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Abstract

Most researches indicate that despite several efforts to reduce housing demand in Addis Ababa, Ethiopia, the housing price, rent, and mortgage prices are considered beyond the capacity of the many city dwellers. For this clear reason, affordable housing in all tenure types is considered unattainable in many cases of households. Some research indications seem that housing stress is affecting the well-being of citizens. This research investigates beyond the observations and through scientific analysis of housing affordability to determine the scale of housing affordability stress as well as the well-being of selected neighborhoods in Yeka Abado Condominium. To reach a considerable conclusion, the methodology employed includes housing affordability measurements (ratio methods), adequacy and compatibility questionnaires, analysis of the relationship between the housing affordability stress and wellbeing, RAND SF-36 internationally accepted questionnaire is used. To further analyze longitudinal affordability additional interviews are employed. The main result of the study shows that housing unaffordability in all tenure types shows that an increased *housing expenditure* decreases *well-being outcomes*. Overall, 75% of the residents' dwell in units that are unaffordable, inadequate, and incompatible with their needs. similarly, 45.7% for rental tenure, 38.5% for mortgage tenure, and 10% for ownership tenure housing stress was recorded. Based on the relationship of housing stress and well-being mental and social functioning have been affected by housing stress. The study further forwarded that the housing affordability issue is more complex than economic affordability. The paper also indicates that those different aspects of affordability affect the well-being of dwellers. economic affordability must be considered thoroughly by all target groups and tenure types (both the owner and tenant). Furthermore, existing beneficiaries of the IHDP program should get strategic relief and an alternative affordability housing ladder.

Keywords: housing stress, affordable housing, wellbeing, adequacy, compatibility

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ABBREVIATIONS

AHI	Annual Household Income
AHP	Analytical Hierarchy Process
AHURI	Australian Housing and Urban Research Institute
BCE	Before The Common Era
CCD	Country Club Developers
COPRAS	COmplex PRoportional Assessment
DIR	Debt to Income Ratio
EPRDF	Ethiopian People's Revolutionary Democratic Front
GDP	Gross domestic product
GIS	Geographic Information System
IHDP	Integrated Housing Development Program
HPIR	Housing Price to Income
ILO	International Labour Organization
MCDM	Multi Criteria Decision Making Method
MCS	Mental Component Summery
MDF	Medium-Density Fiberboard
MPP	Mobility Probability Plot
MSE	Micro and Small Enterprises
MWUD	Ministry of Work and Urban Development
NCD	Non-Communicable Diseases
NDP	Neighborhood Development Plan
OSM	Open Street Map
PASDEP	Plan for Accelerated and Sustained Development to End Poverty'
PCS	Physical Component Summery
PIR	Price to Income Ratio
PP	Property Price
QOL	Quality Of Life
RIR	Rent to Income Ratio

SBS	Sick Building Syndrome
SF-36	The Short Form 36 Health Survey Questionnaire
TOPSIS	Technique for Order of Preference by Similarity to Ideal Solution
UN-HABITAT	The United Nations Agency for Human Settlements
UN	United Nation
VOC	Volatile Organic Compounds
WHO	World Health Organization
YAC	Yeka Abado Condominium

LOCAL TERMS

Birr	currency name of Ethiopian money.
Ekub	a cultural saving system in Ethiopia
Edir	funeral based social institution
Kebele	smallest administration unit in Ethiopia
Woreda	the second smallest administration unit in Ethiopia
Sefer	an Amharic term referring neighborhood
Wakefeta	religious group predominantly exercised by Oromo people

GENERAL NOTES

All tables, figures and boxes without source are prepared by the author.

The calendar used in the whole content is Gregorian calendar.

The photos in the document are all taken by the author.

Ibid: it means referring to a previously cited source with in the same paragraph.

PART ONE: INTRODUCTION

1.1 BACKGROUND

Over the centuries of human existence, our world has been challenged with various challenges until this moment. Today, the current challenges of our planet like climate change, population increase, and conflicts all over the world stand opposing the current generation. In the past century, which is the 20th century, many nations have witnessed the two greatest distractive world wars in human history. Meanwhile, the continent of Africa was struggling to be at liberty against colonial powers after decades of colonialism. Following the two world wars, many European cities were laid into ruins in the course of the war leading to several neighborhoods being bombarded. Post colonially, Africa on the other hand experienced economic stagnation and a very high population increase (Hirsch and Lopes, 2020). Due to this reason, many African cities were characterized by slum urbanism and urban poverty (Mabogunje, 1990). This global housing and city development challenge forced nations and international organizations like United Nation to make considerable attention to improving housing and rise the collapsing national economies of countries through policies (United Nations. Department of Economic and Social Affairs., 2007). Some of the notable policies and goals internationally were included in the Millennium Development Goal, Sustainable Development Goal. Most of those agenda's are characterized by poverty alleviation and improving people's life (ibid).

Despite considerable attention, the problem of urban poverty, urban decay, and slum urbanism passed the 20th century and is still the headache of the 21st century both nationally and internationally. Among those problems, lack of adequate housing and homelessness is considered hot issue among countries. For example, European efforts to rebuild their cities shortfall from fulfilling the current housing demand (UN-Habitat, 2016). While North American countries experience housing deterioration due to aging (UN-Habitat, 2016). Similarly, Africa's economic hardship created impediments to the construction of new housing which fits the current population. As a result, the urban expansion of most African cities is characterized by inadequate housing or slums (Mabogunje, 1990).

Ethiopia as a country in Africa has a similar problem in housing and urban decay. In fact, most of the housing condition in Ethiopia is considered to be slums (Tsion Lema; Richard Sliuzas; Monika Kuffer, 2006). The problem is even prominent in the capital city Addis Ababa, due to the kebele house which deteriorated over the years without maintenance and high population increase both through natural increase as well as migration to the city. Overall, the initiation of government has been minimal in the provision of housing until 2005 (Settlements, 2011). No policy or clear strategies have been apparent in housing development, especially since 1991 (Tadashi and Jonathan, 2015a). Yet, to mitigate this

problem, the government of Ethiopia at that period the Ethiopian people's liberation front (EPRDF) launched a large-scale housing project for low-income groups (Settlements, 2011). The program was called the "IHDP" or integrated housing development program. The program had several integrated goals to be met like job creation that targets urban poverty (ibid). The project builds a condominium housing in different parts of the city. Starting from 2005, the program helped thousands of beneficiaries to have improved housing. Yet many people still wait for the transfer of the houses after registration.

Research in housing affordability is fundamental to addressing the current housing problem and proposing solutions. Several studies are being conducted in many countries to get insight into the current problem of housing. One of the study areas that are getting attention worldwide is that current moment is housing, housing affordability and its impact on wellbeing (Rowley *et al.*, 2012; Nebbitt, 2015; Ganesh *et al.*, 2017; Chung *et al.*, 2019). This paper aims to research affordability in multispectral or different ranges. Some of them include spatial adequacy, compatibility with the household needs and the impact of housing affordability stress on households' well-being. This is essentially motivated by the importance raised by previous scholars that considering housing affordability from economic perspective as a short falling (Hulchanski, 1995), the overall theme of the research is the analysis of affordability, housing compatibility, and housing adequacy of a selected site of the IHDP program. Since the project was aimed for low-income groups, affordability should be post-evaluated for the success of the program.

1.2 MOTIVATION FOR THE STUDY

Residing in the capital city of Ethiopia, it's hard to ignore the hardship people face due to housing problems. Despite the housing type, especially most people in rental houses suffer from housing affordability problem. Several move-outs are common for most tenants. An increase in rental fees is another considerable problem. To fit in the housing ladder, many people prefer to lower their standard of living so that income, workplace, and family fit their housing need. This is not a personal observation only; government bodies and official reports agree with such problems. On the other hand, international researches show that housing affordability is related to decline in well-being. While in the case of Addis Ababa, this experience is not well documented, studied, and verified adequately to make a policy change or a policy support. Thus, this research is inspired by the experience of many dwellers in Addis Ababa city who struggle with housing affordability problems as well as international publications on housing affordability and well-being outcomes.

1.3 STATEMENT OF THE PROBLEM

The meaning associated with owning a home is beyond just a shelter in the Ethiopian community. It is a means of expression of status, a measure of success, or luck if he or she is a beneficiary of the IHDP program (Tadashi and Jonathan, 2015b). This is due to the housing affordability problem in Addis Ababa both in the rental as well as in ownership tenure. The demand in the city of Addis Ababa is increasing (Settlements, 2011), supply is far from meeting the demand. On the other hand, rental prices are rising. It is common to hear the city dwellers of Addis Ababa complain about the unaffordability of units or several move-outs in search of adequate and compatible units (Tadashi and Jonathan, 2015b). The program which aimed in solving the housing problem, the IHDP program is criticized by many researchers for not targeting low- and middle-income groups as intended (MEKONNEN and A, 2017). For this reason, many beneficiaries report that they rented out their units to pay their monthly mortgage (ibid).

Thus, the general housing affordability problem in Addis Ababa lacks scientific research. Many of the studies which are made lack adequate measurement and the use of adequacy and compatibility. The researchers claim a vast generalization without measurement or only using an economic aspect of affordability (Keffa, 2014; Weldesilassie and Gebrehiwot, 2017).

Furthermore, the relationship between housing affordability stress and well-being has been studied in some countries like China, Australia and Canada has shown some relationships (Rowley *et al.*, 2012; Rahman, 2014; Chung *et al.*, 2019). But the strength of the data lacks further research in different parts of the world. Similarly, in the case of Addis Ababa, integrating affordability analysis with proper measurement and relating it to the well-being outputs of dwellers is crucial in both national as well as international housing studies. Thus, the researcher has not come across such a study in the context of Addis Ababa.

1.4 OBJECTIVE OF THE STUDY

1.4.1 GENERAL OBJECTIVE

The general objective is to assess the housing affordability levels of Yeka Abado Condominium and correlate Economic affordability with spatial adequacy and compatibility of household needs. to get the comprehensive affordability problem. and finally, establish the relationship between housing affordability stress and well-being.

1.4.2 SPECIFIC OBJECTIVE

The specific objectives are:

- To analyze the rate of housing affordability problem
- To study the relationship of housing's spatial adequacy of the units with the dwellers
- To study the relationship of compatibility of the units with the dwellers
- To study housing affordability stress by age, family size, and type of occupation (type of income generation activities)
- To Analyze general well-being including physical, mental, and social functioning, and the link with housing stress

1.5 THE RESEARCH QUESTION

In the formulation of the research questions, several aspects were taken into consideration. One of them is previous literature on the housing shortage and the IHDP program. Many scientific (MEKONNEN and A, 2017; Yohannes and Dinku, 2018) works of literature show that housing affordability is a challenge in Ethiopia, whereas the IHDP program which aimed in providing affordable housing has fallen short despite being promising for a long time. Thus, it became a likely situation that clear affordability stress has could occur in the neighborhoods of the IHDP program. Due to this reason, the first research question came into being.

- a. What is the extent of the housing affordability problem in Yeka Abado condominium selected blocks?*

Understanding the extent of the affordability problem of a given study area is required to determine housing affordability stress impacts. Using quantitative methods, several measurements exist to measure housing affordability problems and the financial stress households experience. Which are discussed in the literature part of this research.

- b. What is the level of Housing's spatial adequacy and level of compatibility with the households Yeka Abado condominium selected blocks?*

Even though, quantitative figures clearly show either the existence or the absence of housing stress, a clear understanding could only be found with the consideration of spatial adequacy and compatibility

of units. Otherwise, the conclusion from an economic perspective only decreases the reputability of the existence or absence of the housing affordability problem within a given area. This argument leads to the second research question.

A housing space that is not adequate spatially to the household activities could not be considered affordable. Similarly, the compatibility of units with the household's emotional, physiological, and social activities cannot be considered to give a full prospective of affordability. Considering only the financial stress without the spatial adequacy and compatibility measurements will short-fall to explain what is going on in a given household.

c. What is the well-being impact of housing affordability stress in the case of Yeka Abado condominium selected blocks?

After following a critical road in measuring housing affordability and the existence and absence of housing stress, it is crucial to analyze the well-being impact of housing stress. Many international journals have published several pieces of research demonstrating the well-being impact of housing and affordability stress (Rowley *et al.*, 2012; Nebbitt, 2015; Ganesh *et al.*, 2017; Chung *et al.*, 2019). Those researches show mental health issues whereas some show social and physical problems related to housing. Yet no established research exists on the topic of well-being and housing stress in the Ethiopian context.

1.6 GAPS IN KNOWLEDGE

There exists a very well-established literature on housing, housing affordability, housing affordability measurements (Hulchanski, 1995; Rowley *et al.*, 2012; Nebbitt, 2015; Wrenn, Yi and Zhang, 2019). In the case of wellbeing and housing there is also substantial number of studies conducted in different countries. But in the issue of the use of household compatibility and spatial adequacy of units as a variable in housing affordability measurement, there is a huge gap to on such use of methodology. Yet, scholars like (Rowley *et al.*, 2012),(Hulchanski, 1994),(Hancock, 1993) has successfully shown that consideration of housing affordability from the prospective of economic aspect is limited in explaining housing affordability.

The second gap is, as seen in the literature, subjective definitions of key terms such as affordable housing, well-being or health, adequacy and compatibility are diverse and sometimes overlapping. From the literature reviewed a well-established, universally acceptable definition could not be formed.

Thirdly, In the case of Ethiopia, a detailed and in-depth research in housing affordability could not be founded. A few researches exist on the topic of housing affordability in the IHDP program, yet they tell as to little about the problem.

1.7 SIGNIFICANCE OF THE STUDY

Several studies have been made on the affordability of condominium housing with different perspectives in observance (Tadashi and Jonathan, 2015a; MEKONNEN and A, 2017). Generally, most of them focus on abilities to pay for the units. Thus, the problem with such studies is they only show the problems in an economic pattern only. such views have been criticized so many times by many researchers internationally (Hancock, 1993; Hulchanski and Michalski, 1994; Kamete, 2001). Yet, this research aims in enlighten a new perspective on housing affordability stress and general well-being perspective alongside the economic and social status of the households. It also uses almost all of the available resources in measuring housing affordability to better measure and increase the reputability of the findings.

In the case of the Abado condominium, the housing project is part of the IHDP. Being built on the periphery of Addis Ababa city, it was a large-scale project built on previous farmland. As with any IHDP project, it was aimed to be affordable to low-income groups. In such a case, studying the post-occupancy success of the housing is important.

Overall, the significance of the study is:

- Government will evaluate the projects and come up with directions and policies towards new housing development programs.
- Policymakers and academicians will get a new perspective on well-being and condominiums housing.
- Triggers future study on the issue of well-being and housing in general, especially in the context of Ethiopia.
- Helps future developers get a perspective on who affords what.
- Decreases the gap between health professionals, economists, and housing experts to work together to solve the issues of housing.
- This study could be used by banks, and insurance companies to identify affordability for possible housing credit requests for housing.

1.8 SCOPE OF THE STUDY

1.8.1 Spatial scope

The overall study area covers the whole Yeka Abado condominium site. which is found in Addis Ababa, Ethiopia. the site is located in northern part of the city under the previous yeka sub-city and currently under lemi kura sub-city Yet, Due to its size being so large a survey was administered to a smaller sub-neighborhood and a pilot survey is conducted to find suitable and a representing block for the study. In the preliminary process of data, collection selection criteria include, blocks with willing housing associations, blocks occupied before five years, and areas that have a higher percentage of occupancy were selected.

1.8.2 Selection Criteria of The Study Site

The selection criteria are based on accessibility of information. In the case of Yeka Abado Condominium, the researcher has been engaged with the society for quite some time. As a result, the willingness to give information and trust was built and very well established prior to this research. Secondly, as a late project of the IHDP program, less research is investigated on the late projects. Those late projects differ from earlier projects in size, housing typology and location (which some are built in the periphery of the city). As a result, those sites are considered unique among the previous sites.

To summarize the why for YAC, it is based upon ease of access in information, and lack of research on similar study sites which previous typologies have been covered relatively.

1.8.3 Thematic scope

The theme of the research is in the areas of economic affordability, spatial adequacy, compatibility with the dwellers needs, and well-being aspects. Thus, income and expenditure being the core, It analysis willingness to pay for the preferred housing type. In measuring housing affordability, by taking a consideration of adequacy and compatibility of neighborhood and housing units. Social status like gender, age, and occupation are taken into consideration. Finally, it examines well-being by using Short form health survey questionnaire. means of measurements as a tool to yield a clear perspective on the well-being impact of housing stress. Where well-being is understood as mental, physical, and social functioning in Yeka Abado Condominium.

1.9 LIMITATION OF THE STUDY

In the process of studying the topic, the major hurdle was the diverse definition of housing affordability. Over a long period, the definition has changed enormously. Similarly, current scholars do not have a consensus on the definition of affordable housing and its measurement. This was a greater deal to select the appropriate method. In the context of Ethiopia, there is no sufficient literature made on how to measure affordability, housing stress, housing adequacy, and housing compatibility. The other methods of measurement seem to lack in measuring housing affordability in different geographical locations.

The other limitation is due to the rise of the COVID-19 pandemic many households hesitate to interview. On the other hand, some of the dwellers are not available during the daytime, and surveys were forced to be made on weekends which limited the number of surveys to be completed. The other problem was economic questions are considered to be private and many households refuse to tell their monthly income and expenditure.

Nationally, in 2020/21 the political heat in several parts of Ethiopia made many dwellers suspicious of the data collection and reason. Many people refuse to give information by creating their own.

As a result, of those mentioned limitations, the data collected were centered to a certain block only, despite the initial aim was to cover the whole Yeka Abdo condominium. Similarly, as a result the limitations the data collection time took longer period.

1.10 ORGANIZATION OF THE RESEARCH PAPER

This research paper has seven chapters each chapter is ordained to support research claims and understandably display research results. Thus:

CHAPTER 1 INTRODUCTION: in this section of the research general description of the research is presented. Some sections are the research question, statement of the problem, significance, and objectives of the study, and the overall scope and limitations of the research are presented in detail.

CHAPTER 2 METHODOLOGY: this methodology section of the research contains and explains the method of choices made to carry out the research. Its subsections contain the research design section, method of choice, source of data, type of data collected, and interpretation and ethical considerations.

CHAPTER 3 LITERATURE REVIEW: is a scholarly review related to the title. In general, this section aims in providing adequate background information and previous scholarly work. In general, the literature review is aimed only at giving a conceptual framework on related topics.

CHAPTER 5: RESULTS: This is one of the main parts of the research. In this section, all-important findings will be discussed. Those findings include interpretations of the collected data.

CHAPTER 6: CONCLUSION AND RECOMMENDATIONS: based on the results in chapter five Policy and related recommendations are discussed in this part of the research. The recommendations integrate international experiences and are based on interpretations of the previous chapter.

PART 2: RESEARCH METHOD

2.1 INTRODUCTION

To get good familiarity with the research topic and undertake the research phenomenon properly employing a good research methodology is important. To display appropriateness and clarify the chosen method used in this research, this chapter came to being to explain the different kinds of methods and methodologies used to reach and hit the objectives and answer the research question. Thus, the chapter includes choice of method, the research design, source of data, instruments of data collection, method of data interpretation, sampling technique and selection of the study site.

2.2 THE STUDY AREA

The selected case is found in the northeastern part of Addis Ababa. In the newly formed Lemi Kura sub-city. The site is found on the outskirts of the city of Addis Ababa, where the regional state of Oromia, the town of Legetafo is considered to be a neighbor. In a few kilometers' wealthy, high-income gated communities of CCD and Ropak real-estate are found. On the southern part of the condominium site, a similar condominium site is found

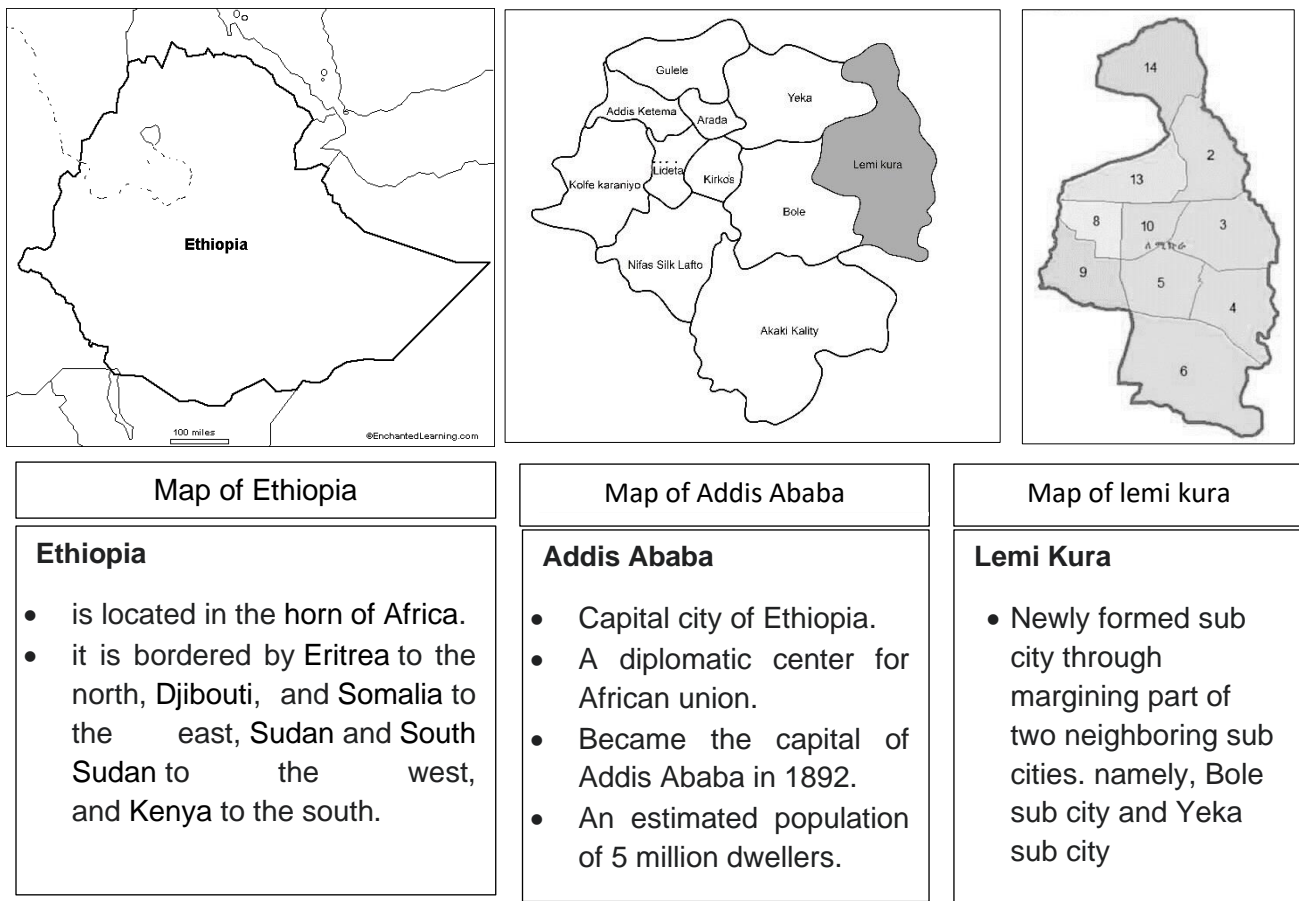


Figure 1: location map and description of the study area source: Aca

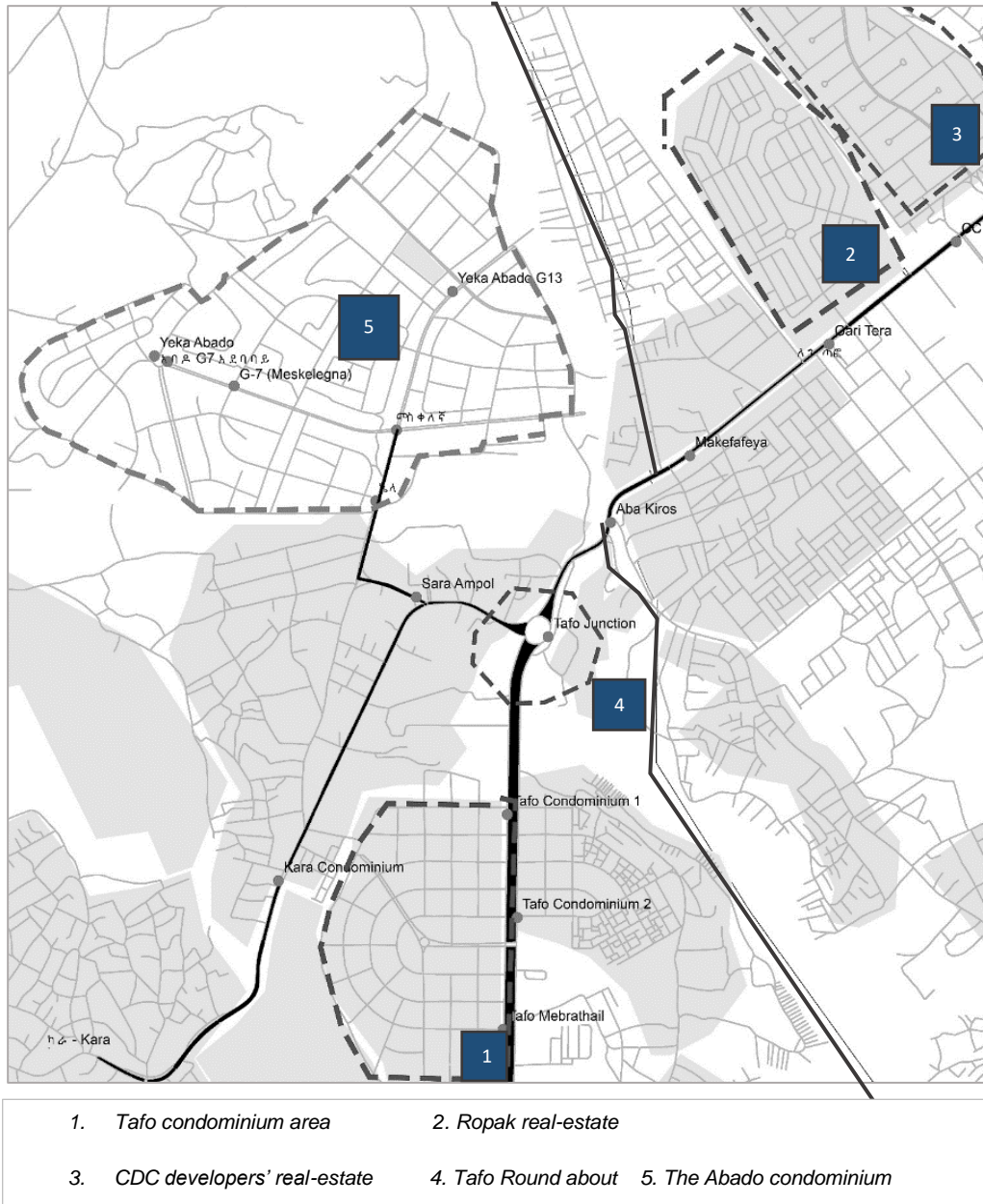


Figure 2:location of the study site: source: OSM

2.3 THE NEIGHBORHOOD AND THE HOUSING

The neighborhood is planned in a way that the social amenities uniformly reach to all inhabitants. For this reason, the neighborhood is segmented into sub-neighborhoods. The sub-neighborhoods are

future divided into urban blocks and parcels¹. within the compounds of the condominiums, a communal building is built for the purpose of providing local social meetings and communal activities.

In general, the neighborhood could be understood as a conscious design decision made in the design stage. While the condominium houses are designed with several typologies. Most of the floors are typical. While most street-facing housing blocks² have a ground floor dedicated to shops and services.

The list of the typologies in the selected study area is listed below.

Typology	Number of floors	Area	Household per floor	No of one-bed unit	no two-bed unit	No of three-bed unit	No of studio unit
E-1	G+5	305 m ²	6	12	0	12	12
E-1 +G (co.)	G+5	305 m ²	6 ³	10	0	10	10
A-1	G+5	290 m ²	6	12	12	0	12
A-1 +G (co.)	G+5	290 m ²	6 ³	10	10	0	10
A-2	G+5	304 m ²	4	12	0	12	0
A-2 +G (co)	G+5	304 m ²	4 ³	10	0	10	0
E-2	G+5	235 m ²	4	10	10	0	0

Table 1: typology data (source: from site's CAD file)

2.4 General description of Yeka Abado Condominium

The yeka Abado condominium is one of the late project sites in the IHDP program. Being transferred in 2009, the Abado condominium is built for 18336 households. The project consists of several typologies. Some of those typologies are a g+5 commercial ground floor and a pure residence. There are also G+7 both pure and mixed residential typologies. The blocks are built dispersedly and intend to provide enclosed internal green areas, parking lots, and playgrounds. Within the compounds, there is a communal building that serves for social gatherings and some other services live abattoir and storage space.

¹ The term urban block is used to avoid confusion with the condominium block or building itself.

² The term building block is meant to be the condominium building itself not the urban block

³ The ground floor is an exception, which is 100% commercial.



Figure 3: G+5 condominium typologies in YAC



Figure 4: G+7 typologies condominiums in YAC

2.5 SOURCE OF DATA

In general, it is known that data may have two sources. One being primary source of data and secondary source of data. This research also used both sources to solve the research question.

Previous literatures: like any other research this paper is based upon previous works of other researchers. To get sufficient background and to avoid redundant work previous papers worldwide were used.

Site map and neighborhood layout: as a secondary source of information, these maps and layout were found from the city's municipality. They were used to measure areas of the neighborhood, identify typologies and floor plans of the selected sub-neighborhood blocks.

Satellite maps and GIS data from OSM map: as a secondary source and supporting data, GIS maps were used to map travel distances of dwellers, prepare a location map for the study area. The most commonly used sources are Google map and Open Street Map.

Pictures taken from the site: pictures were used to capture observations relevant to the research. Some of the pictures taken are presented in the annex.

Interview with officials: as a primary source and as a crucial part of the study, interviews are used in both preliminary stage of data collection as well as during the data collection. Interviews are also conducted to get a perspective in dwellers housing life story. The aim of the interviews was in the intentions of getting key information related to the research title or selection of the study site.

2.6 METHOD OF DATA COLLECTION

1. Questionnaire

Both internationally accepted standard questionnaires as well as customized questionnaires were used for the overall study. Several questions are closed ended and a comparable number of questions reside to open ended questions with the choice to answer the question or not to answer the questions.

In general, the main source of data in this research is questionnaire. The questionnaires are divided into three categories.

- a. Wellbeing related:** both mental and physical wellbeing are experiential. This makes health related questions fall short of explaining in acceptable manner across different researches. To solve this problem, standardize international questionnaire is used.

The international reputed questionnaire used in this research is Short Form-36 (SF-36). SF-36 is a tool used to describe quality of life (QOL) and general wellbeing. The tool has eight scales within it. Those include "physical functioning, physical role, pain, general health, vitality, social function, emotional role, and mental health."

- b. Economic related:** in the study of housing stress and affordability income and expenditure are important. Income and expenditure are characterized by different patterns and names

across the globe. Following this assertion customized and questions that much the culture of expenditure and income is introduced.

c. Social and personal related: career, age, household size and social interaction question will entertain in this part of the questionnaire.

d. Physical: in general, the housing condition will be assessed in this part of this questionnaire.

The questionnaire was distributed to the different types of owners and tenants.

2. In-depth Interview

A beyond a questionnaire, people may have opinions and ideas to be reflected. With unstructured interview, giving only the topic, participants were able to explain experiences and thoughts related to the study. The interview results are then analyzed and interpreted with other data collection methods and as a standalone result.

3. Observation

To understand compatibility and adequacy observation was used alongside the questionnaires and mappings. Social service usage, recreational and entertainment activates were analyzed through observation in addition to interviews.

4. Archival documents and government sources

Government reports, municipality publications, housing related proclamations and similar sources were used in understanding in the process of understanding local contexts. Future more, the documents of previous research were used to avoid re-doing similar research.

5. Document Analysis

Using research papers made internationally, reports released by institutions, books and papers are analyzed, cited and were crucial to develop the theoretical and conceptual parts of this research.

6. Life stories

To get deep insight, into the livelihood of the households, a life story is used to strengthen the qualitative aspect of health, housing stress findings.

2.7 METHOD OF DATA ANALYSIS AND INTERPRETATION

Since the research uses mixed method (both quantitative and qualitative), it is important to select to analysis both methods.

For quantitative data, which is mainly collected from questionnaires and key-informant interview, the primary means of analysis uses elements of descriptive statistics. Those include mean, range, standard deviation and median. Those data are presented by using different charts.

To analysis the relationship between housing affordability stress and wellbeing an inferential analysis method called “linear regression” is used. regression analysis is commonly used to see the cause and effect of variables. in this case, the variables are housing affordability stress and well-being of households. those findings are presented in narrative text as well as charts.

For qualitative data, especially for subject and perceived variables, (compatibility, spatial, adequacy, etc.) the data is presented in Likert scale, life-stories to show the experience of households in relation to housing affordability, narrative texts, summary charts are used to present the data.

2.8 CHOICE OF RESEARCH METHOD

The concept of housing affordability and wellbeing is not merely an absence of finance to cover housing nor is it the quality of housing problem. It integrates both the measurable (quantitative) as well as the unmeasurable (qualitative) aspects. Such used of method is called a mixed method. For example, economic affordability is easily measurable while well-being is directly related to quality of life which is not quantifiable. So, depending on the research questions, it was crucial to use both quantitative and qualitative research methods. As mentioned in chapter one the title of this research Most of wellbeing related questions in this research use qualitative method rather than quantitative methods.

“Quantitative research is based on the measurement of quantity or amount. It is applicable to phenomena that can be expressed in terms of quantity. Qualitative research, on the other hand, is concerned with qualitative phenomenon, i.e., phenomena relating to or involving quality or kind. For instance, when we are interested in investigating the reasons for human behavior (i.e., why people think or do certain things)”

(KOTHARI, 2004).

This research is mainly categorized as case study research. In case study research the use of both qualitative and quantitative data gives the research the richness it needs for reaching a convincing end. For such a reason, using a mixed method is suitable for the research.

“Traditionally, the case study has been associated with qualitative methods of analysis. Indeed, the notion of a case study is sometimes employed as a broad rubric covering a host of non-quantitative approaches – ethnographic, clinical, anecdotal, participant-observation, process-tracing, historical, textual, field research, and so forth. I argue that this offhand usage should be understood as a methodological affinity, not a definitional entailment. To study a single case intensively need not limit an investigator to qualitative techniques.”

(Gerring, 2007.p 10)

The central theme of this research thus measuring affordability uses through merged tools mentioned in the literature review. This is done due to strength and weakness of each method. The two major categories of measurement tools are income ratio method and residual income method. Some of the income ratio method used in this research is:

House price to income ratio: this tool is a better tool in measuring purchasing ability of a household. This tool is used to measure current abilities of household’s ability to own a home.

Residual income method: is a better tool in measuring affordability. This method is used to measure general affordability of the houses.

Rent to income method: since all households are not owners, significant number of dwellers are renting the units from landlords.

Expenditure to income: this method is used to measure pattern of expenditure and proportion of housing expense.

METHODS	USE IN THIS RESEARCH	RATIONALE	REPUTATION
House price to income	Ability to buy a house	Good in measuring one’s capacity to buy a house compared to other methods.	Used by united nations
Loan repayment / Rent to income	To measure affordability of rental units	Significant number of the dwellers are	Used by united nations

		renting from land lords.	
Expenditure to income	Proportion of housing to non-housing expense	Best explains households expenditure pattern	Long history of use yet lacks ability in affordability
Residual income method	To measure housing affordability	Comparatively better to measure household expenditure	Many researchers use this method to measure housing affordability

Table 2: Affordability measurements used in the study (source: author)

2.9 RESEARCH DESIGN

In the realm of academics three major types of research methods are used, those are qualitative, quantitative and a combination of the two called a mixed method. In this case the mixed method is used because of the nature of the topic. The housing affordability stress as clarified in literature review, has a character of both quantifiable as well as quality related aspects.

The initial stage of this research was collecting related research on affordability and housing affordability measurements, challenges of affordable housing, the impact of affordable housing, previous researches on mental wellbeing and physical wellbeing in relationship with affordability.

Secondly, using a mixed method, a survey questionnaire was prepared for the household heads and stakeholders. The questionnaires are both standard and customized questionnaires. In the case of standard questionnaires especially for health-related issues “Short Form-36 (SF-36)” was used. In the case of physical wellbeing “physical component summery (PCS)” and for mental wellbeing questionnaires “mental component summery (MCS) were used. (Ware *et al.*, 1994). Even though it’s important to use internationally accepted standard questionnaires, it will not be adequate to grasp all variables due to differences in contextual aspects around the world. To mitigate this problem custom questionnaires were prepared based on the research questions and aims of the research.

Future more as a third step, interview to households who have been selected from different categories. The aim of selected household interview is to get further information and strengthen the research through collecting additional information from the perspectives of the households or stakeholders.

2.10 TARGET POPULATION

The Abado condominium is constructed to shelter 18336 households. Yet, due to incomplete construction the site is not fully developed. Due to this reason the site was not serving fully as its current situation. The general population consists of home or unit owners (dwellers), tenants, owners without mortgage payments. The population size of Yeka Abado Condominium is more than 54000 dwellers within the condominiums. since the population size is too large, a selected best study sub neighborhoods and blocks were used.

The study targets urban blocks contain 450 households. Those locations are located in the Meskelegna and Asra sost sub neighborhoods.

2.11 SAMPLE SIZE AND SAMPLING TECHNIQUE

Conducting the required sample is labor, time, and finance intensive. And the similarity between parcels of the blocks has been investigated in the pilot study of the research. For this reason and for a detailed study of the case two-block parcels were selected. The selected sites were chosen based on the duration of habitation, through requests made by the researcher, and through recommendations made by the housing administration in woreda 14.

Since the population size is finite, we could determine the size of a sample easily and unambiguously. Yet the problem is the population size is too large. As a result, using a systematic sampling is important .as presented in the data collection procedure below, the process of data collection started with selecting sub neighborhoods and blocks through pilot survey and informant interviews. As per the result of the survey and interview result the target population was determined to be 450 total from selected blocks sites. The. Method of determining sample size uses Yamane's formula. This is due to its standard across researches as well as simplistic and easy understandability.

$$n = \frac{N}{1 + N(e^2)} * 100 \quad \dots\dots\dots \quad \text{equation 1: Yamane's formula}$$

Where: n=sample size N= population size e=level of precision

Following this formula, with confidence level of 95% and margin of error of 5%, Thus, the selected sample size is 140. In the case of sampling, it is obvious that the inclusion of representing participants of the case area. Yet, variables that determine the final output has to be determined as a prerequisite. Based on this assumption variables were determined. The other element is willingness of the households, to insure the quality of data households who aren't willing to give full answer were either

jumped or answers were disqualified for assessment. For this reason, slight intervention has been made to the sampling technique and data collection protocol. Thus, the method used in this data collection is systematic random sampling. Using every k^{th} number of households in the blocks. Based on the method, odd number sequence is used. In each block starting from a house number one then followed by three then five. In case, if the house number is not willing or not available the preceding even number is used. To fulfill the required sample size data without using the sampling technique.



Figure 5: map of selected blocks. source: Addis Ababa city Administration

Location	Area	Number of parcels	Number of condominium blocks	Population size
Meskelegna area	3.43 ha	2	15	350
Asra sost area	1.5 ha	2	5	100

Table 3: sampled site's data size (source: author)

In the systematic samples' method, the protocol of data collection in the selected builds used the “the house number” as a tool. The house numbers starting by odd number are used. in the case of absence of a household head for the questionnaire or unwillingness to give information the next even number is added to the sample. This has completed several times during the process.

The data collection is started within the buildings top floor in case of the block number is odd. In situations where the block numbers are even, the data collection started from the base units of the building.

The starting point of the building, is the lowest block number given by the public. to reach all buildings, the maximum number of households to be surveyed on a single building is set to be 7 households.

2.12 PROCEDURES OF DATA COLLECTION

The first step of data collection is conducting a review of literature, practices related to the research question. The aim of this stage is to understand the topic (the research question) and what others have come across on the topic.

Secondly, it is important in deciding what type of data to collected in the selected case. Make background research on local context, aim of this study is what related papers are established knowledge exists in the local context that could be related to the research questions.

Followed by determining the appropriate methods and tools, this task includes understanding the case area, identifying the sample size, getting permits to data collection, and methods of data collection

The fourth step is collecting the data, in this case through interview, questionnaires, observations according to preplanned procedure. Finally, and the six step is analysis and interoperating the data according to mentioned methods.

The fifth and final step of the data collection is to analysis the results and present it according the research question. This part is the goal of the data collection, in which the data is presented in a utilizable format for conclusion as well recommendation.

2.13 VALIDITY AND RELIABILITY OF THE INSTRUMENTS

To understand and clearly show both a qualitatively and quantitatively, using a proper source is important. In the process of conducting this research adequate attention has been given to the source's legitimacy in both primary and secondary sources of data.

In the case of economic aspects of the research questionnaire, the questionnaires were administered final to avoid unwanted suspicion. Secondly, the economic questionnaire was left to be filled without the names of the dwellers in a separate paper with identification code only. Thirdly, households who do not want to report monthly income were allowed to do not answer the questions. Fourthly, the aim of the questionnaire is briefly described to the participants prior of starting the questionnaire proceeding was determined by the participants themselves. Fifth, suspicious and incomplete questionnaires were filtered by the researcher. Some of the criteria for filtering the questionnaire were:

- Incomplete data
- Extreme difference in income and expenditure
- Unclearly answered questions (ambiguous)

On In the case of RAND 36-Item health survey (version 1) is widely used and reputable in the health research area (Rowley *et al.*, 2012). Comparatively, it has simpler and straight forward method of evaluation compared to MOS SF-36 evaluation which has been distributed by international health care Assessment. Anyone who would like to compare the health out puts of this research must use RAND 36-item Health survey.

2.14 EVALUATION METHOD OF RAND SF-36

WHAT IS SF-36?

the sf-36 stands 36-Item Short Form Survey, while RAND is an institution which is dedicated in to policy and decision making through research. Rand SF-36 is considered a "Medical Outcome Study". It is very well established among the academic society. It is commonly self-administered. The key development of the SF-36 took place in the 1998 in based upon census in U.S. the SF-36 has several versions, after ten years of use, in 1900's update was made in wording. Then it gave birth to SF-36v2 or 36-item short form survey.

The RAND 36-Item Health Survey (Version 1.0) is used in the research. The survey includes eight health concepts (Health *et al.*, 2016). Additionally, there are also questions that perceived change in

health compared to the past year. The scoring process is having two stages. Initially, the data collected must be recoded as given by the tables below.

(Question number) Item number questions	Original response	Recoded value
1,2,20,22,34,36	1	100
	2	75
	3	50
	4	25
3,4,5,6,7,8,9,10,11,12		0
	1	0
	2	50
13,14,15,16,17,18,19	3	100
	1	0
	2	100
21,23,26,27,30	1	100
	2	80
	3	60
	4	40
	5	20
	6	0
24,25,28,29,31	1	0
	2	20
	3	40
	4	60
	5	80
	6	100
32,33,35	1	0
	2	25
	3	50
	4	75
	5	100

Table 4: RAND SF scoring data encoding (Health et al., 2016)

In the second step, an eight-scale health finding is produced through averaging items of the same scale. Thus, the table below summarizes the different health components.

scale	Number of items	Averaged items
Physical functioning	10	3 4 5 6 7 8 9 10 11 12
Role limitations due to physical health	4	13 14 15 16
Role limitation due to emotional problems	3	17 18 19
Energy fatigue	4	23 27 29 31
Emotional wellbeing	5	24 25 26 28 30
Social functioning	2	20 32
Pain	2	21 22
General health	5	1 33 34 35 36

Table 5: target questions and their respective question number source: (Health et al., 2016)

2.15 ETHICAL CONSIDERATIONS

As a general principle the study must follow good ethical standards for the study. Especially on the information given from the study group must be kept secret and no part of them the data given will be public without the permission of the respondents.

Accordingly, every source of this research which require other sources citation is cited and gives acknowledgment to the owner of the publication.

As of participates they have the right to:

- Individual or institutions have the right to confidentiality whenever needed or as per their request. This is also true if they feel threatened or could be harmed in any way.
- Individual or institutions participating in this research can withdraw their involvement at any time before completion of the research.
- They are entitled to know why? And understand aims of the research. And the researcher is obligated to give honest and truthful information to participants.
- Participants must give a clear consent to the researcher before starting the research. And he/she is obligated to ask accordingly.

- These terms of confidentiality must be explained prior to interview or participation

PART THREE: LITERATURE REVIEW

3.1 INTRODUCTION

In this section of the research, A conceptual and theoretical frame for housing affordability, housing stress, and well-being, and their respective relationship to housing affordability is discussed. In the process affordability concept, and the method of its measurement will be discussed. The required knowledge for discussion are presented. These include compatibility and adequacy of housing which are also within the theme of the research's literature.

3.2 DEFINITION OF HOUSING

“Shelter”, which is commonly understood as a basic human need is a generic definition of housing. Yet, Housing does not have a common consensus of definition due to its wide variety of meanings that are associated with different fields of study, and global cultural difference in understanding ‘housing’. To understand housing, it is important to understand the functional and theoretical aspects of housing in the process of defining housing.

Generally, humans are 90 % of the time within interior spaces (McCoy, 1998). For such a case dwelling could have a significant part in human life. Yet scholars like Amos Rapaport argues the initial aim of dwellings were not for sheltering purpose (Lozar and Rapoport, 1970). In support of his argument, he raises the idea of many South American, South-East Asia, and parts of Australia who people live without proper dwelling. Due to this reason, he proposes that building a home cannot be universally considered “Basic”.

Even though it could be argued on the necessity of housing as a universal concept, housing for modern men and women has significant importance. The inability to afford housing in whatever tenure type will create housing stress and homelessness (Wendell Cox, 2021). Housing stress and homelessness are related to bad well-being outcomes and low quality of life (ibid). For modern men and women housing is a place of recreation, procreation, and a place of taking our last breath. In general, most of us cannot think of living without some kind of shelter or interior space. Due to this reason, a complete single word or statement could not be made to define housing (Robinson and Adams, 2008).

Simplifying the issue, Housing is studied in different fields of studies, mainly in architecture, urban planning, sociology, and economics. Due to its multispectral nature housing is defined differently in different study areas.

YEAR	RESEARCHER/ THINKER	DEFINITION OF HOUSING
1776	Adam Smith	“ a commodity”
1817	David Ricardo	“ tangible asset with a return”
1887	William Stanley Jevons	“Fixed asset” regardless of tenure type. (Jevons, 1871)
1890	Alfred Marshall	as a capital that is similar to the machine, if it is operated by a worker, but as a commodity, if it is not operated
1987	Ulf Torgersen	“the wobbly pillar under the welfare state”

Table 6: different scholarly definitions of housing (source: (Stephen, Id and Hoskara, 2019)

Most Architects, urban planners, and housing experts rely on the definition of housing based on John F.C Turner’s definition of housing as a “verb” and as a “noun” (Turner, 1972). This is because the definition approaches both the ‘process aspect’ and the “product aspect”. Both aspects are related to the architect’s and planner’s work. This is because the provisional aspect of the definition easily fits the provisional character within those fields.

Housing as a verb is a ‘process’. It is also defined as ‘what it does to dwellers improvement of life?’. It focuses on the psychological and physical needs of the inhabitants. Housing as a noun is understood as a ‘commodity’ or a ‘product’. As a noun refers to ‘what it is? ‘a built structure’. Materiality and monetary value. In such a case the physical attributes are emphasized (Turner, 1972).

Whereas, the dictionary definition from the oxford dictionary defines “dwelling or houses collectively”, “provision of housing” ‘and” shelter or lodging”.

3.3 CHARACTERISTICS OF HOUSING

By its very nature, Housing has divergent characteristics compared to other needs. Those characteristics include durability, a basic necessity, importance, spatial fixity, individuality, complexity and multidimensionality, dynamism, transaction cost, and information asymmetry (Smith, Rosen and Fallis, 2010).

Durability - unlike food and cloth housing serves several decades. Unless intentional interventions, it could even pass to generations as a dwelling. Dwellings centuries before now can be found in good conditions both serving their inhabitant or as museums and historical facts. In general, housing is one of the most durable human needs.

Several remains of building starting from 8000 BCE can be found in good condition across the world. For example, in the United States, more than 13% of houses were built before the year 1939. This implies more than 17 million houses were built eight decades ago to serve inhabitants. (Schwartz and Willson, 2008)

Basic necessity- the concept of basic need has been impacted by the psychology realm. In the early 1940s, Albert Maslow coined the concept of “hierarchy of needs”. Stated under “motivational” psychology, the hierarchy had five stages ranging from “physiological need” to “self-actualization” (Watson, 2014). Following the concept for decades in 1974, the International Labour Organization in its world employment program coined the concept of ‘basic needs development concept’ was introduced to the world. The report made by ILO used food, cloth, housing, education, and public transport as a benchmark. The concept uses consumption goods as a measurement and focuses on physical wellbeing. In both concepts of basic necessity, housing is crucially understood as “basic” (Watson, 2014)

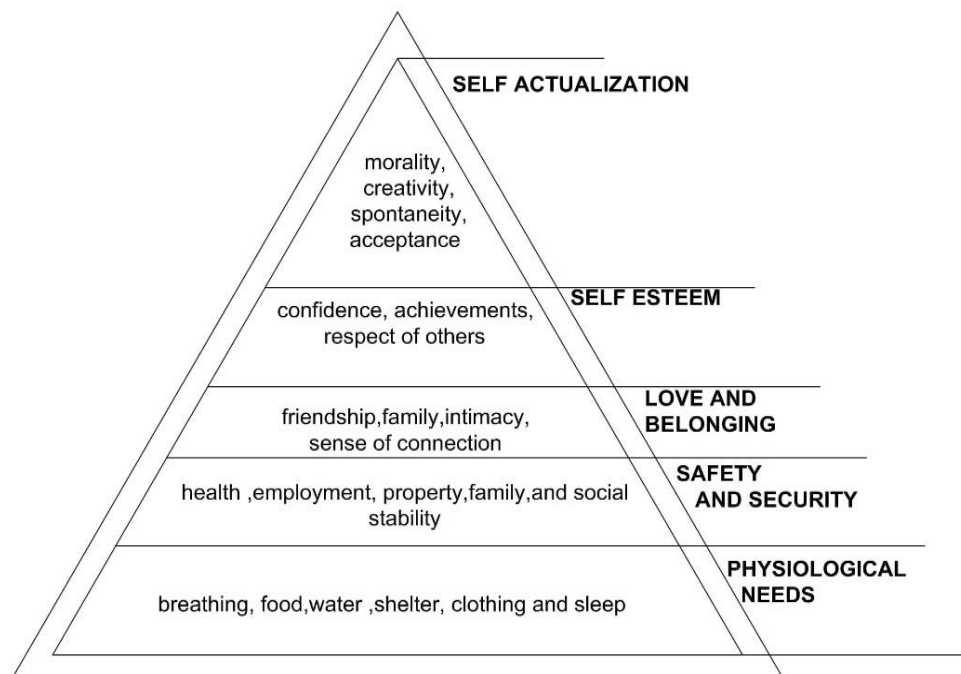


Figure 6: Maslow's hierarchy of needs source: (Hopper, 2020)

Importance – consumption-wise, for households across the globe, housing is one of the most important assets they strive for during their lifetime. Henilane (2016) puts it housing is among other needs the most important for humans. In respect to an economic perspective, housing has a

substantial impact on increasing regional, and national economic performance as well as creating spatial competitiveness. (Alwan Professor, 1970). Housing also has great importance in improving health outcomes.

Spatial fixity – despite the existence of mobile homes, houses are commonly known as “fixed assets” or as “immovable property” (Smith, Rosen and Fallis, 2010). Due to this reason, every purchased house for a dwelling is directly related to the decision made to live in a given location. This nature of housing makes it suitable for banks and insurance as collateral for credit services

Complexity and Multi-dimensionality - housing units have different aspects that are multidimensional and complex. For example, housing has a spatial element that varies in size and quality. Whereas in the social aspect housing has an intrinsic and extrinsic element of meaning. Housing also differs in building material in comparison to building material. In any purchasing or building process, the tenant goes through preference (Smith, Rosen and Fallis, 2010).

Dynamism: even if housing is a fixed asset or unmovable asset, it undergoes transformations through rehabilitation and maintenance and change in function (Smith, Rosen and Fallis, 2010).

Transaction costs: purchasing, renting and construction costs of housing are characterized by higher expenses compared to other household needs (Smith, Rosen and Fallis, 2010).

3.4 THE CONCEPT HOUSING AFFORDABILITY AND HOUSING STRESS

Affordability is a complex concept and a widely used word in different disciplines. Depending on the range in the application, discipline of study affordability could be interchangeably used as “inexpensive, reasonable, budget-friendly, cheap, approachable, attainable, feasible, cost-efficient, achievable, bearable, manageable, reachable, economical, lower-cost, cost-effective, desirable, cost-effectively, cost-competitive, costly, comfortable, advantageous, suitable” (Collins, 2021).

There is no clear definition for housing affordability since cultural, personal, aspects of affordability are subjective. The commonly used method of defining housing from the perspective of economic concept has short fallen due to its consideration of income and expenditure only. The short falling mainly arises due to the personal preference of people being forgotten in this context. Some other definitions also have lacked in what affordable and standard housing should look like. In the case of definitions, here is a summary of scholars’ definitions of housing affordability.

“Affordability is concerned with securing some given standard of housing (or different standards) at a price or rent which does not impose, in the eye of some third party (usually government) an unreasonable burden on household incomes.” (Williams, 1990,p.9)

“The answer is that any rent will be affordable which leaves the consumer with a socially acceptable standard of both housing and non-housing consumption after rent is paid”

(Hancock, 1993, p.144)

“A household is said to have a housing affordability problem, in most formulations of the term, when it pays more than a certain percentage of income to obtain adequate and appropriate housing”

(Hulchanski, 1995, p.471)

“Physically adequate housing that is made available to those who, without some special intervention by government or special arrangement by the providers of housing, could not afford the rent or mortgage payments for such housing.”

(Charles G.Field, 1997)

“Definitions of affordability concentrate on the relationship between housing expenditure and household income and define a standard in terms of that income above which housing is regarded as unaffordable”

(Freeman, Chaplin and Whitehead 1997)

“The notion of reasonable housing costs in relation to income: that is, housing costs that leave households with sufficient income to meet other basic needs such as food, clothing, transport, medical care and education”

(Australia National Housing Strategy, 1991)

“ Housing affordability refers to the capacity of households to meet housing costs while maintaining the ability to meet other basic costs of living.”

(Burke, 2004)

“Affordability is not simply a matter of housing costs and income levels; it is about people’s ability to obtain housing and to stay in it.”

(Corporation., 2005)

“a unit is considered unaffordable if a household has to spend more than 30 percent of its income on it.”

(Feldman, 2002)

In the context of defining housing affordability, integrating all the possible elements that affect housing affordability is important. Affordability is mainly could be an economic concept (Feldman, 2002). To afford something there should have to be a price to be paid. And the price is dependent on demand and supply. The demand for housing can be classified as “effective demand” and “potential demand”.(Davidson, F. ; Payne, 1983). According to Davidson and Payne effective demand is dependent on the abilities of the people to own. While “potential demand” is based upon preference arising from the ability to pick from home types (Davidson, F. ; Payne, 1983). As a Consequence of this economic affordability in the housing market must be a consideration.

Nevertheless, housing without adequate space or incompatible with the households need is still should a concern (Yohannes and Dinku, 2018).for this clear reason, the definition of housing affordability in this researches context is “housing which is economically affordable (Feldman, 2002), spatially adequate (Charles G.Field, 1997) and compatible with the households need” (Hulchanski, 1995).

Based on the above-mentioned definitions, if some on is said to have experienced housing affordability problem in pre-established measurements, the person or the household is said to be under housing stress. In some cases, it is also called housing affordability stress. For example, a household is said to be in housing stress if the housing expenditure is beyond 30% of the household income in countries like Australia (Sliogeris *et al.*, 2012).

3.5 GLOBAL HOUSING DEFICIT

“Housing is the single-largest household expenditure on average”(Marissa, 2019). With the increasing urban population and rural to urban migration, affordable urban housing has become a challenge for both developed and developing countries. According to the United Nations Department of Economic and Social Affairs, global urban dwellers have increased from 30% of the world’s population in the 1950s to 54% in 2014 (*World Urbanization Prospects*, 2014). On the other hand urban population in 2015 which is 4 billion is estimated to increase by 2.3 billion dwellers by 2050 (Kallergis *et al.*, 2018). This creates a huge gap to be filled by the housing supply side in urban settings.

The issue of lack of affordable housing is more visible in less developed countries compared to developed countries. Based on the median affordability measure less developed countries are 28% less affordable. (judge & Tomlinson)

One of the main reasons for the lack of affordable housing is the shortage of adequate supply that reasonably fits the demand side (Kallergis *et al.*, 2018). By 2025 the global housing supply is typically required to construct one billion new houses to mitigate the housing challenge. Thus, it requires a wealth of 650 billion dollars annually or up to 11 trillion dollars until the end of 2025. According to UN-HABITAT, there is a lack of adequate housing for more than 980 million urban dwellers. This convincingly shows the current obvious supply shortage of housing (UN-Habitat,2016). The housing supply chain does not only lack quantitatively rather getting quality housing that promotes dignity and social values remains also a critical problem around the world.

The issue of lack of affordable housing is more visible in less developed countries compared to developed countries. Based on the median affordability measure less developed countries are 28% less affordable. (Judge & Tomlinson). The demand for affordable housing will not slow down soon. With limited land resources, and constraining land acquisition policies, the property supply side will fail catastrophically if no measure is taken. Leading to extreme homelessness and physical and emotional stress. According to an UN-Habitat report in 2016, only 13% of the world's cities have affordable housing. (UN HABITAT, 2016).

Due to the increasing problem of the housing shortage, the housing supply is becoming under the international spotlight, especially among governments and organizations like the United Nations. The organization has now integrated by making housing one of the "new urban agenda (UN-Habitat, 2016)". Following the guideline, most cities and nations are integrating affordable housing supply policies into their respective national and regional policy development. (Development and Platform, 2019)

A survey made to the UN Expert Group Meeting on Affordable Housing and Social Protection Systems for all to Address Homelessness shows that 50% of participating countries out of 35 countries consider affordability a major policy issue. Followed by 22000 citizen responses, found affordability to be a central concern among other five others(Marissa, 2019).

Affordability studies main got attention in the late 19th century. Some of the most prominent pioneers are Ernst Engel and Herman Schwabe in finding the "rule of thumb or income to expenditure rule".

To bridge the gap in the existing housing demand, researchers from different fields are interested in researching affordability in different contexts. One of the common themes in the affordability study is the relationship between standard of living, health, and social well-being. Among the major topics of study in affordability, the relationship between housing stress and well-being has

been investigated numerous times in different countries by different researchers (CDC, 2006; Rowley *et al.*, 2012; Nebbitt, 2015; Ganesh *et al.*, 2017; Wrenn, Yi and Zhang, 2019).

3.6 HOUSING AFFORDABILITY MEASUREMENT

The most widely used international concept of measuring housing affordability, which is the “25% rule” was founded in eighteen hundred the United States. According to David Hulchanski, the idea emerged from the American expression “one week’s pay for one month’s rent”. (Hulchanski, 1995). Adopting this concept most mortgage lenders and policymakers started using it.

The other concept that is widely used is “housing expenditure to income rule of thumb” which was the result of studies in the 19th century. The pioneers in this concept are Ernest Engel’s and Herman Schwabe (Meen, 2018). Following their footsteps, many researchers have been trying to make studies but failed due to three main reasons which are “conceptual difficulty”. “Practical difficulty”, and “appropriate definitions on cost and income”. With such a problem, researchers were not able to form solid ground to study affordability (Meen, 2018). In the process of understanding housing affordability measurements looking at them from general to specific is crucial. The study made by Eastern Mediterranean University showed that studies in general use three major types of affordability measurement categories. Those are conventional approaches, rarely used approaches, and emerging innovative approaches. Thus the table 2.1 shows the summary of the measurement tools (Stephen, Id and Hoskara, 2019).

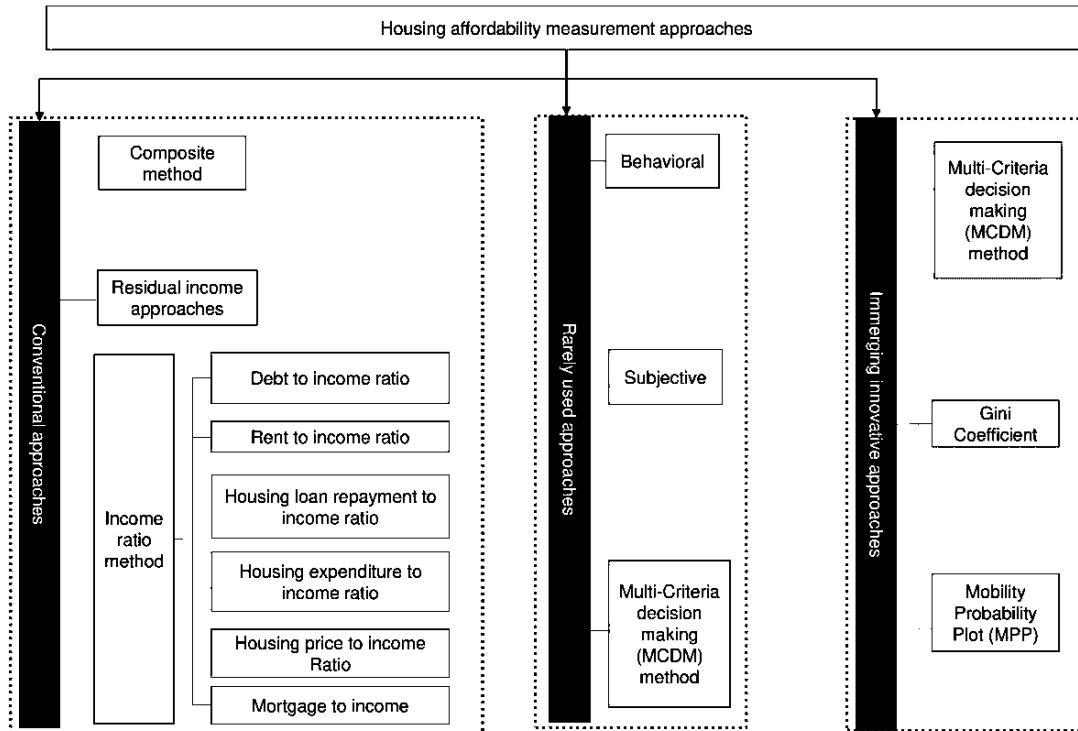


Figure 7: Types of housing affordability measurements source: (Stephen, Id and Hoskara, 2019)

In general, according to (Development and Platform, 2019) The three most commonly use methods in computing the affordable housing are:

“*The median multiple method*”:- “ considers housing affordable if the median house price is less than three times median household annual income.”(Development and Platform, 2019)

“*The housing cost burden method*”:- “ considers housing to be affordable if households spend under 30% of their income on housing (mortgage payments or rent, rates, taxes, household insurance, repairs and maintenance, energy costs.” (Development and Platform, 2019)

“*The residual income method*”:- subtracts the costs of meeting basic necessities from household income and uses the remaining “residual” income as the household’s capacity to spend on housing. This approach is primarily used by commercial banks when evaluating mortgage applications. (Development and Platform, 2019)

3.6.1 CONVENTIONAL APPROACH

According to literature made by Stephen and Hoskara conventional approach contains three main methods of evaluation income ratio method, residual income method, and composite method (Stephen, Id and Hoskara, 2019). In general, income ratio method is calculated through the income

to housing cost principle. Whenever the ratio exceeds a certain percentile a given household is considered under housing stress (ibid).

a) *Debt to income ratio.*

Debt is given mostly for the construction of a house or a finished home ready to be inhabited in most cases. The ratio approaches gross income which means without deduction of tax and debt expenditure. The calculation is made through the division of total debt by the total income of households divided by one hundred (CHRIS B. MURPHY, 2022).

$$DIR = \frac{TD.t}{TI.t} * 100. \dots\dots\dots \text{equation 2: debt to income}$$

Source: (CHRIS B. MURPHY, 2022)

Where:

TD.t is total debt at a given time

TI.t is total income in a given time

DIR is debt to income ratio

b) *Rent to income ratio*

This method is used to measure affordability for renting tenure types or tenants. The method uses the amount of rent expenditure (which is categorized as housing expenditure) divided by income. In the process, the period for both variables must be kept constant. For example, the rent amount for one week must be divided by the income amount for one week. In the process, using average is a possible option, using average may not give a good understanding of affordability in the context of rent. As a good option, better than average would be using median and 10th percentile methods. (Grant, 2006).

$$RIR = \frac{R.t}{I.t} * 100 \dots\dots\dots \text{equation 3: Rent to Income source :(Grant, 2006)}$$

Where:

RID is rent to income ratio

R.t is rent payment in a given time

I.t is the income per given time

- *Where the given time is similar for both income and rent values.*

Hence, with the lower value of the proportion, it is said to be comparatively unaffordable while value increase is considered an affordable option. (Grant, 2006)

c) Housing loan repayment ratio

This ratio is the amount of loan to be paid within a given period in relation to housing income. This is used to determine once legibility for a housing loan. To determine the ratio it is first important to identify the amount which is paid periodically.

$$Dn = D.(1 + r) n \dots\dots\dots \text{equation 4: the loan repayment period}$$

Where:

D = initial deposit (D0)

r = interest rate, if floating r_n is the interest rate in year n

n = year

Then the formula for housing loan repayment ratio stands as

$$HLRR = \frac{LP.t}{I.t} \dots\dots\dots \text{Equation 5: the housing loan repayment ratio. (Stephen, Id and Hoskara, 2019)}$$

Where:

HLRR is the Housing loan repayment ratio

LP.t Loan amount per a given period

I.t Income amount within a similar period

d) Housing expenditure to income ratio

The historical concept of “the ability to pay” for housing as a definition of affordability, has gaps in its capability of measuring housing affordability. For example, the UN-HABITAT defines affordable housing as:

“housing which is adequate in quality and location and does not cost so much that it prohibits its occupants from meeting other basic living costs or threatens their enjoyment of basic human rights” (UNHABITAT, 2011).

Amin Y Kamete also argues that housing goes beyond “ability to pay” and also relates to the “social character” like family size, occupation, etc. (Kamete, 2001). Which he correlated as “willingness to

pay". On the other hand, this concept of understanding household needs from the perspective of social character was not new. In fact, Humphrey Carver in 1948 stated that.

"It must be confessed that the attempt to reduce family needs to a classified budget is a denial of the manifold varieties of human nature ... The idiosyncrasies, vanities, pleasures, and generousities that make life worth living cannot be accounted for in scientific budgets and economic formulae. But even this cold examination of minimum family needs has shown the many variable factors that must enter into household plans; it is clear that simple generalizations and rules of thumb for calculating a family's capacity to pay for housing may be quite misleading

. (Humphrey Carver, 1948, p. 86).

The housing cost is not a static one-time payment. Rather affordability also means not only to buy but to afford to dwell in it (Enterprise Community Partners, 2014). After initial payments are made there are always bills for maintenance, electricity, security, and related services.

The contemporary definitions of affordable housing focus on expense as a defined percentage compared to income (Hulchanski, 1995).

The measure of housing expenditure to income ratio is one of the common methods used to measure housing affordability. Since it includes interest rates, it is also considered better to measure long-run affordability changes. (Meen, 2018).

The housing expenditure to income ratio uses disposable income. The formula uses total housing expenses divided by disposable income over a given period.

$$HETIR = \frac{HE}{DI} \dots\dots\dots \text{equation 6: housing expenditure to income ratio}$$

Where:

HETIR = housing expenditure to income ratio

HE= housing expenditure

DI = Disposable income

There are some downsides to using housing expenditure to income ration those include:

- *May miss represent a given household because of a lack of consideration in preference to quality* (Hulchanski, 1995)

A given household may prefer to reside in a neighborhood with certain amenities considering the services a priority over the affordable home. Or prefer a detached house over an apartment in which both are adequate or fulfill a given standard. Household preference for housing is extremely subjective. Households also may prefer certain materials or finishes over other building materials. Since housing is related to expressing status within society people may choose spacious or smaller units and plots over one another. In the measurement of affordability using the expenditure of housing price. Using only two variables namely; income and expenditure quality preference is out of the equation. Resulting in the misconception of placing households in similar standards. (Hulchanski and Michalski, 1994)

On the other hand, the household may choose between housing and non-housing expenses like food, and transportation. In such cases, certain families want or are forced to spend on non-housing expenses. This kind of situation may suppress housing unaffordable. This also depends on the household's preference to save the money or to expend ultimately affecting housing in obvious ways.

A similar case could also be raised in situations where a person or a household is forced to live in a certain area (low priced) area away from their work, family, and relatives. In this case, the housing could be considered affordable in the case of the housing to expenditure measurement ratio. Such scenarios make it an obsolete tool for measuring affordability.

- *the sensitivity to the definition of housing costs and income* (Hulchanski, 1995).

Housing cost in measuring housing affordability is ambiguous. In income cases, housing cost is considered gross income while other scholars use disposable income. In such cases, housing costs cannot be clearly understood. Similarly, housing costs cannot be identified since some of the expenses overlap with non-housing expenses.

- *The failure to account for household size or composition* (Hulchanski, 1995)

Non-housing expenses like food and transportation, education, and medical expenses are directly related to household size. Whenever family sizes increase, considering quality and quantity constant for every member, the non-housing expense will increase. This means that every time a household expands income is forced to the budget line and housing becomes unaffordable. Whenever the household expense increases the ratio of housing expenditure decreases comparatively. Even though non-housing expenses increase housing expense is also considered to increase by a small

margin. This is not necessarily from housing prices, which may also increase to accommodate a given family size. Rather it is related to bills related to services like electricity, water, telephone, and maintenances.

- *Does not consider loan/credit markets* (Hulchanski, 1995).

Some countries and cities may not have credit services for housing or people may not be able to get the service in the desired manner, in such cases, housing expenses are reduced, and it will look like affordable than what it really is. Due to this reason, households may live below their need and the housing to expenditure ratio looks healthy and affordable.

e) *Housing price to income ratio*

Housing price to earning is a straightforward method of measuring affordability. It is also a common tool used in several contexts. The first person to use this method is John C. Weicher. UN also acknowledged as a tool to measure affordability (Meen, 2018). This measuring tool is used by many market forecasters due to its use as a rule of thumb. The concept is that there must be a fixed proportion or ratio to measure affordability. The ratio between household income and the house price. As a rule of thumb, several ratios are used all over the world. The formula is that the house price is divided by yearly income.

$$HPIR = \frac{\text{Average Unit Price of Housing} \times \text{House Size}}{\text{Per Capita Annual Disposable Income per Household} \times \text{Population per Household}}$$

Equation 7: housing price to income ratio formula, (Stephen, Id and Hoskara, 2019)

Where

HPIR= housing price to income

PP= property price

AHI= annual household income

If the ratio is for the group OR people residing in a given geographic area.

International the accepted standard among many nations is from 4 to 6 (Deng Yusong, 2021). One of the strengths of using this method is the ability to find similar data in different contexts. Comparatively, there are no similar documents for other methods (Meen, 2018). On the other hand, it is a simple manageable method that does not require technical knowledge. In addition, anyone who requires a clear-cut affordability ratio like mortgage lenders has a clear set of measurements.

3.6.2 RARELY USED APPROACH

a) Behavioral Method

This method is used under a given standard of behavior and preference of households. It examines and analysis decisions made concerning housing expenses and material preferences of the households (Stephen, Id and Hoskara, 2019). The general housing choice behavior is called the consumption behavior of households. Some of the choices studied under the behavioral method include preference of type o housing, choice of where to live? Or location preference, tenure type preference, and spatial preference. The argument for the support of the behavioral method is the subjectivity of human needs despite income similarities (ibid, 2019).

As a single method employed in studying housing affordability, the resulting empirical data is significantly important in the use of generative “affordability indicators” This method of assessing housing affordability can be used with other normative methods. In some studies, the behavioral pattern of non-employed households was discouraged to find employment due to housing subsidies (ibid, 2019).

The weakness of this method is its difficulty in quantifying and computing behavioral patterns. Yet the weakness of normative methods and the development of behavioral economics gives this method hope for future development (ibid, 2019).

b) Subjective method

The subjective method, unlike other methods, uses perceived information from the occupants. It requests the dwellers thought on what their housing need is. With the integration of preferred quality and condition and overcrowding subjective method analysis affordability based on the responses. In the process of using this method, researchers ask directly if occupants consider their house affordable (Stephen, Id and Hoskara, 2019). This method is often used as a determinant of housing price within a market or as a supportive study within objective studies such as behavioral methods and normative methods. It also aids in understanding policy pitfalls and areas for improvement. (ibid, 2019)The weakness of this method is its fluctuation through time. Human behavior is unpredictable and changes over time. In such a case having a normative standard is a must in measuring housing affordability. (ibid, 2019)

c) Multi-Criteria Decision-Making Method

MCDM is a sophisticated method of measurement. In the financial realm, decision-making involves considering multiple criteria at a time. This method allows to see or measure occurrence, and evaluate

scenario tests, with a lot of variables and criteria. It enables to choose from evaluations and results with the ability to sort alternatives (Stephen, Id and Hoskara, 2019).

There are several models used in the multi-criteria decision-making method. Some of the commonly used are complex proportional assessment (COPRAS), Analytical hierarchy process (AHP), and order of preference by similarity to ideal solution (TOPSIS). A study made by Mulliner EK used the COPRAS model for assessing housing affordability. In his finding, he considered a lot of variables beyond economic consideration and the result is a much different scenario, where consideration of location and social sustainability had when compared to economic only considerations.

The major weakness of this method is its varying result based on the framework used. It is also easy to manipulate which could alter the accuracy of the outcome. For this reason, in the use of housing affordability measurement, the alterability, complexity, and accuracy of the outcome could make it hard to be accepted by researchers and analysts (Velasquez and Hester, 2013). Another weakness of MCDM is its dependency on the model employed. Since several models can be used simultaneously as well as a standalone, the result could vary based on the overall model (Mardani *et al.*, 2015).

3.6.3 EMERGING NEW TECHNOLOGY

a) Gini coefficient

This method was developed by Italian statistician Corrado Gini. Gini coefficient is commonly defined as a measure of inequality. The ratio ranges from 0 to 1. Where 0 value means no income difference while 1 shows all income going to one person only. The Gini coefficient multiplied by 100 is called the Gini index and is expressed in percentages (Meen, 2018).

In the process of calculating the Gini coefficient, several parameters can be used for example rent to income ratio is a possibility. Yet the commonly used variable is the housing price to income ratio.

This method is and can be applied in comparison to income for certain population groups. It measures inequality in housing affordability. The other benefit of this method is the ability to use time frames. (ibid, 2018).

The underlying weakness of using this method is its relative nature the absoluteness of certain income types is ignored. On the other hand, there is no means of studying cause inequality within the method. The use of separated scenarios or limited variables tends to hide the whole picture. In some instances, opposite scenarios may occur in certain economic situations. In such a case Gini coefficient lack in depicting the picture. Thus, this method should not be a standalone method for measuring affordability. It is a good practice to use it with absolute measurement methods (ibid, 2018).

b) Mobility probability

A mobility probability plot (MPP) is a newly emerging method used concerning housing affordability. This method of analysis was first used in China in the inequality study of cities' affordability caused by disparities in industrialization from region to region (Stephen, Id and Hoskara, 2019).

The method uses PIR or price to income ratio and compares it within cities and towns. The PIR is calculated by dividing housing prices by income (ibid, 2019). The result of such measurement ranges between – 100 to +100. Whenever the result increases, in the positive quadrant, housing is said to be unaffordable while an increase in negative value signifies the probability of a city going down in the distribution of PIR (ibid, 2019).

3.7 CONCEPT OF HEALTH AND DISEASE

The definition of health and disease has been a challenge globally. Health is now defined in the themes of constructivism as well as naturalism (Murphy, 2021). It imposes normative standards for general psychological well-being while using empirical standards for physiological well-being (Bloomfield, 2001).

Concerning physical well-being, to determine health, a set of standards are assumed to be normal or natural. In such propositions, there is no common consensus on what a normal healthy life should be among writers. While oxford dictionary defines it as *“the absence of diseases”*. This definition doesn't explain what health is (Murphy, 2021). Rather it jumps over the meaning by providing its antonyms with a negative proposition. Even though it could be considered, a definition requires defining “diseases” which by itself is hard to define. Or in the case of defining “diseases”, we could make a similar definition as “disease is the absence of health”, which leads to a loop of definitions.

In general, WHO defines health as: *“a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity”*(Bloomfield, 2001).

By the time this definition was coined it was considered “groundbreaking” because it improved the dictionary definition by a greater margin. Additionally, it also integrated the “physical”, “social” and “emotional” aspects of health within the definition. (Huber *et al.*, 2011)

Yet this definition has been criticized by a wide range of scholars. The main source of the criticism is based upon the word “complete” which refers to absoluteness. The definition then forces most of the global population to be “sick”. Even though someone is considered “completely” healthy, with technological advancements, abnormalities could be found that most don't require a physician or a medication.(Murphy, 2021)

The other aspect is the definition of dates because of the pattern of health problems in 1948 and recent decades. Acute disease, during the definition, was a prominent source of illness. But in the current pattern, with improved sanitation and hygiene within society, the acute disease is not much of a problem. Rather in recent years, people with chronic diseases are sources of physician visits. Those with chronic diseases are usually adopted to live with their problems. In such a case, WHO's definition of health includes this person including people with disability (Murphy, 2021).

To redefine Health, it is crucial to understand the past, the current, and the future pattern of human life. In possible ways, integrating the technological achievements of the future. This implies that any optional definition of health must be dynamic rather than static and must consider almost all society (Murphy, 2021).

A supposed good definition was coined at a Dutch conference. *“The ability to adapt, and self-manage”*. As a definition, it had a better dynamism in the application and avoids the previous definition of absolutism in WHO's definition. It also gives more sense to integrate every part of society (Murphy, 2021).

As a definition, this has been questioned by participating bodies because of its character lacking precise definition or meaning. It also is hard to implement as a meaningful act. As a result, some proposed it as a “conceptual framework for health.”(Huber *et al.*, 2011)

3.8 HOUSING AND WELL-BEING

Housing, despite the level of technological advancement or level of environmental or cultural difference, affects the health and well-being of the dwellers whether positively or negatively (Battersby, Ezratty and Ormandy, 2020). Due to this reason, nations are constructing large-scale housing projects to meet their citizen's housing demand. This shows that many countries recognize the need for housing as a “social determinant”.

“A dwelling (be it a house or flat or some other structure) and its condition are crucial to the health and well-being of the occupiers. But the dwelling should be more than just the physical structure that provides shelter from the elements, it should permit the establishment of a secure home environment. The home is where we bring up families, socialize with friends, and have our own space, where it is possible to relax, keep our possessions safe, and take refuge from the rest of the world, allowing our households to flourish. It is where we also spend most of our time. The right home environment protects and improves health and well-being and helps to prevent physical and mental ill-health.”

3.8.1 HOUSING AND MENTAL WELL-BEING

The relationship between housing and mental well-being is studied adequately to show their relationship. Yet the studies are underdeveloped. In the case of high-rise buildings studies show that they are subjected to detrimental health effects, especially on mental well-being. This is because of “social isolation “due to decreased social isolation within the buildings. Lack of access to playground and stigmatization of high-rise lifestyle affects highly mothers with children and children themselves (Robinson and Adams, 2008).

Housing quality in Several studies is linked, to a positive impact on psychological well-being contributing to the mental well-being of the dwellers (Battersby, Ezratty and Ormandy, 2020). In some cases, researchers claim improvement of mental well-being through the process of upgrading to better quality housing. (Robinson and Adams, 2008). Beyond many claims, the research done by WHO on European housing has shown the prevalence of Anxiety and depression among dwellers living in houses that have the least protection from external forces like cold and noise (ibid). In general, social and economic difficulties, lack of proper tenure security, and hardship in changing dwellings due to economic constraints have been shown to contribute to mental well-being problems like depression and anxiety (ibid).

Indirectly, people in housing stress, both households who purchased and who rented a home are subjected to financial stress. This financial stress forces families' to reduce expenses for health care which indirectly affects the mental health of family members (Battersby, Ezratty and Ormandy, 2020).

Thus, as AHURI, (2002) the health impact of housing stress is stronger in tenants than owners. Based on the research families within a renting tenure report health problem (including mental well-being) more commonly than owners with housing stress. The problem is even more intense in the case of renters who are above the age of 46 and sole partners.

Similarly, in research made in Canada, tenure type has shown to be a determinant of psychological distress. Many homeowners are more psychologically stable and report fewer complaints about their mental well-being (Robinson and Adams, 2008).

Research made in Britain shows that the inability to pay rent and mortgage has been seen to be detrimental to mental health. Based on the research financial hardship and fear of losing tenure right has the same impact as a “major life event” similar to divorce or death (ibid).

Housing stress due to affordability of rent and purchasing ability is not considered a major stressor. Yet in a prolonged period, the impact is obvious. Yet such stressors are ignored because of attention given to higher stressors. (ibid)

Families without affordability stress benefit from not being distracted by housing needs. This provides stability and a more convenient space to focus on other parts of life like relationships, social life, education, or career (Battersby, Ezratty and Ormandy, 2020).

3.8.2 HOUSING AND PHYSICAL WELL-BEING

Housing is strongly linked to physical well-being. Such problems may arise from faulty design considerations, physical deterioration, and escalation in monetary value.

In general, building design is mainly aimed at housing human beings. Using data from field surveys and deploying available technology through analysis of personal preferences, architects, planners and engineers build what is best for the dweller. Without such a process buildings built will function weaker in the health aspect of the built environment. According to McCoy (1998) five architectural dimensions are linked with psychological stress. Namely “stimulation”, “coherence”, “affordance”, “control”, and ‘restorative”.

Stimulation is the amount of information transferred from ‘object’ and ‘settings’ to humans through impinging elements such as intensity, variety, complexity, mystery, and novelty (McCoy, 1998). In situations where spaces are either over or little stimulated, psychological stress may occur. Humans in general function better in the medium or acceptable range of stimulation. In cases where there is less *stimulation*, the space feels boredom. In an extreme case, it creates sensory deprivation (McCoy, 1998). Makes it hard to make planned decisions. In the design process of architectural design, the use of intense light, strong smell, loud sounds, and bright colors create overstimulation. Such spaces are by nature psychologically stress-inducing (ibid).

Improper design of spatial layout, vertical and horizontal circulation system designs, spatial location within space, and spatial arrangement of spaces are sources of an excessive or little level of stimulation.

“Coherence refers to the clarity or comprehensibility of building elements and form. Ambiguity, disorganization, and disorientation are major impediments to coherence.”

(McCoy, 1998)

Coherence is related to clarity or predictability. With the use of coherent design, expressing identity, meaning and location are achieved. In the case of spaces designed without coherent features, the unpredictability nature of elements overloads the sensory part of the dwellers leading to stress (ibid).

Affordance on the other hand is the ability to use space-based on understanding. Whenever we are unable to get information about the functional use of a space misaffordances to occur. Misaffordances is a common design problem that creates stress for inhabitants (Heft, 1997). It is characterized by ambiguities. Misaffordance occurs due to several reasons, for example, physical barriers limit visual access to building elements leading to disorientation. In some cases, illusions created within the designed space forces accidents. Such spaces are prone to a stressful living environment (ibid).

“Control is defined herein as mastery of the ability to either alter the physical environment or regulate exposure to one’s surroundings.”

(McCoy, 1998)

Uncontrolled environmental conditions force into “learned hopelessness”, which is mainly sourced from the emotional or psychological force. Insufficient spatial resources, static spatial organization, and inability to change climatic and lighting impacts have shown to be enough in creating “hopelessness” thought, especially in children. On the other hand, having control over the space decrease depression and in creating a sense of control. The design of architectural space within such consideration can impact the dweller’s happiness and health (ibid).

“Restorative qualities define the potential of design elements to function therapeutically, reducing cognitive fatigue and other sources of stress.”

(McCoy, 1998)

Elements of such kind don’t directly engage in creating stress. Rather they provide solutions through design. Those elements include retreat, fascination, and exposure to nature. Such restorative therapeutic elements are a concern in mainly health buildings whose main aim is to make people feel better (ibid).

In general, health and architectural design are linked strongly. Since the built environments evoke emotions in people within the space.

With the aging of a dwelling or with poor material in use, housing could suffer from physical deterioration. Such material deteriorations create toxic spaces, uncomfortable smells, and

aesthetically disturbing spaces (Environmental Protection Agency and Environments Division, 1991). In such cases, contamination of toxic material and related problems directly affect the quality and health of the dwellers within the house as well as anyone closer to that home.

Dwellers in some buildings or homes experience acute (short-term) health problems as long as they are within that building. This experience is called Sick Building Syndrome. It is characterized by temporary discomfort that is experienced while the dweller is within the building. The symptoms may range from headaches, nausea, respiratory discomfort, difficulty concentrating and feeling sick and tired. People who stayed within those buildings reported relief after they left the space (Environmental Protection Agency and Environments Division, 1991).

One of the contributing factors to SBS is 'inadequate ventilation' (Environmental Protection Agency and Environments Division, 1991). With different standards required in different countries, lack of inadequate ventilation is the main reason for SBS. In general, research has shown that a decrease in the amount of ventilation has created discomfort to the health of the occupants.

Even though, outdoor air significantly improves internal air quality, in occasions where there is strong internal air pollution, adequate ventilation may not be enough to reverse the impact. If internal pollutions come from paints, plastic and wood products, machines, smoke, cleaning agents, and volatile organic compounds. (Environmental Protection Agency and Environments Division, 1991). The existence of high VOC may contribute to cancer. Such chemicals are called 'carcinogens'. All those chemicals have the potential to create both acute and chronic health problems (ibid).

As mentioned above ventilation may be important in the process of internal air quality. This may not always be true since the outdoor air may be polluted. Some of the pollutants of outdoor air are dust, and exhaust systems that are not located in their convenient location. Contributing to SBS.

Biological contaminants also take share in SBS. The main source of biological contamination is due to deteriorating or poorly designed building elements such as humidifiers, vents, and pipes. Some of the sources of water accumulation in unreachable or ignored areas. Sometimes increase in insect population and bird droppings create biological contamination. If a building is under biological contamination dwellers suffer from cough, chest pain, and upper respiratory congestion. (Environmental Protection Agency and Environments Division, 1991)

On the other side building materials poses a strong threat to the health of the dwellers. Materials such as asbestos cause serious health problems. Some natural stones have harmful properties to humans. An example of such material could be granite which could create respiratory disease. The disease

that arises from granite is an irreversible and chronic lung problem. The disease is called silicosis. Even in artificial stones (concrete base), many chemicals are used to improve their property. Unless used with proper consideration, they could deteriorate the health of the dwellers within which they are built with. (Kokulu and Acun Ozgunler, 2019)

Even though wood is a natural material. It is not free from causing health problems. Wood in general is mostly used with adhesive, and paints to polish and preserve its property. The preservative materials release toxic gas into the environment. (Kokulu and Acun Ozgunler, 2019). In the manufacturing of processed woods like MDF has a chemical called formaldehyde which is bad for internal air quality.

The façade material aluminum and the lead used in paintings also affect the human health. For instance, aluminum is related to Alzheimer's and lung diseases while lead metal is the source of lead poisoning which leads to high health problems for both children and adults (McCoy, 1998).

The most obvious plastics are responsible for diseases of brain and lung tumors. In case of inflation in land and real-estate properties, housing expense of household's definitely rises. In the process, so-called "affordable housing" will become unaffordable to the tenants or in some cases to the owners. Most households then are forced to sell their property, and leave the housing to lower quality more affordable options. Despite those options, dwellers may choose to live in the same house forcing other non-housing expenses to diminish. This solution forces expenses for proper diet and health to become mimicked below the household need. As a result, health becomes compromised leading to undiagnosed prolonged diseases to flourish. The risk of mental health on the other side also increases due to fear of eviction and over-stressing to increase income (ibid).

3.8.3 HOUSING AND SOCIAL WELL-BEING

In homes that are adequate, affordable, and have a stable living environment, there is a stronger benefit for educational, health, and employment success of all age groups. For example, the impact of stable housing has been seen and documented in aiding children. And children without affordable housing were vulnerable to "mental health problems", "developmental delays", and "poor cognitive outcomes" according to (Battersby, Ezratty and Ormandy, 2020)

There is also a relationship between housing instability and which could directly interfere with future success. For example, children in sustainable and affordable housing are more likely to do not fail in school or drop out as a consequence.

With the increase in technological advancement, homes are becoming both working and living spaces (Battersby, Ezratty and Ormandy, 2020). With such social change the sociological sense of housing changes in need and meaning. For someone who works from home and lives within gives great importance to his dwelling compared to the one who uses it for living only purpose.

Housing also is descriptive of one's social status. Marcus (2006)

“Throughout our lives, whether we are conscious of it or not, our home and its contents are very potent statements about who we are. In particular, they represent symbols of our ego-selves”.

(Marcus, 2006)

In relation to the formation of families' the inability to afford a home both in rent and purchasing ability sustainably affects family formation. In research made in China, where having a home prior to marriage is a norm, an increase in housing prices has a negative impact on a couple's first-time marriage entry (Wrenn, Yi and Zhang, 2019). Based on the research increase in 1% in housing prices decreased the rate of marriage by 0.08% and 0.13% for men and women respectively (Wrenn, Yi and Zhang, 2019). The study can force into thinking that affording a house has the power to determine one's ability to start a family within a society or as descriptive of social status.

In children and adults, living in stable and adequate housing provides a multitude of opportunities in children's educational outcomes. Educational, health, and employment outcomes are achieved very well in stable housing (Brennan, Reed and Sturtevant, 2014). For example, the issue of mental health problems in youth is a very well-documented aspect where unstable homes are the cause of such problems. Furthermore, the youth is vulnerable to developmental delay and poor cognitive outcomes. There is also evidence of trauma due to unstable housing. Young children in stable housing are less likely to repeat classes. Overall housing has a significant impact on health issues and related social issues (Brennan, Reed and Sturtevant, 2014).

3.9 HOUSING ADEQUACY AND COMPATIBILITY

a. Housing Adequacy

UN-Habitat definition of adequate housing is the most commonly used definition within the academic writings. The definition by far contains a large amount of prerequisite in the determining process of adequate housing. As a result, analysis of adequate housing could not be easy.

The legal level, as presented by un-habitat and Office of the United Nations High Commissioner for Human Rights, it gives citizens of nations under the umbrella of United Nations High Commissioner

for Human Rights to have the entitlement tenure security, property ownership, non-discriminatory access for housing. And participation in housing decision making (ibid).

The legal dictionary of “law insider” describes adequate housing as:

“Adequate housing means housing which meets minimum structural, heating, lighting, ventilation, sanitary, occupancy, and maintenance standards compatible with applicable building and housing codes, as determined under rules of the authority”.

(‘Adequate housing definition’, 2021)

According to UN-habitat One home is considered to be adequate if it has ‘security of tenure’, ‘Availability of services, materials, facilities, and infrastructure’, ‘has affordability’, ‘habitability’, ‘Accessibility’, ‘Location’, ‘cultural adequacy’.

Security of tenure: Dwellers must experience freedom and legal right in their dwellings and should have to be free from external negative and unreasonable pressure like fear of eviction and harassment.

Availability of services, materials, facilities, and infrastructure: “housing is not adequate if its occupants do not have safe drinking water, adequate sanitation, and energy for cooking, heating, lighting, food storage or refuse disposal.”(De Schutter, 2014)

Affordability: housing expenses must be within the range of the household’s ability without compromising other needs like transportation, food, and clothing housing is not adequate if its cost threatens or compromises the occupants’ enjoyment of other human rights (De Schutter, 2014).

Habitability: Adequate housing must be spatially adequate. Means, it must fulfill the space required for a household for activities. At the same time protected from climatic forces like heat and cold, rain and wind must be protective. It must also be structural safe promoting physical safety.

Accessibility: universal design principle must be considered to make an adequate home. Where every marginalized ground gets access.

Location: housing is not adequate if, dwellers are far away from employment and health, school, and other social amenities. It must also promote safety like robbery and pollution.

Cultural adequacy: “housing is not adequate if it does not respect and take into account the expression of cultural identity.”

The report covered spatial adequacy of housing under within the sphere of the habitability. Yet, habitability and spatial adequacy are not equivalent in meaning. Habitability, takes several considerations beyond spatial adequacy. Some reports and studies like CDC,(2006) emphasize the spatial adequacy placing it as fundamental physiological need. Spatial adequacy is considered to give normal family life. lack of spatial adequacy creates privacy bridge due to sharing of multiple rooms (CDC, 2006).

Lacking in spatial adequacy is characterized by overcrowding, privacy bridge, and the use of space beyond the intended purpose. Some of the measurements used in spatial adequacy based upon given standards, some of the well-known standards include: Canadian National Occupancy Standard, British Bedroom Standard, UN-Habitat are some of them. Most of the standards use availability of additional bed room.

b. Compatibility

In some legal definition compatibility is defined as “appropriate housing” or “suitable housing” (Inc., 2021). Similarly, Battersby, Ezratty and Ormandy, (2020) uses compatibility as a term to define the needs of housing specific to a household. According to Canadian Data program, good housing compatibility or suitability is linked to spatial accommodation (CDP, no date).

In the published document of the United Nations, compatibility is somewhat presented under the umbrella of adequate housing as “location adequacy”. Incompatible units are characterized by, lacking in normal family and social life, lack of belongingness, limited physical activity (Elsinga and Hoekstra, 2005).

Some activates are specific to certain family types. For example, despite spatial adequacy a household with small kids and elders may not be able to climb a stair. As a result, those families try to avoid living in higher stories. If that is not the case incompatibility of activity will occur. In the case of neighborhood, households may choose to engage in economic activity within their home. But the housing use regulation location of the house within the neighborhood affects their decisions. For several reasons, one may choose to engage in sports activity. But the neighborhood and the housing condition may limit his or her will. The other mentionable source of compatibility is based on disability. Disabled people account for more than 650 million people worldwide (De Schutter, 2014).For those people the neighborhood, the living quarter must be designed and built to fit their need. If this is not the case, a housing unit may be incompatible with households who have members with disability.

3.10 BACKGROUND OF THE STUDY

Ethiopia is a country found in Eastern Africa. Contributing more than 112.1 million estimated population to the world. The population size of Ethiopia marks the nation as the second largest populous country in the continent followed by Nigeria. The geographical landscape is rich in mountains, gorges, and valleys. The height point is mount Ras Dashen with a height of 4533 meters and the lowest point is the afar depression which is – 125 meters below sea level (Atavist, 2021). Climatically, Ethiopia has a wide variety of climate groups ranging from tropical to cool highlands.

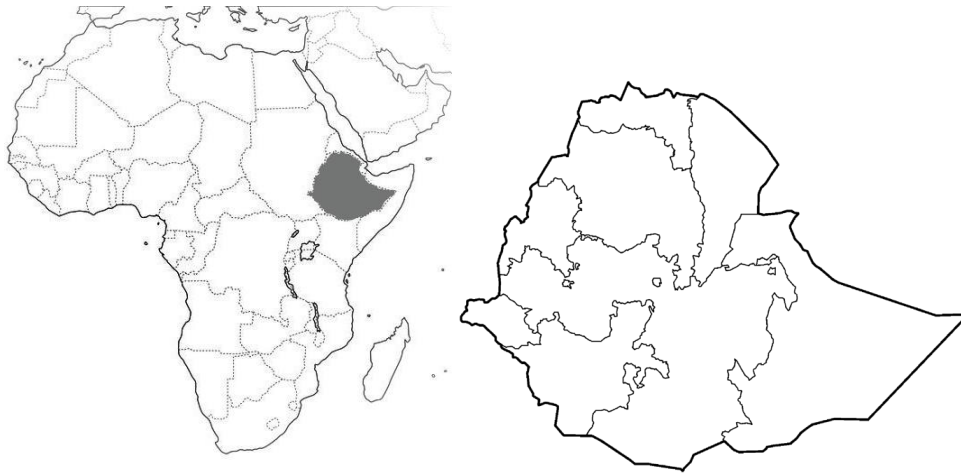


Figure 8: map of Africa (left) and Ethiopia (right) (source : internet)

The people of Ethiopia are comprised of more than 80 nations and nationalities. Speaking more than 80 languages and different cultures. Ethiopia is considered a religious country and many religious views are entertained alongside each other. The main religious views are Christianity and Islam. Yet there are several religious beliefs both foreign and indigenous practiced in the nation including “Waqefata” (Oromo people’s cultural belief).

Historically Ethiopia is one of the oldest nations in history. Archeologically, the oldest human remains were found in Ethiopia. The notable finding is the Australopithecus Afarensis called “lucy”. Lucy is estimated to have lived 3.5 million years ago. As a nation, Ethiopia also dates more than 2000 years old. With notable civilizations like Axum, Ethiopia had a significant role in the ancient world.

As a nation, Ethiopia has never been subjugated by external colonial powers. A significant win over the colonial power of Italy in the battle of Adwa made the nation a symbol of freedom and hope for other African nations struggling against colonials.

The current government system of Ethiopia contains 10 regional states and two city administrations. In its form, the government is structured as a “federal parliamentary republic”. The head of the state is the president while the head of the government is the prime minister.

Due to internal power friction and a series of continuous wars, the country is now considered one of the poorest nations in the world. With a per capita income of 890 USD in 2020, most services are controlled by the public sector. Yet development in the country is greater compared to the region. The main contributors to the economy are sectors like service and construction. Following this, the number of citizens who were under the national poverty line decreased by 30 percent between 2011 and 2016. One of the recent challenges to its economic growth is internal stability. In Ethiopia, in 2015, the largest portion of the GDP was under agriculture accounts about 40.5 percent meanwhile 81% of the export sector was based on agriculture.

a. HISTORY OF URBAN POLICIES AND AFFORDABLE HOUSING PROVISION

Even though most people in Ethiopia reside in locations far away from basic infrastructure. The national urbanization rate is closing the gap with an average rate of 4.4 percent and 5.6 percent annually (Unkown, 2022). The growth in Ethiopia is expected to reach 27 to 30 percent of the total population. Comparatively, the population growth rate is 2.9 with such a rate the population growth is expected to double within 33 years (BANK, 2022). Even though the rate of the population growth is smaller than the urbanization rate, without difficulty helps accelerate the current housing and urban development problems.

- **During the period of Emperor Haile Selassie**

The land and housing ownership at the time of emperor Haile-Selassie were under the selected nobilities of the feudal. Land ownership had two stakeholders the peasant (chisesegna) and the nobility Warlords and few other nobilities had more than 70 percent of arable land within that period (Settlements, 2011). And many more who were peasants for warlords and nobilities were tenants within those a given land of the nobilities. Considering low-income people, an immediate option was renting especially in urban areas. In 1962 58 percent of the land of the capital city, Addis Ababa was controlled by 1768 people which means on average one person occupied 10000 meters square of land (ibid)

- **In the period of the Derg regime (1974-1991)**

When in the early 1970s student revolution facilitated the military to take power. As the students revolted against the emperor on land equity and distribution. In July, 1975 a new proclamation was

made on the ownership of urban land and housing (ibid,2011). Proclamation 47: Government ownership of urban land and Extra house' stated that extra houses were to be governed by the state. This housing policy, helped many tenants to get affordable housing with better tenure security. As a result, two types of government-owned housing emerged. One of them is the kebele house which is rented below 100 birrs per unit and a rental housing which is administrated by the housing Agency and the rental prices of the units are above 100 birrs (ibid,2011). At that time almost 60% of housing in Addis Ababa was under rental tenure. Yet, this administration struggled because of a lack of housing investment, an inability to regulate the management, and a shortfall in the availability of land and credit services (ibid,2011).

At the end of the 1980s, the government started to loosen its control on the supply of land and housing. This was achieved by permitting the selling and exchange of houses. However, the government was the major driver in the supply of housing. Due to a lack of management of the houses, the houses started deteriorating over time. The rental prices which were collected from the tenants were not sufficient for maintenance.

In the period of EPRDF (1991- 2016)

Several changes were made after EPRDF took power. Some of them are structural adjustment policies, decentralization of government structure, and a program called agricultural-led industrialization. Among them, housing policy is not of them. In the era of EPRDF, the housing policy is mostly forgotten. Some of the mentionable attempts are the Land reform program that took place after the formulation of the new constitution. The program aimed to absorb the shock of rural-urban migration by developing secondary cities to attract rural migrants. Thus the ownership of housing and land ownership was still maintained. And housing provision was left to be met by the housing market alone. However, the private market failed to provide the land and housing deficit despite subsidies in land provision. (Settlements, 2011). Finally, with increasing urban complaints the government started shifting to urban areas. The IHDP program came into consideration.

b. NATIONAL DEMAND AND SUPPLY OF HOUSING

In general, the housing demand and supply of housing in Ethiopia as well as in the capital city of Addis Ababa is high. In the case of the largest housing development program, the IHDP program reports show that it has achieved half of the initial aim. In the census made in 1994, the total number of households was 9.5% higher than the available housing units. Furthermore, this difference increased in ten years to 24.8%. In 2011, a report made by the Addis Ababa city Administration the current housing deficit was considered 900,000 - 1,000,000. (Settlements, 2011) This made the

housing supply of the city even worse. This figure shows that cohabitation of multiple households in a single unit is common. (Bihon, 2008).

i. General housing conditions

During the formation period and the following few years in Addis Ababa, the houses were primarily vernacular made of mud and straw huts. Later, with the involvement of modern builders from abroad new construction of houses emerged. The primary building style adopted by the builders of the city of Addis Ababa was simple building volumes. (van Gameren and Tola, 2018). Since then the housing condition of housing didn't change much. In fact, 80% of the housing in the inner city of Addis Ababa requires total replacement. (Bihon, 2008). As Bihon 2008, the housing deficit in 2004 was 386,620. In 2015, the housing needs reached about 2,250,831 units, which equated to a demand of 225,000 new housings per annum (Yohannes and Dinku, 2018).

Houses are one-roomed and the number of household per unit is 1.1%.(Bihon, 2008). Considering the building material of 82.5% of houses out of the total housing stock is made up of mud and wood. Considering quality 88.5 % of Addis Ababa has connected pipe water lines. Yet most of the city suffers from a frequent lack of water. In the cities, 25% of waste is throughout the streets, drainage channels, and vacant plots. While 23 of the city does not have a toilet.

j. Housing Market in Addis Ababa

In 2008, the cheapest home developed by private real-estate developers was from 1 million to 3 million birr. At that period most of the Addis Ababa dwellers were earning 3,340 ETB (Yohannes and Dinku, 2018). Even more, the affordability became very high when the price became 3 to 6 million in 2016. As this this phenomenon became apparent, the housing ownership option in most of the dwellers shattered (ibid).

Market price (Cost per m2)	Public houses (Cost per m2)	Public houses avg. cost difference (%)	Real estate houses (Cost per m2)	(Cost per m2) Real estate houses avg. cost difference (%)
6,000-18,000	2,171.6 – 4,918	70.5%	22,692.9 - 32,962.6	+132%

Table 7: payments by housing payment source: (Yohannes and Dinku, 2018)

As of the IHDP program, with its several schemes, 10/90, 20/80 and 60,40 which respectively require initial depositing 10%, 20% and 40% of the cost of the units are being built and transferred to beneficiaries. As a program encouraging home ownership, the mortgage payment is expected monthly from the beneficiaries. the comparison of market, between Addis Ababa's market price compared to public housing showed 70.5% in cost reduction per floor area of the units.

No.	Housing schemes	size of the units	Total cost (birr)	Cost per meter square	Monthly payment
1	10/90 (10% saved for three years and 90% loan provided by the CBE)	Studio flat (31 m ²)	67,320.	2,171.60	187
2	20/80 (saved for seven years and 80% loan provided by the CBE)	One bed room unit (50 m ²)	127,000	2540	302.40
		Two bed room flat (70 m ²)	224,000	3200	533.30
		Three bed room (85 m ²)	304,000	3576.47	723.80
3	40/60 (saved for five years and 60% loan provided by the CBE)	One bed room unit (50 m ²)	701,270	4918	4,675
		Two bed room flat (70 m ²)	847,650	4918	5,651
		Three bed room (85 m ²)	950,000	4918	6,333.3

Table 8: comparison of different market prices of housing in Addis Ababa (Yohannes and Dinku, 2018)

k. The Housing Market of Yeka Abado Condominium

Factors affecting the housing market in the Yeka Abado condominium are several aspects. By nature, the housing market is complex. Similarly, in the case of the Yeka Abado condominium, the unit price is based on different aspects:

- *Location in the neighborhood:* If the unit's location is in the outskirts of the neighborhood, the housing price for purchasing and renting is expected to decrease in the Yeka Abado condominium according to key informant interviews with the brokers.
- *Material and finishes:* if the unit is in its state of transfer, where most of the finishings of the units are left to the owner, the price is expected to be lower than the finished unit counterparts.
- *Completion of mortgage:* if the unit has an incomplete mortgage the unit is expected to be lower in price.

Thus, the summary of mortgage, rent and selling price have been collected from the brokers working in Yeka Abado Condominium. And is presented in the table below.

MORTGAGE PAYMENTS OF UNITS IN YAC				
scheme	Studio unit	One Bed Room unit	Two Bed Room unit	Three Bed Room unit
10/90	187			
20/80	-	196	401	489
40/60	-	1033	1575	2453

Table 9: Mortgage payment in YAC: source, commercial bank of Ethiopia.

RENT PAYMENTS OF UNITS IN YAC			
Studio unit	One Bed Room unit	Two Bed Room unit	Three Bed Room unit
1500- 5000 ETB	3000-5000 ETB	6000- 9500 ETB	6000-10500 ETB

Table 10: Rent payment in YAC source: (key informant interview.)

HOUSING UNIT PRICES IN YAC			
Studio unit	One Bed Room unit	Two Bed Room unit	Three Bed Room unit
0.9 – 1 million	1.1 -1.4 million ETB	2-2.5 million ETB	2.25 - 4 million ETB

Table 11: condominium unit prices in YAC (source: key informant interview)

I. The IHDP program

The IHDP (the integrated housing development program) is an integrated affordable housing development project initiated and financed by the government which was started in 2004. With the initiation of the Ministry of Work and Urban Development (MWUD), it was integrated with the national five-year transformation plan. Which is called 'Plan for Accelerated and Sustained Development to End Poverty (PASDEP) (Settlements, 2011).

The aim of the IHDP program was not only to provide housing. In the process, it targets several other components as a goal. Among the targets was to stimulate urban development due to deteriorating urban infrastructure. Over the years the other challenge of the urban landscape was the lack of employment. In this respect, the IHDP program promoted employment as a secondary goal. Following job creation, the program was aiming in awakening the economy through MSE (micro and small enterprises). Many urban dwellers who didn't directly get employed in a program were able to be beneficiaries through those small enterprises. In general, the micro and small enterprises (MSE) were

participants in the construction material supply, labor work, etc. in the relation to direct beneficiaries, one of the aims of the IHDP was to encourage savings. Many beneficiaries were able to save for years and become homeowners. The financial institutions involved in the program were strengthened due to increased savings. The program also believed in homeownership. According to the program, homeownership rights empower society through independence, confidence, and in the process of credit services. For housing construction, the program had envisioned strengthening the capacity of the domestic construction industry (Settlements, 2011).

In direct relation to housing, the project was targeted to reduce Addis Ababa's slums by up to 50% and reduced the housing deficit while realizing a significant decrease in unemployment by half. In the process of achieving this goal, above 80,000 housing units were built until 2010. Those units are part of the national goal of building 400,000 units nationally. The project is not entirely new rather it was considered a continuation of 'The Addis Ababa Grand Housing Program'.

According to UN-habitat (Settlements, 2011) report the general aim of the IHDP program is in the first PASDEP year (2006-2010) can be summarized as:

- a) To construct 400,000 housing units.
- b) To create 200,000 jobs and thereby contribute significantly to the national target of reducing urban unemployment by half.
- c) To promote the development of 10,000 small enterprises on a sustainable basis in the construction industry.
- d) To deliver 6,000 hectares of serviced land per annum for housing and other investments.
- e) To enhance and build the capacity of contractors, consultants, engineers, and foremen as well as suppliers of construction materials.
- f) To support the private sector to produce 125,000 housing units per annum through the provision of land and infrastructure and a conducive legal and policy framework (Settlements, 2011).

Official reports show that the program has helped the national GDP to draw in 11.5 percent. While creating 176,000 jobs slightly below the intended goal.

a. WELL-BEING IN GENERAL

Modern medicine is adopted in the 16th century. Yet the health infrastructure and trained personnel are slow and low. For example, the first hospital in the country was built Russian Red Cross in 1909. Then after the progress is much better comparatively, nine hospitals were built between 1909 and 1936. Not for long following the Ethio-Italian war the progress slowed again. as a result, the existing

health facilities were overburdened. In 1965, a medical school was opened in the university (Health, 2019).

The health structure in Ethiopia has three-segment: primary, secondary, and tertiary levels of care. The primary health service is given through primary hospitals and small health centers like health posts. In the lowest level of primary health has a female staff of about 30,000. They mainly help their community. Most of the time they focus on children and mothers like the case of childbirth. (Health, 2019) The secondary level of health care involves general hospitals. The proportion of the service is one to one million five hundred. And similarly, the tertiary health service is targeted at specialty hospitals with 3.5 – 5 million people per hospital.

The fertility rate of Ethiopians is 4.3 lives per woman. While the life expectancy of a male is 66 years while a female is 70 years old. When we consider the infant mortality of the population 29.5 deaths are expected from 1000 live births. Similarly, the maternal mortality is 401 deaths per 100,000 live births. The other indicator of health, which is obesity is less than 6%. (Health, 2019). The primary causes of death in Ethiopia include lower respiratory infections such as pneumonia and bronchitis. In general, it accounts for more than 10% of death every year. Those diseases are curable but if they are not treated, they are fatal. As a result, children in Ethiopia are infected from 4 to 8 times per year. One of the reasons for infections in Ethiopia arises due to malnutrition. According to studies, 42% of children who get hospitalized for pneumonia are vitamin D deficient.

Rotavirus has its highest rates in Ethiopia. It is the most common cause of severe diarrhea around the world. The diarrheal disease causes 8% of death in Ethiopia annually. It is also a leading death in children. 14% of the death of children under five is caused by diarrheal diseases. The main cause of this disease arises from lack of good sanitation and access to water. (FDREMH, 2011) .

Non-communicable diseases (NCD) are disease that has chronic nature and any cause agents. On the other hand, are not transmitted from one person to another. NCD has become a global health agenda due to the reason that it is responsible for more deaths per year than other diseases combined. According to WHO, 78% of deaths per annum are caused by NCD. This is even a pressing problem in developing countries. Within a given society the use of alcohol, tobacco, diet, and inactivity are the main sources of non-communicable diseases. In the context of Ethiopia non-communicable disease contributes to 39.3% of total death in Ethiopia. (Girum *et al.*, 2020).

About mental health in Ethiopia, the contributing risk factors for mental health are “domestic violence”, “poverty”, and “traditional prenatal practices”. On the other hand, the impact on mental health is stronger in people with disability and economically disadvantaged (FDREMH, 2011).

In general, globally, people with mental illness will not get “good quality care”. In the case of Ethiopia, this figure reaches 90% of total mental illness cases. (Global mental health: Perspectives from Ethiopia). Among other health programs, mental health is disadvantaged in Ethiopia’s health system. To showcase this problem, the program commonly lacks “basic amenities” for serving the patients. In addition, the amount of skilled manpower required is much greater than the demand for mental health. In Ethiopia ratio for mental health among 100 people is 18 for adults while 15 for children (FDREMH, 2011).

3.11 SUMMERY OF LITERATURE

Housing by its nature is a complex concept. Rather than defining housing it is easier to characterize and see what importance it gives to people. As presented above housing could be defined differently in different fields. It is highly dependent on the perspective of the study subject. The summery to housing definition then could be concluded by its importance “as a basic need”, as “roof over head”, as the definition of the john turner “as a commodity” and as a “process”. Following its importance affordable housing is considered has become part of human rights.

Despite having an adequate housing as a form of human right the housing demand internationally is beyond being meet. Due to housing supply short falling by government and the private sector, informal settlements and slum formations are prominent in developing countries. The issue of homelessness is also significant internationally.

The short falling in housing demand and supply also affected the economic affordability of the units. Many households both in developed as well as developing countries both to rent and to own. As a result, nations integrated affordable housing provision programs. Affordable housing is a program that goes beyond providing just housing.

To maintain those programs, scholars and policy makers have tried to define what affordability means in housing. There is no common consensus of definition in the affordability meaning. Future more, there are difficulties in measuring what affordable housing must look like. The commonly used measures arise from expenditure and income ratios. Some other scholars have developed their own measurements. The very major gap in measuring the housing affordability in most measurements especially ratios lack the ability to consider household size and space, house hold preference, and compatibility with the households.

Nevertheless, several studies have been made on housing and health. Many of those study show lack of housing, unaffordability, physical deterioration, inadequate housing, housing with lack of tenure is all characterized by impacting the health of the households. For example, physical

deterioration caused by dampness causes “SBS”. Housing unaffordability is characterized by increased mental health problems. This is even aggravated in forced eviction, incompatible housing.

3.12 Conceptual framework of the study:

After following the footsteps of previous researches, this part of the paper discusses the conceptual framework used to answer the research questions. The variables of the study are could be classified under three categories. The first categories are the independent variables, those variables are part of the study which are measured. Those variables include economic affordability, compatibility with household needs, and spatial adequacy. The second variable the dependent variable. Those variables are the housing stress which is measured or affected by economic affordability, compatibility with households needs, and spatial adequacy. Well-being impact of housing stress, and level of affordability problem are also considered dependent variable which are moderated by third type of variables called “moderating variable”.

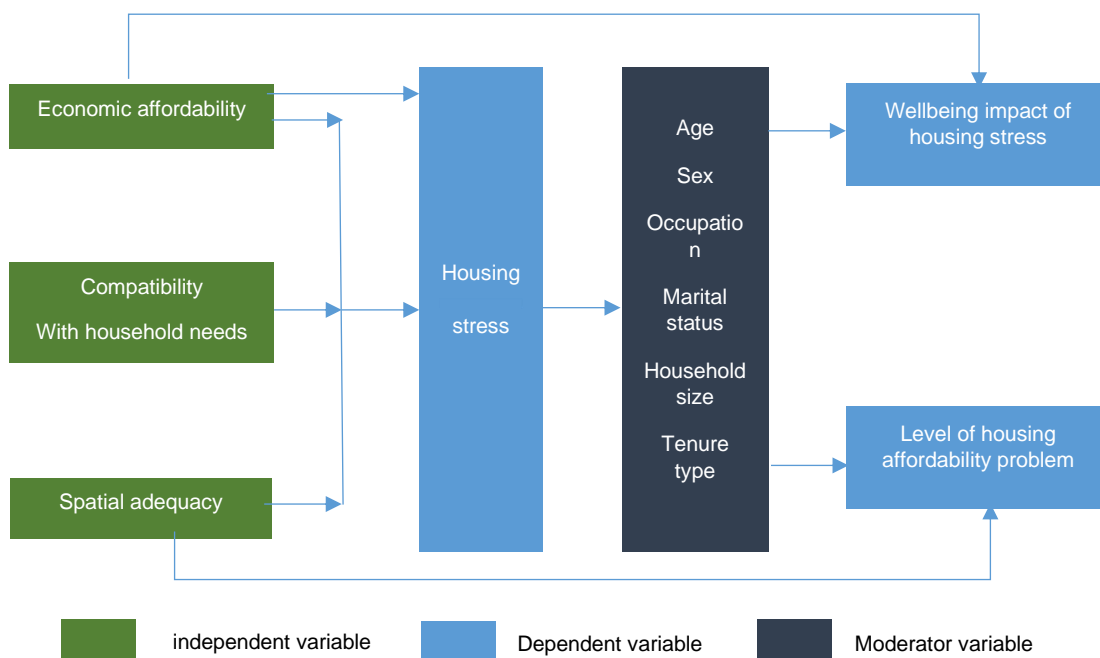


Figure 9: conceptual framework

3.13 Theoretical framework:

By accepting the concept of housing as a basic as point out by Maslow, and this paper agrees by the use of housing definition coined by John F. Turner which is housing has both aspects of value both the materiality as well as the provisional value. Since this paper aims to study housing affordability beyond the economic aspect John Turners definition fits sufficiently to the context.

in the measuring of housing affordability a economic aspect, compatibility with household needs and spatial adequacy is used by merging the definitions. in understanding level of housing affordability problem, expenditure to income ratio, rent to income ratio, mortgage to income ratio, are price to income ratio are used. To get the prospective beyond quantitative data, subjective affordability measurement is used.

compatibility is in the literature is related the specific needs that a household possesses. Compatibility as mentioned in other contexts as suitability is characterized mainly as “needs specific to household”.

In the case of comprehensive affordability. The research has avoided the victimization of affordable and unaffordable while

	Economic affordability	Compatibility with household needs	Spatial adequacy	conclusion
1	No	No	No	Acute housing problem
2	No	yes	No	Unaffordable poor housing
3	No	No	yes	Unaffordable poor housing
4	No	yes	yes	Unaffordable housing
5	Yes	No	No	Affordable lowered standard housing
6	yes	yes	No	Inadequate housing
7	yes	no	yes	Incompatible housing
8	yes	yes	yes	Affordable (desirable) housing

Table 12: logical argument of the paper (source: author)

Acute housing problem: the acute housing problem is a housing problem with an immediate housing need. This type of housing is characterized by inadequate space, incompatible housing or neighborhood and economically unaffordable. This type of housing is just better than homelessness.

Unaffordable poor housing: this type of housing refers to a housing which lacks adequacy or compatibility in addition to lack of economic affordability. The issue of such problem arises the housing spatial adequacy

Unaffordable housing: is a housing which is adequate and compatible but lack economic affordability. The main problem with this housing is lack of finance. The unit or home being lived in is adequate in space and compatible.

Affordable lowered standard housing: this type of housing is economically affordable but lacks both adequacy and compatibility. The main reason for choosing this type of housing is its economic affordability only.

Inadequate housing: a housing which is economically affordable, compatible in housing but lacks a spatial adequacy is called inadequate housing.

Incompatible housing: is economically affordable and spatially adequate but lacks in fulfilling the specific household need. Thus, lacks only in compatibility.

Affordable housing: affordable housing is a housing which is adequate spatially, compatible with household need, and economically affordable.

Thus, the study bases on previous studies made by other scholars. The research gaps the knowledge on Ethiopian context specific to the IHDP program. It analysis the affordability of the units, the compatibility, ad spatial adequacy Using perceived and ratio methods.

Affordable housing: a house which is economically affordable, spatially adequate, and functionally compatible for a given household.

Housing stress: refers to housing affordability stress. Paying more than 30% of a given expense. Does not directly relate to mental strain.

PART 4: RESULTS

4.1 INTRODUCTION

The data collected from both primary and secondary sources were analyzed using the third-party software MS-Excel and SPSS. This part of the study describes the collected data relevant to the research question and analyses the results with discussions. It shows the resulting housing affordability stress and the correlation between dwellers' well-being, and the relationships between the moderator using multiple sets of tools. It also addresses the housing adequacy and compatibility of the study area.

4.2 SOCIO ECONOMIC PROFILE OF YAC

Marital status of the households: 80% of the dwellers in YAC's selected blocks are married. And, 5% divorced, and 15% single. Results from both the questionnaire and interview implied that married people tend to choose condominium housing for two reasons. One of the reasons is the absence of a landlord or owner. In situations where the landlord and owners are present (like private rental housing), privacy and freedom are bridged. While in a condominium there is a clear set of freedom. As a result, newly married couples or couples married in another type of housing who have children prefer to dwell in condominium housing in search of freedom and privacy. The second reason is single people tend to get married as they become owners of condominium units. There are not many affordable options for homeownership in Addis Ababa other than condominium housing.

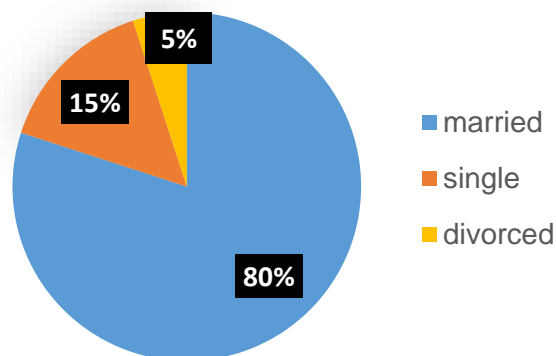


Figure 10:marital status of households in YAC's selected blocks

Household head characteristics: 73.4% of the household head is male. This is due to women's difficulty economically and pressuring cultural impact. This is seen in households where both the husband and wife have a source of income. Despite providing a substantial amount of money to the family, the woman tends to think of her husband as a household head.

Age: The age ranges from 18 years old to 80 years. Yet most households are between their middle 30s to early '50s. Age below 30 and age beyond 50 are not common. The average is 41.27.

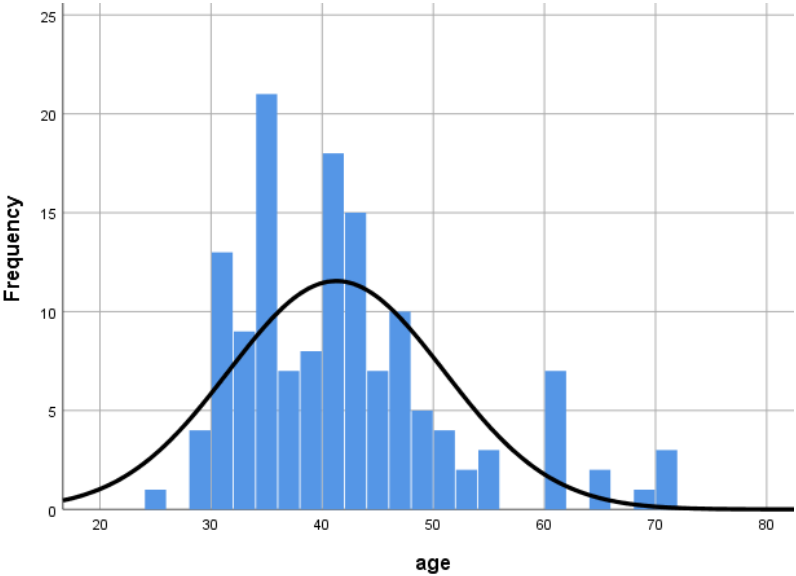


Figure 11: age distribution in the selected blocks of YAC

Tenure type composition: 59 % of dwellers in the studied blocks of Yeka Abado Condominium are owned in rental tenure. Due to the unaffordability of the units’ mortgage, many owners have rented them out. As a result, in some respect, 25% of the dwellers are owners with a covered mortgage. While the rest, 16 % of the total population are beneficiaries with an owner with incomplete mortgage. This signifies that at least half of the population is not a direct beneficiary of the IHDP program which is aimed at housing low groups. relating this to (anonmous, 2017-18) report by English housing survey, which is made in England shows that outright ownership is a declining trend in the developing countries where is this paper also shows a similar trend in the developing countries like Ethiopia.

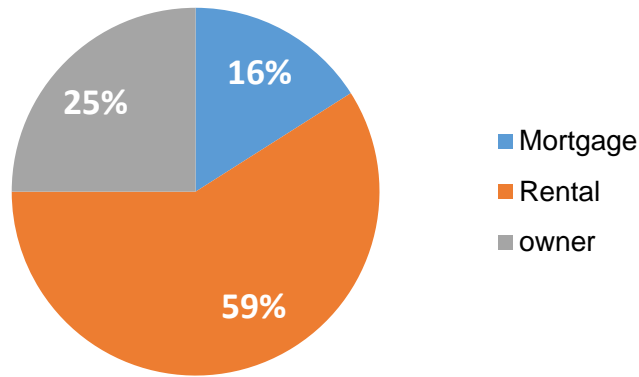


Table 13: Tenure composition of selected blocks of YAC

Occupation: most of the dweller’s work and careers are dependent on the private sector. 55% of the dwellers are engaged in their private work like construction works, owning shops in the city, and transportation services are common. Among the general population, 30 percent are engaged in government-based civil servants like teachers, and government officials. Most of them travel to the inner city, to their workplace in the morning while returning in the evening. Some other sources of income in the neighborhood are, pensions, NGO hired workers. Some families get support from abroad through remittance and goods like clothing.

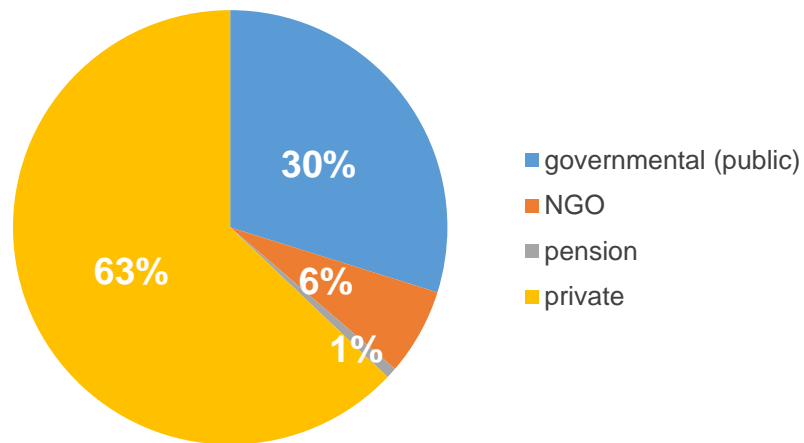


Figure 12: occupational distribution in selected blocks of YAC

Income by tenure: the average monthly income for the households in the neighborhood is 15,000 ETB while the median income of the neighborhood is 13,000 ETB. The smallest recorded income is 3,000 ETB while the highest is 150,000 ETB. Some households do not have a personal income. This

people base their life on the support of extended family. when compared by tenure type, income is much higher in rental tenure followed by mortgage owners.

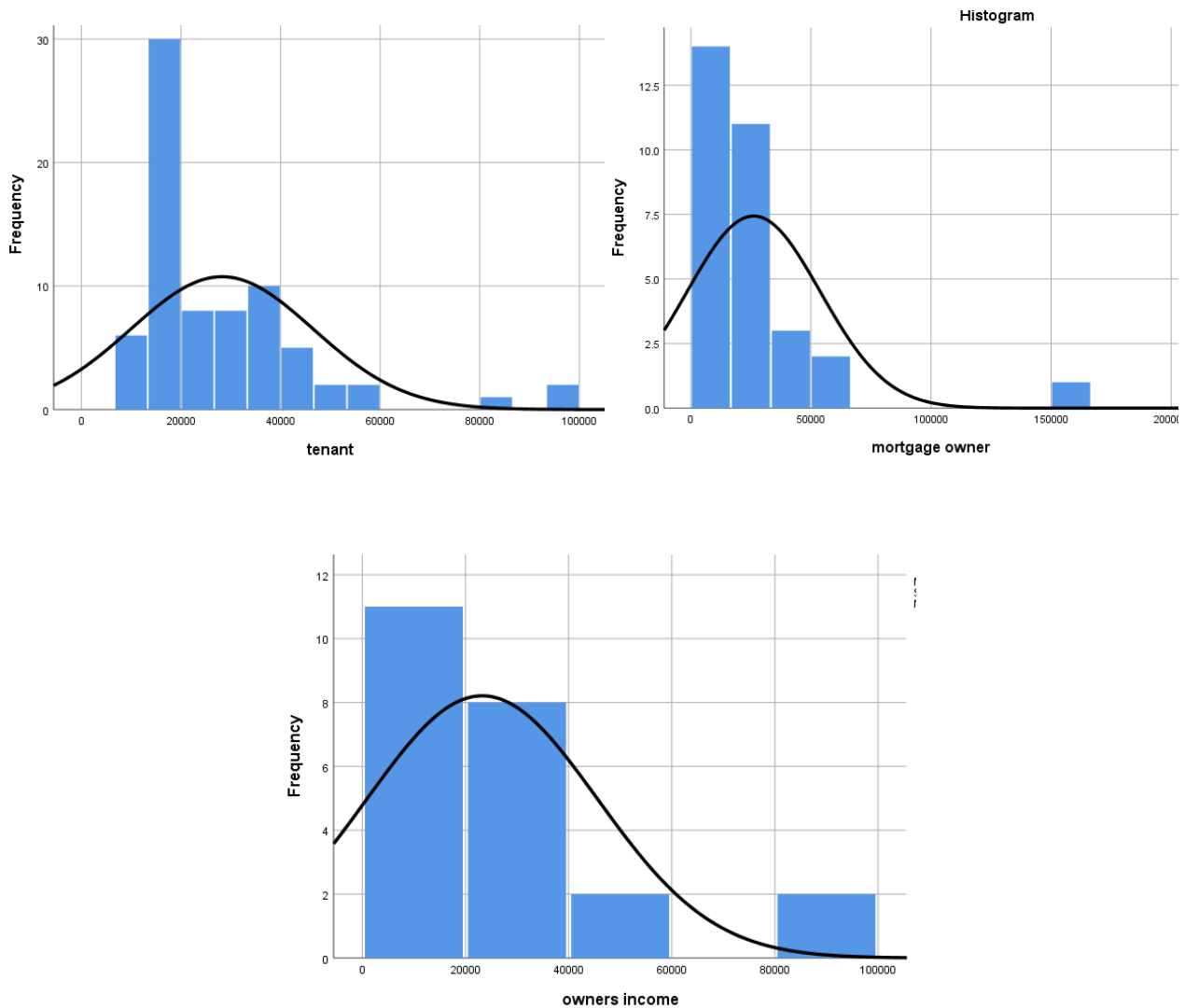


Figure 13: income distribution by tenure type in YAC selected blocks

Means of transportation: within the neighborhood the main means of transportation is by foot, and Bajaj⁴. Whereas in the morning and evening public transport options like school buses, public servants' buses, institutional buses, the meter taxi, and the most commonly used taxi minibus are used as a means of transportation. Due to this reason the traffic is congested by vehicles. And finding

⁴ Three wheel motor vehicle common in Ethiopian cities.

transportation in the morning is quite difficult. In addition to this, 25% of the dwellers are owners of the private vehicle making the congestion higher.

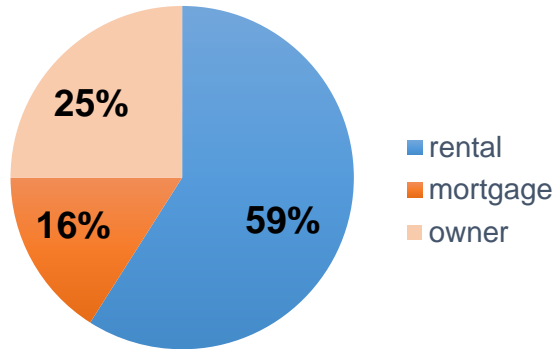


Figure 14: composition of tenure in YAC selected blocks

Family size: since most households are married; the family size is greater than two. Only 6 households from 100 live solo within the YAC. The frequent family size is four. Mostly parents and children. Most working families during the daytime who have kids under six years tend to place a maid for babysitting and cooking, washing purposes. Some who are economically lower or prefer to raise their child for themselves are more likely to place the mother at home even if she has paid work during the daytime.

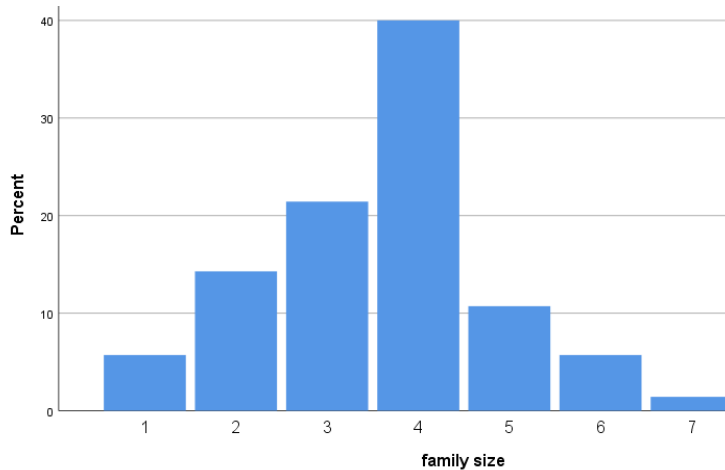


Figure 15: household size of the selected blocks of YAC

Social services in YAC: social amenities which are found in the neighborhood are either were in the design or are added after the construction. Some of the pre-intended social services are primary and secondary schools, green areas, and clinics. Despite being intended for some other services,

undeveloped and open spaces are transformed into some other services. For example, in the NDP, as space planned for a kindergarten was left open, is now serving as a paid parking space. Some of the social amenities on the other hand are transformed built spaces. Within the neighborhood, two private clinics are opened through the rental of the communal buildings. In some cases, gyms and other economic activities take place within the communal building. The most complained social services are telecommunication and transportation. Banks, restaurants, and shops are located within the condominium block's ground floor. Due to this reason fewer complaints were raised about such services. Among mostly mentioned to be added to the neighborhood service and amenities are recreational and sports centers.



1. A land use for kg being used for car parking in the Meskelegna selected sub-neighborhood.
2. Land use of Meskelegna area, where land use for kindergarten is being used for parking.

Figure 16: design and onground function mismatch

Crime and pollution: 84% dwellers agree that the crime in YAC is low and is decreasing from time to time. Yet the police station in the neighborhood believes that there are some common crimes taking place. Robbery of houses through similar key or picklock is one of them.

Meanwhile, YAC is considered a cleaner neighborhood by most of the dwellers very few of the residents claim pollution due to waste disposal problems. There is no direct fee that residents pay for the collection of waste. But once per week, the collection is done by small enterprises.

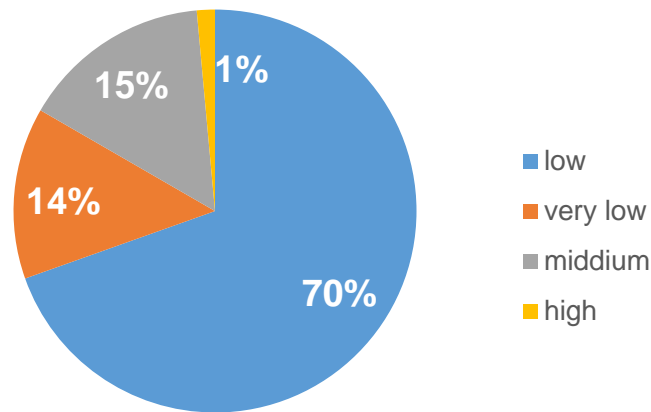


Figure 17: level of crime in YAC

Housing condition: the housing condition of the condominiums is a far more acceptable standard. 95% are happy with the construction quality. And there are 2% of the households reported design defects that forced them to injury.

4.3 COMPATIBILITY WITH HOUSEHOLD NEEDS

4.3.1 Assumed compatibility with household need

Every household has its unique requirements. This is due to the special needs of each household claims. Some of those include family size, spatial requirements, and closeness to the workplace. Rather than in addition of asking each component the question of compatibility was directly asked. As per the question, 50.7% of the households consider their home to be compatible reasonably. While a significant amount of them 37.1 % responded that the housing they are living in is incompatible with their specific needs.

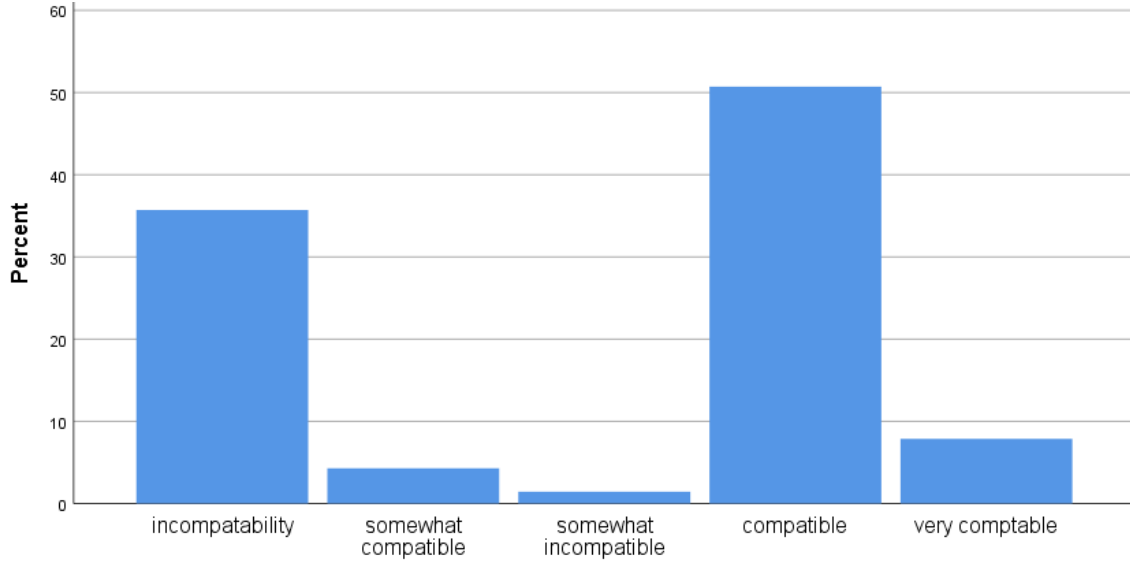


Figure 18: perceived compatibility of units in YAC selected blocks.

4.3.2 Their chosen location and house type with the current ability

Most of the household's primary choice is not condominium housing for all tenure types. A house with a private plot or villa is the primary choice of housing for many households. A significant number of them also reported their primary choice to be an apartment. Considering the location, many families choose an inner-city. Those of them who choose a condominium required an additional space provision or addition of rooms. Very few are happy with their current housing choice and location.

4.3.3 Activity compatibility

a. Compatibility for sports activity

Sports activity is a crucial element in a given neighborhood. With the increasing demand for exercise both due to lifestyle changes and considerable attention to wellbeing and fitness within the society, sports activity is essential for a well-functioning and healthy neighborhood. In addition, sports activity is part of the entertainment and recreation option for some households.

As the result shows limitation for sports activity within the neighborhood is limited to some extent. 51% of the household heads experienced the limitation the neighborhood has for sports activity. Yet, despite lacking a formal sports center in the neighborhood, people in the area are exercising in the morning on the streets. Children also play football on weekends in open spaces and streets. There is also a communal building that is transformed into a commercial gym.

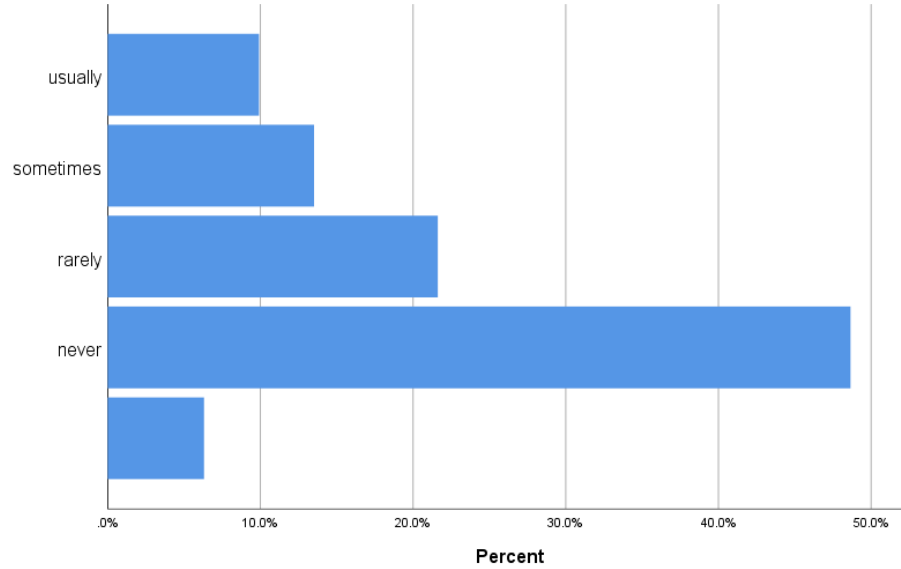


Figure 19: Graph of compatibility of the neighborhood for sports activity

b. Compatibility for cleaning and washing activity

Most households in Ethiopia do not use washing machines and driers for their clothes. Rather they are mainly focused on human labor and solar power to wash and dry cloths. As a result, many households report incompatibility in washing and drying clothes. 51.4% are affected by incompatibility for washing and cleaning activities. Similarly, 26.4% of dwellers are able to do there washing activates without limitation.

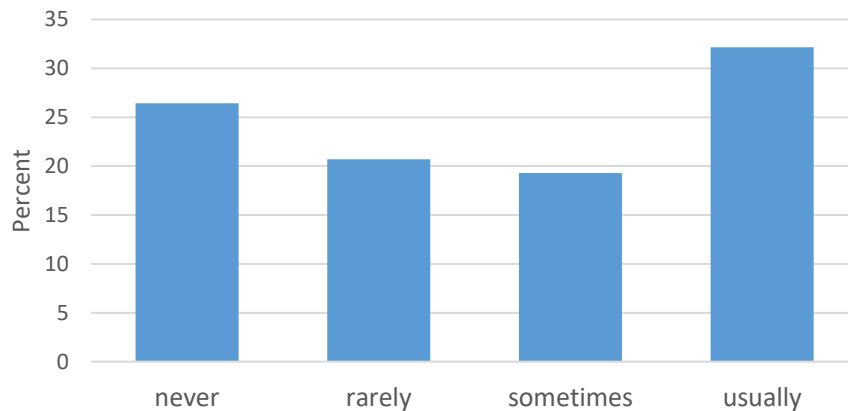


Figure 20: Graph of compatibility of the neighborhood for cleaning activity

c. Compatibility for religious activities

Religious activities are an integrated part of Ethiopian society. Sundays are commonly a church day for Christians while Friday is for Muslims. Along this many of those activities take place both at the neighborhood level as well as in their respective homes. Through such activity, their home and neighborhood are analyzed. The finding shows that only 17 percent have difficulty on the day to day bases. Predominately most households never experience such difficulty. Related to this there are 4 percent who do not practice any religious or ritual activity within their home or neighborhood. People who do not practice any religious activity within their neighborhood do not necessarily imply that they are not religious. There are two main reasons for them not making religious activities. One they prefer to do somewhere else outside of the neighborhood and avoid religious activities within their home. Secondly, they do not practice religious activities on daily or weekly bases.

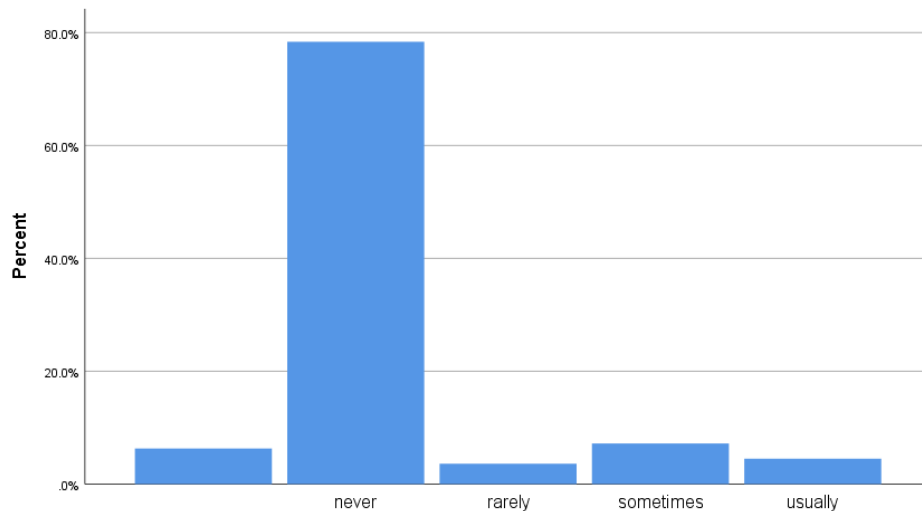


Figure 21: Graph of compatibility of the neighborhood for religious activity

d. Compatibility to social events and activities:

Social events in the Ethiopian community are the central themes of social gatherings. Weddings, funerals, takes giving ceremonies all are very important gatherings. Yet such activities would have taken place in large outdoor tents in private houses due to large people gatherings. In this case, most families have somehow experienced difficulty due to incompatibility of the neighborhood and the unit for such a case. There are more than 30% of the population who do not suffer from the limitations of social events, yet since many of the social activities take place over the years, they may not experience it during their stay.

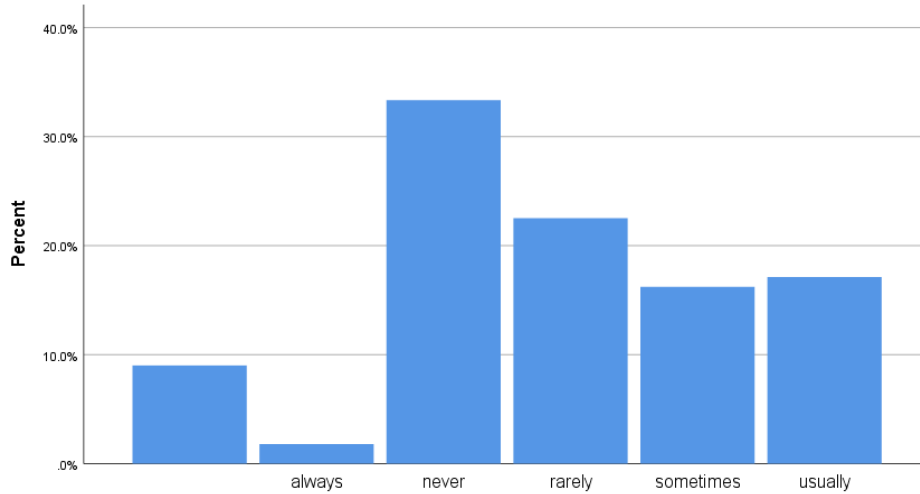


Figure 22: graph of compatibility of the neighborhood for social activity

e. Compatibility to recreational and entertainment activities

There is no active recreational and entertainment center in the neighborhood. The few recreational spots that could get mentioned include games zones and small green areas within the compounds. Residents mostly prefer to walk on the street walkways for recreational purposes. As a result, many people struggle to get an entertainment and recreational center for their family members. Some households have avoided currently their recreational activities due to the COVID-19 pandemic in 2020 and 2021 while this research was going on. For this reason, their primary choice of recreation and entertainment was television and the internet.

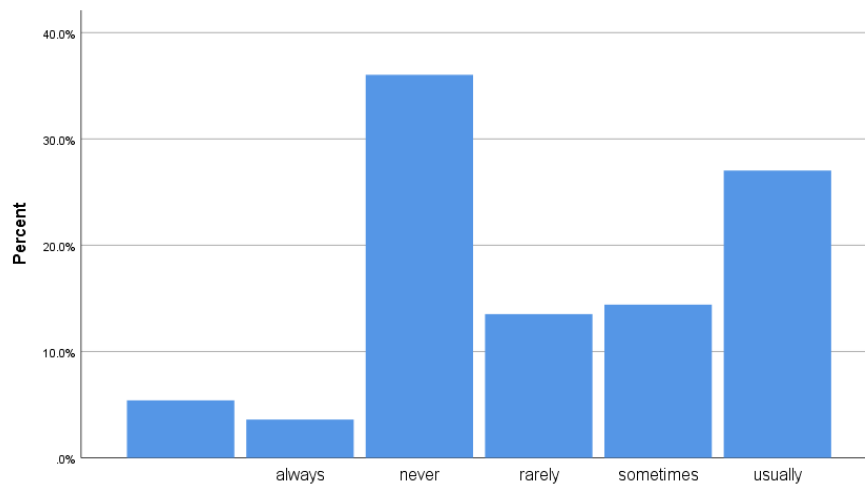


Figure 23: graph of compatibility of the neighborhood for recreational and entertainment activities

f. Compatibility and satisfaction with social services.

Several social services function for the societal good of the neighborhood. Some of those functions include Banks, primary and secondary schools, clinics, waste management services, power, and electricity, are some of them. Satisfaction with social services indicates compatibility and adequacy of services with the neighborhood demand.

Health center: health centers are crucial for well-functioning societies. Access to medical and health services is placed important goal in the millennium development goal as well. In YAC the health service is provided by two private clinics as well as one governmental clinic. As per the review, the health service is considered pleasing for many residents. The finding shows that the health service is one of the most admired services compared to other services.

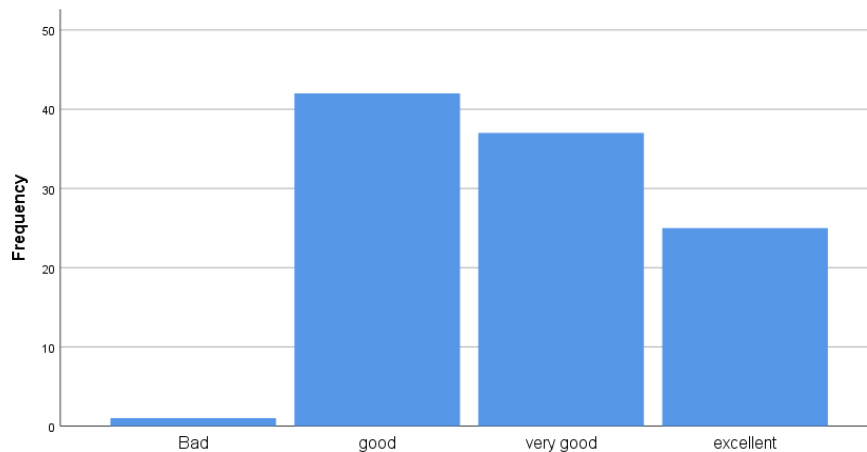


Figure 24: graph of quality of service in YAC: health center

Waste management: the neighborhood is designed and constructed with good waste management service. A small number of people have complained about waste management. Such waste management complaints arise from floor to floor waste management problems. Most of the outdoor waste management residents are happy. Floor to floor and neighbor to neighbor waste management are caused by construction defects or improper usage. Below is the response of residents in YAC on neighborhood service quality for health centers and waste management.

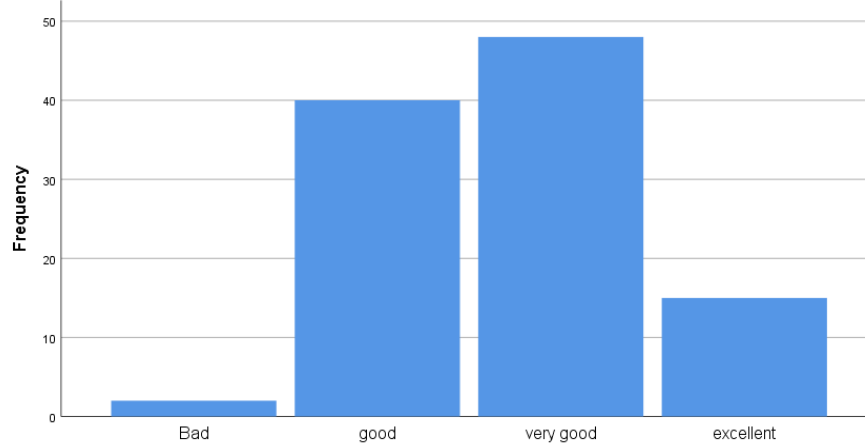


Figure 25: graph of quality of service in YAC: waste management

Electricity: the electric service is the most complained service within the neighborhood. There is a bad review by society in general. The residents say electricity is interrupted at least once a week for at least half a day. As a result, many of the people are unhappy with the electric service.

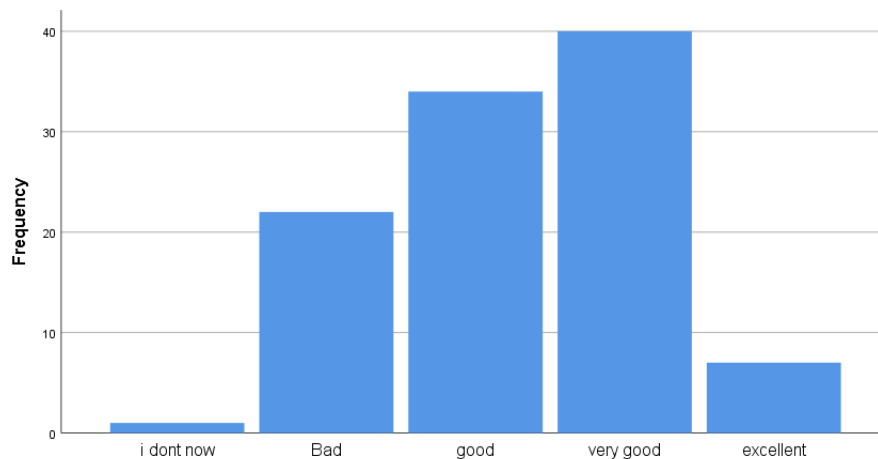


Figure 26: graph of quality of service in YAC: electricity

Primary school: the primary school in YAC is part of the design of the neighborhood as well as constructed for the intended service. Many households send their children to the school within the neighborhood yet a similar number of families also send their children out of the neighborhood with the assumption of the school within the neighborhood is low quality. The finding shows that many households think the primary school quality is decent. 10 percent of the population thinks that the school quality is either bad or does not know its status.

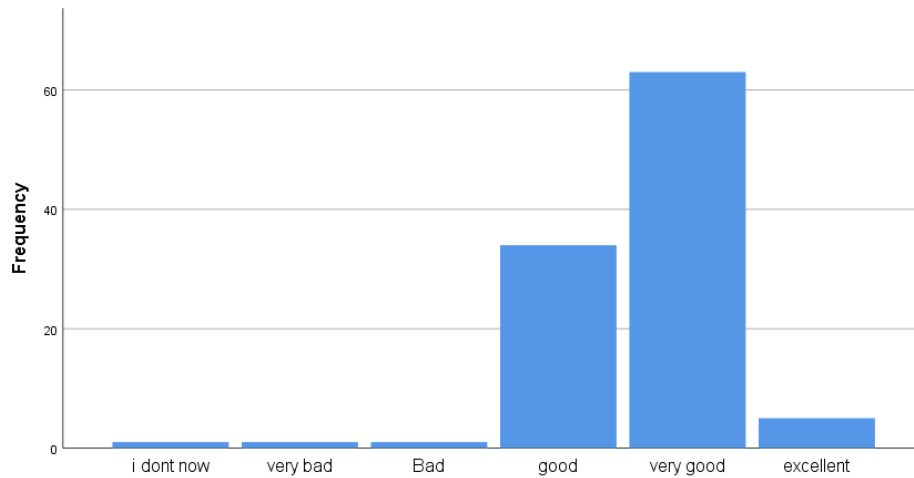


Figure 27: graph of quality of service in YAC. Primary school

Secondary school: the secondary school within the YAC is aimed to provide secondary school education to the residents. It was conceived before construction in the design phase. Residents consider the school of good quality in its physical condition as well as its service quality. It is also pleased with the location’s accessibility.

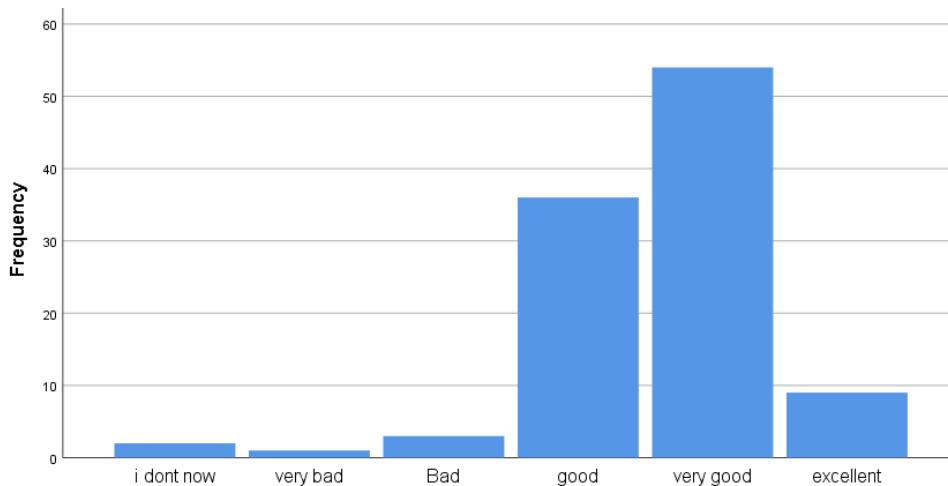


Figure 28: graph of quality of service in YAC: secondary school

Religious center: there are no religious institutions integrated into the design of YAC yet with the development of the neighborhood religious centers are formed around the neighborhood. Mosques and churches are abundant. Even though 3% of residents prefer to go somewhere else for their religious activities. This is even more prominent to believers who are attracted to mass gatherings.

This doesn't mean that they do not participate locally, rather their initial preference isn't within the neighborhood.

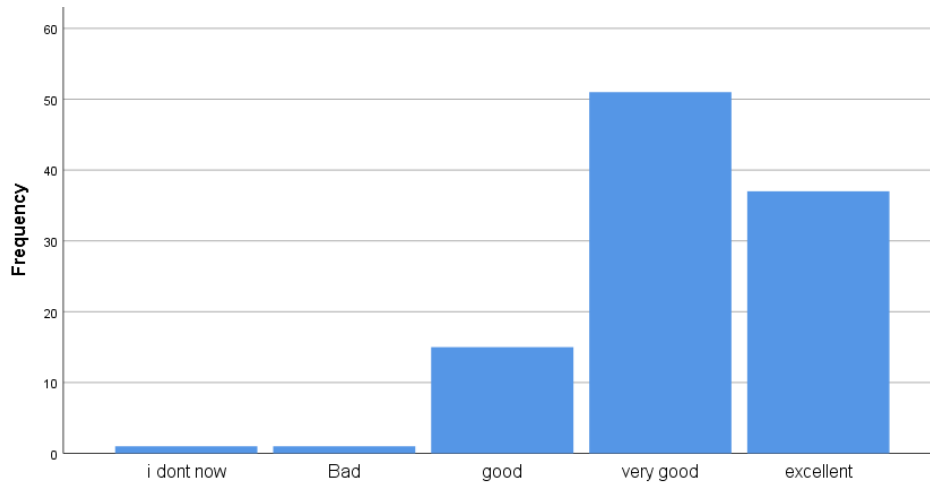


Figure 29: graph of quality of service in YAC, religious centers.

Bank: several banks both public and private are provided within the neighborhood. And the quality of service is praised except for commercial bank the respondents.

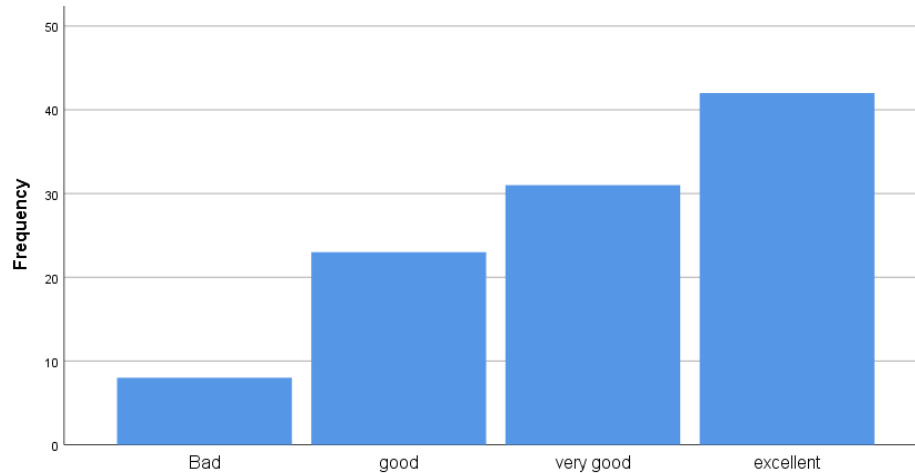


Figure 30: graph of quality of service in YAC: banks

Telecommunication: the telecommunication service is considered poor in YAC. This is because of interruptions in voice and internet services in most of the neighborhood. As the dwellers say the problem is even more prominent in the evening and on weekends. As a result, many households respond negatively to the telecommunication service of YAC.

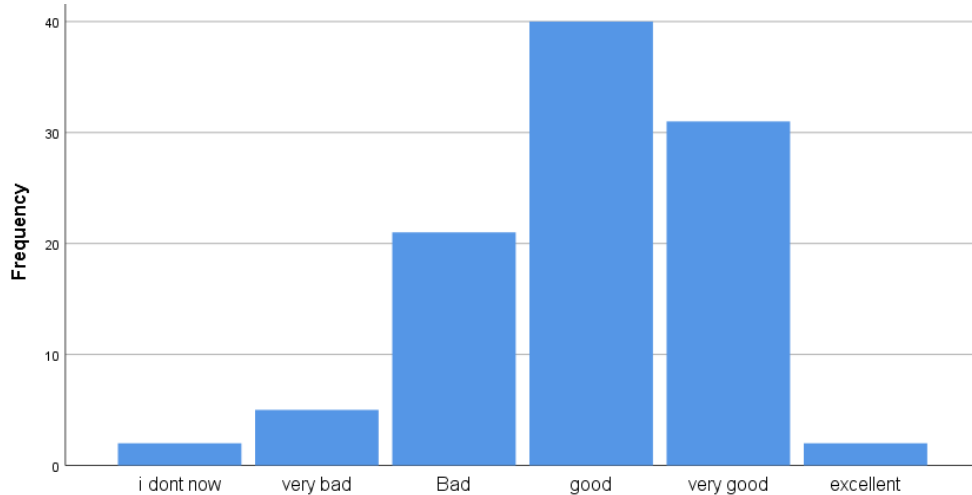


Figure 31: graph of quality of service in YAC: telecommunication

Transportation: The transportation service is considered good by many of the residents. The reason for this is access to public buses. But most of the time, during the morning time access to transportation is challenging and since many people work outside of the neighborhood large amount of people wait for a taxi and buses. As a result, waiting for several minutes or maybe hours is the experience of the residents.

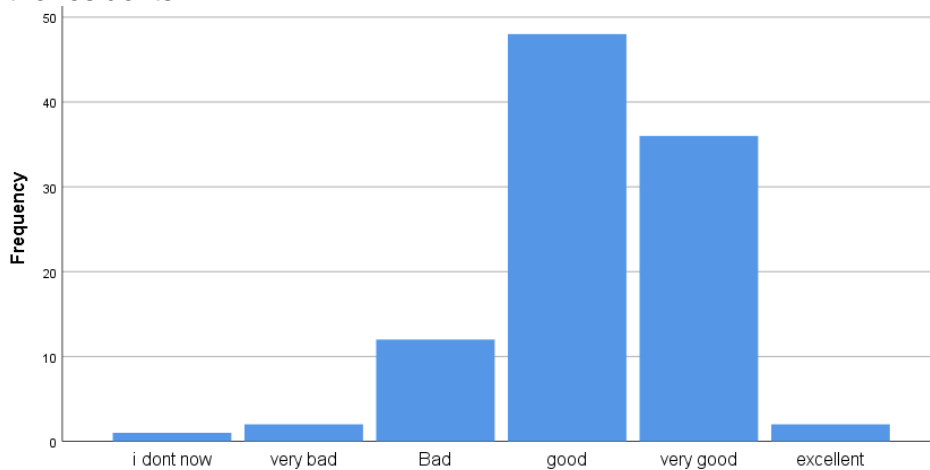


Figure 32: graph of quality of service in YAC: transportation

Market: there are two types of markets government established and small open markets called “gulit”. There are several goods and services provided by the market. Some of the major goods include fruits and vegetables, furniture, clothes, and household items are the main items. As a result, the market is considered good by the neighborhood.

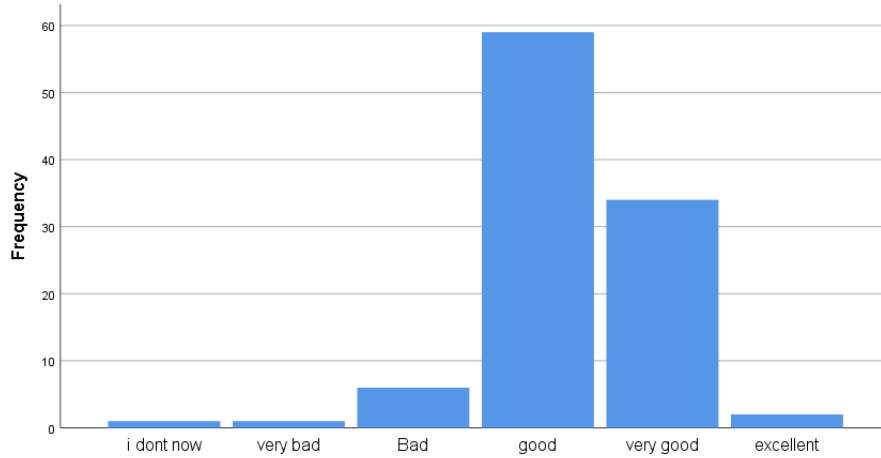


Figure 33: graph of quality of service in YAC: market

Sports center: there is no well-established sports center in the area. The residents use the streets to exercise in the morning. It is common to see teenagers playing football in undeveloped open spaces.

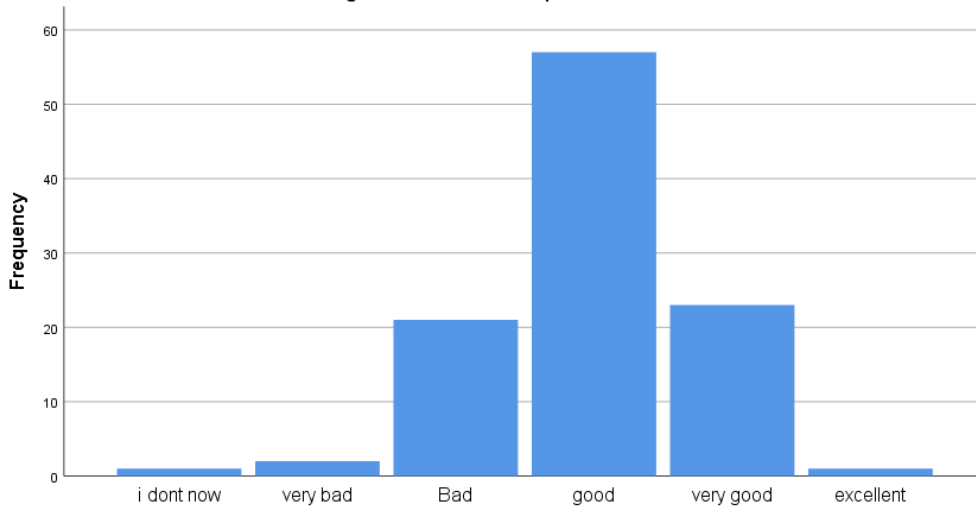


Figure 34: graph of quality of service in YAC: sports center

Recreational center: there is no recreational center in YAC. So most of the respondents are not positive about the recreational and entertainment spaces.

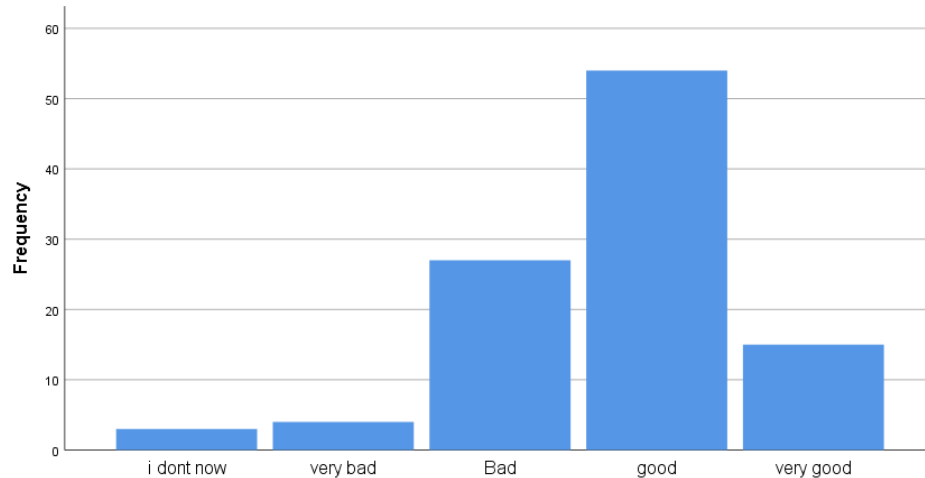


Figure 35: graph of quality of service in YAC: entertainment and recreational center.

4.4 ADEQUACY

a. Assumed adequacy of the units

75 % of the respondents wished they had a wider space or additional room within their unit. Most households are using spaces beyond their intended purpose. For example, the living room of many households is additionally used as a sleeping space for guests, a children’s playing area, and in some cases a storage space. For example, kitchen spaces are used additionally as storage space.

b. Overcrowding

In measuring housing overcrowding one of the most commonly used methods of measurement is person per bedroom. It is based on the number of bedrooms and about a number of the household members. The average number of people sharing a single bedroom is 2.7 or approximately 3 people sharing a bedroom. The maximum number of dwellers sharing a single bedroom is 6. Meanwhile, there are families with the free additional bedroom.

c. Supposed room function vs. household defined activities

Living room: The living room is the most widely used space within the units. The major purpose of the living room is to function as a family gathering space almost 100% of the time. Followed by a dining space. More than 90 % of the households use the living room for dining activities. In the table below is the list of activities taking place in the living room. The table shows how the living room is a multifunctional room addressing several activities including storage and sleeping space. The percentages show that the general activities are widely practiced within the YAC neighborhood

Family gathering space	Dining space	Children's playing space	Sleeping space	Storage space	Reading space	Sleeping space
95.4 %	90%	60%	25%	25%	1%	52%

Table 14: Different use of the living room in YAC. (Source: author)

Kitchen: The kitchen is mainly used for food preparation. But in the YAC neighborhood, the kitchen space has a wide variety of function that doesn't relate directly to cooking service. For example, 8.6% of households use the kitchen as a sleeping space in addition to food preparation. The list of activities and percentage of households engaged in the activities is listed below.

As a sleeping space	Family gathering space	Cooking and dining area	Childers playing area	Storage	Living space
10%	23.3%	100%	15.2%	61%	1%

Table 15: Different functional uses of the kitchen in YAC. (Source: author)

Corridor: The corridor is not considered to be intentionally used for a certain activity. In the case of YAC, the corridor serves many functions beyond connecting spaces. The functions that the corridor servers are not intended in the design phase. The functions of the corridors are defined predominantly by the users.

As a sleeping space	Family gathering space	Dining space	Storage space	none
4.2 %	6.3%	5.2 %	74%	11.5 %

Table 16: Different functional uses of the corridor in YAC. (Source: author)

Veranda: The veranda is a porch found outdoor. It is one of the spatial elements of the design. The main function of the veranda is to connect units and provide an outdoor experience for the dwellers. Beyond this, several functions are integrated by the dwellers into the space.

family gathering space	Dining space	Children's playing area	Storage space	Cloth hanging space and washing	Coffee ceremonial activity
14.6%	10.7%	45.6%	46.6%	50%	1%

Table 17: Different functional uses of the veranda in YAC. (Source: author)

Toilet : The finding shows that the toilet has three major functions. As a bathroom, as a cloth washing area, and finally as a storage space. More than 35 % of the YAC dwellers use the toilet as an additional storage space. And 81.9 % as a cloth washing space.

4.5 AFFORDABILITY ANALYSIS

4.5.1 Subjective affordability

Affordability could not be analyzed by empirical data only. The downside of using such a mechanism is discussed in the literature part. To get the overall picture subjective part of affordability is crucial. Some of the indicators include, longevity of stay within the neighborhood and “their why?” to choosing YAC is descriptive to the scenario of subjective affordability. It shows, why they traded other housing options for the YAC.

a. Fear of forced eviction

Fear of forced eviction is an indicator of a lack of good tenure security. With increasing fear of forced eviction, it is said to be poor tenure security one is experiencing. Fear of forced eviction is seem more on rental tenure, where more than 25% have fear of forced eviction sometime in the future.

Fear of forced eviction by tenure type			
	Rental	Mortgage	owners
never	63.7	16.3	100
rarely	10.0	5.0	
sometimes	22.5	3.8	
usually	3.8	1.3	

Table 18: Fear of forced eviction

b. Experience of several move-outs

Having to experience several moves out has an unwanted psychological impact. Thus, 38 percent of the respondents have experienced several moves out before their current home. 35 percent of the total population has experienced the move out more than four times.

c. Experience of disruptive move-outs

Many scholars agree that disruptive moves of housing change interfere with children’s educational achievement, and emotional and general health outcomes of household members. It also interferes with the social functioning of the household. In the case of YAC, only 16.5% of the population has experienced disruptive moves. Out of 16.5% of respondents, 32.6% experienced it more than twice.

d. Experience of verbal abuse or argument from officials or owners

The experience of verbal abuse is low especially in mortgage and complete ownership. While a small number of dwellers in rental units experience arguments whenever rent raises are considered and rent payments get paid late.

e. Existence of legal document of rent

More than half of the dwellers in the rental unit do not have any rental document or the document has expired long before. Those residents who do not have legal documents say they are okay without rental documents.

f. Years lived in Yeka Abado Condominium and reason

78.6% of the households in YAC have stayed for more than three years in their units. There are 5 reported cases in shifting units within the neighborhood. The aim of the shifting was to lower the standard of living to gain affordable units. According to the questionnaires, the major reason for choosing to live in the YAC neighborhood other than the lottery is affordability and freedom. Even if the affordability of the rent is the case, this is not completely true in the current scenario. Some of them are now complaining about rent increases in the neighborhood. Some households shifted from three or two-bedroom to a studio and one-bedroom. Even though some people complain many agree that the rent in YAC is more or less affordable compared to other IHDP condominium sites.

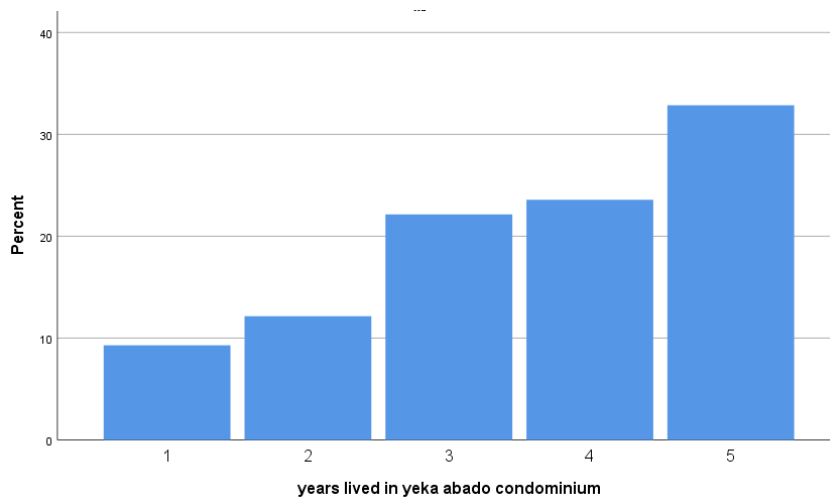


Figure 36: duration of stay in YAC selected blocks

g. Satisfaction within the neighborhood

The ability to pay doesn't solely define what is affordable. Living in a neighborhood that doesn't fit or satisfy the household's physical social and economic needs but only fits the budget of the household

cannot be considered affordable. As a result, their satisfaction with the neighborhood was presented to the household heads. The result shows 55% of households are somewhat satisfied yet they demand beyond the current capability of the neighborhood.

h. Satisfaction of the unit

Similar to the neighborhood satisfaction with the unit is crucial otherwise it gives a blur conception of affordability. To understand the rate of satisfaction with the unit they are living in a direct question was presented. The result shows that most households think their unit is average. 77.6 % of the households compare and contrast the units with their previous housing and praise the current housing type. But most of them complain about spatial inadequacy.

i. Housing preference

The most commonly preferred housing is the life of a villa house. Almost all of the households did not have experienced a high-rise building lifestyle. This is due to the national housing typology being mainly single-story the national housing typology consists of 98.3% of non-storied houses in the 1994 census. Many of them grew up in neighborhoods with private plots or at least in a ground house. Many of them still hope to get a housing option with a home with a yard. Those who think affordability of such housing is worrisome tend to think apartments to be a greater option due to their improved quality and location.

j. Willingness to continue living in Abado condominium

Most of the households are willing to continue to live in Yeka Abado Condominium. Their primary reason is lack of housing options within the city, lack of quality housing, lack of affordable housing, disliking to move out several times, and disliking to abolish already constructed social cohesion in YAC. As a result, many households wish to fit into the Yeka Abado and stay longer as much as they can.

4.5.2 Economic affordability

a. Struggle to pay for mortgage or maintenance or rent.

Half of the YAC households have experienced the inability to pay for their rent or mortgage during some part of their stay in the Yeka Abado Condominium. They have reported that, they cover the period through cultural saving methods called “ekub”, loans, and making a deal with the owner to extend the payment period.

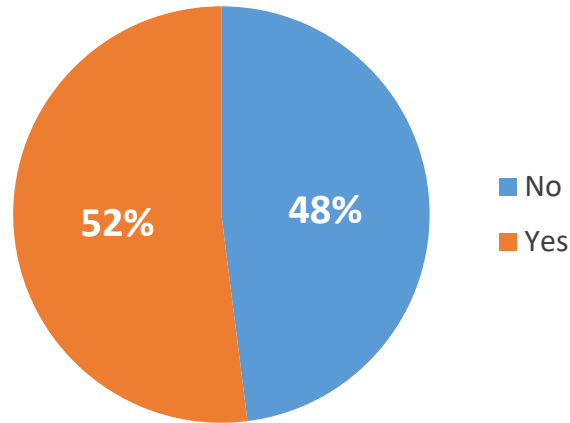


Figure 37 :struggle to pay for housing (mortgage, rent, maintenance)

b. perceived affordability of the units by dwellers.

Most households think that their unit is affordable. 75% of households think their unit “Was and somewhat is affordable” they think rent increase over a long period would significantly risk the affordability of the unit to each household. While 25% of the households consider the units are unaffordable. the only reason for this type of household is the inability to find low-cost housing.

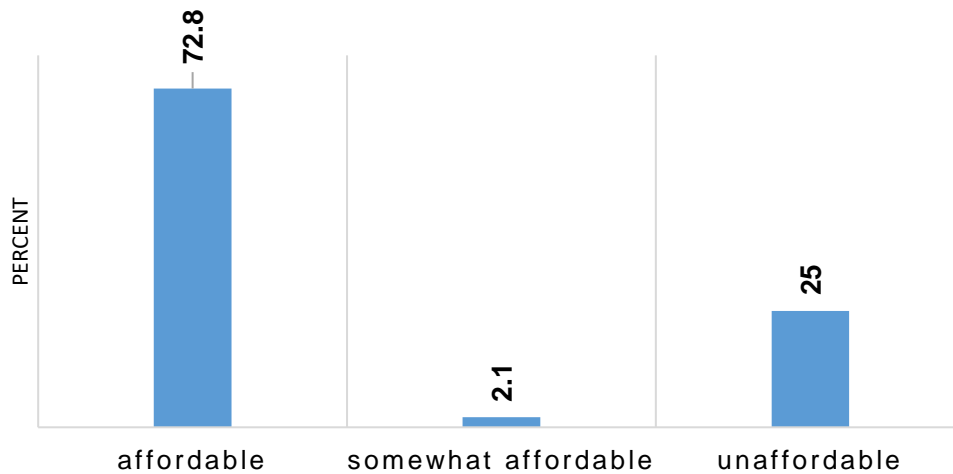


Figure 38: perceived affordability of units in YAC

When asked for why, they considered the unit affordable, they commonly responded,

- “Comparatively, affordable in relation to other condominium houses but not affordable for low-income groups”
- “The rent price is good comparatively”
- “The owner of our house didn't increase the rent to much.”

- “Comparatively Abado is affordable.”

The lesson from their response is, for those households, the primary reason for staying in Yeka Abado Condominium is not its affordability directly their ability to pay, rather lack of housing option has pushed them to stay in the condominium site.

c. Suppression of other needs

Families may have several priorities, for example, a family with urgent health problems or with the need for continuous health follow-up may suppress the need for food, clothing, and housing to support the health need. In some cases, the households generally prefer cloth or food over housing making their housing expense small. As a result, reading the household’s trend in expenditure is important to understand preference and affordability. The result shows that more than 60% of the households suppress their health, clothing, food expenses, or even recreational needs to maintain tenure. For more than 25% of those who suppress other needs, the suppression of the needs is not a rare incident. Rather, they suppress it several times over a year. They also consider a method of making the unit affordable to their need.

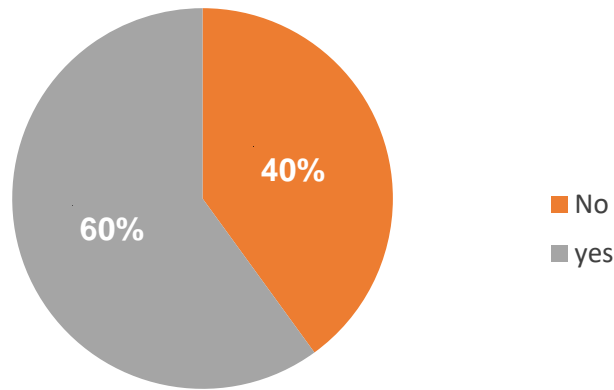


Figure 39: chart for suppression of other needs

d. Expenditure income ratio

The study has found that 34 percent of the households are under housing stress (are paying more than 30% of their income). The standard deviation of the expenditure income ratio measurement also is small, which is 0.12. Based on the standard deviation value we could determine that many people are on the verge of becoming under housing stress. Overall neighborhood’s average expenditure to income ratio is 0.26%. Some strict measurements of affordability place 25% of housing expenses as

a benchmark for housing affordability stress. If such measurement is used in YAC, more than 50% of all dwellers are considered under housing affordability stress.

e. price to income ratio (Purchasing capacity)

the housing price to income ratio based on unit by is analyzed, 4.77, 6.78, 9.55 and 13.57 respectively for studio, one bedroom two bed and three bed room units have been analyzed.

the housing price to income ratio of the selected neighborhood is comparatively good compared to the cities price to income ratio which is said to be 27.6 (Numbeo, 2021).

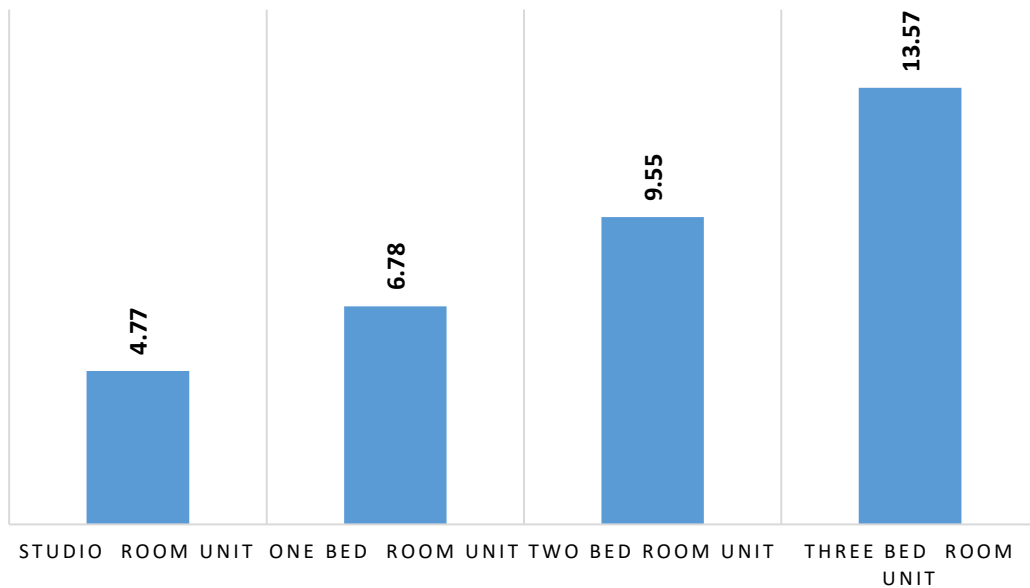


Figure 40 :price to income ratio of different unit types

f. Rent to income ratio (rent affordability)

Considering the time frame to be monthly income rent affordability is analyzed. The average rent-to-income ratio is 0.27. The standard measurement of rent affordability proposes the rate not exceed more than 30%. So, the average rate shows that 27% is the rent-to-income analysis. Out of the total respondent, 35 percent of the dwellers suffer from housing stress. This implies that 28.3 percent of them spend more than 30% of their income on housing expenses. Clearly, the data shows that on average half of the dwellers are in housing stress or in the process of becoming in housing stress in near future. Considering a less substantial increase in income for households

g. Expenditure comparison

Housing is by far the highest expenditure of families every month. In YAC the housing expenditure takes more than 32% followed by food which takes 29% of the housing expenditure. Among the basic necessities, the listed expense is made for clothing. From the total housing expenditure, 2 % of the expense goes to clothing. The savings of YAC are also low. The average saving for the neighborhood is 4% out of the total expenditure. Since many of the households travel a long distance to work, the transportation expense is also considerably high. The summary of the mean expenses of the major categories is presented below.

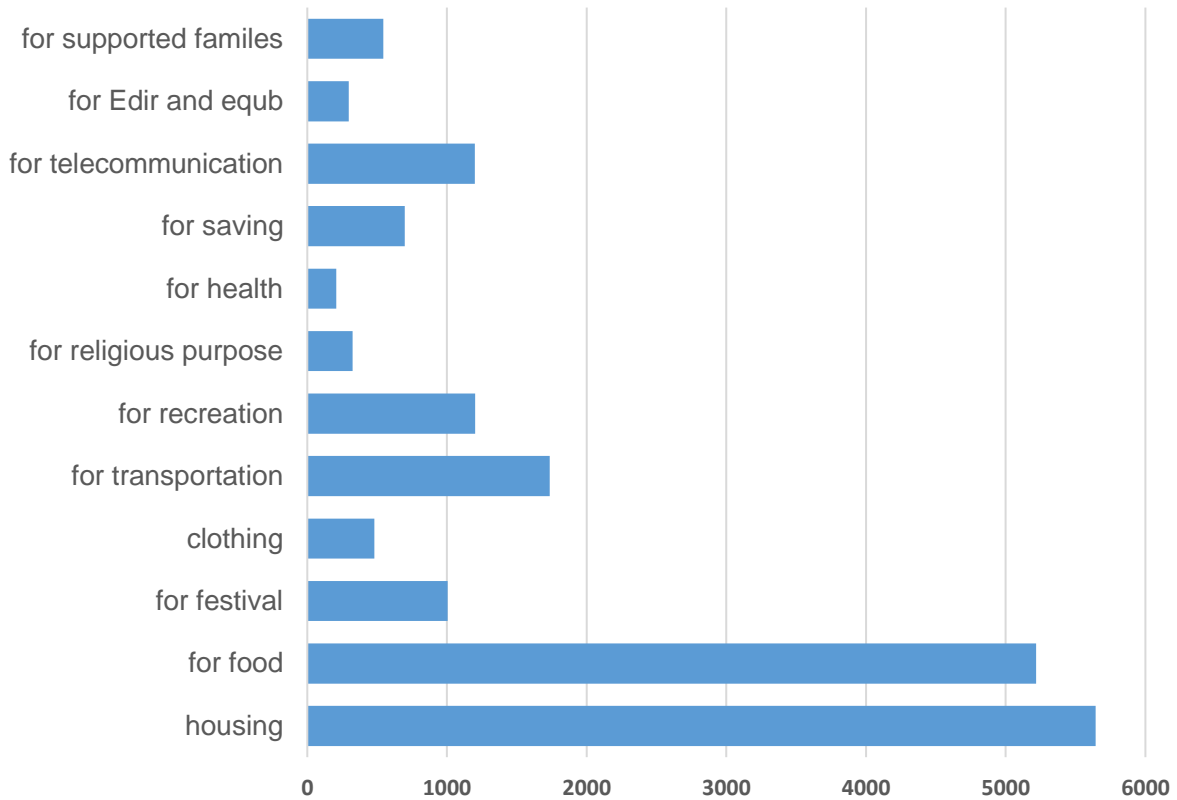


Figure 41: comparison of household expenses (birr)

h. Mortgage to income ratio

The mortgage is the main housing transferring mechanism in the IHDP program. The affordability of the units was primarily conceived to be fulfilled through mortgage payment. By far, many households who could not afford mortgage payments have rented their unit to cover the mortgage payment. As a result, the amount of housing stress due to the mortgage payment is low. Only 16% of the total mortgage owners suffer from paying more than 30% of their income.

i. Annual residual income

Residual income is important to maintain savings and absorb incoming economic shocks. It is also important to maintain tenure despite the increase in housing rent and mortgage. The issue of affordability is directly related to residual income. Thus, 25% of households in the area own a negative balance at the end of the year. The biggest negative balance is calculated to be -16,383 ETB.

j. Longitudinal affordability

Using the household's monthly residual income, the time required to buy the units is calculated. The first part of the calculation considers that if the unit prices are the same in the coming years. at the same time the residual income and decrease and increase in demand for other goods are also considered constant. The result shows that:

- 40% of the sample will never be able to buy a studio unit in YAC with their current residual income and current price or it takes more than 30 years of mortgage with zero interest rate.
- 52% of the samples cannot afford to buy a bedroom unit in YAC with their current residual income and the current price of units.
- 95% of the samples cannot afford to buy two-bedroom units in YAC with their current residual income and the current price of units.
- 99% of respondents cannot afford to buy a three-bedroom unit in YAC with their current residual income and the current price of units.

4.5.3 Comprehensive affordability

As mentioned in the theoretical framework, the affordability problem must be understood in several contexts. Using sub-elements hidden under the hoods of housing affordability a very well-established claim could be generated.

Thus, the analysis shows that 25 percent of the dwellers are economically affordable, spatially adequate, and compatible with their needs.

In general, with this measurement, the non- affordable housing types reach 75%. This shows that, the housing units are either unaffordable economically, inadequate spatially, or incompatible with the household's need. Whereas, the people who need immediate housing option are 6%. Those people are not living in neither of three qualities of housing.

The housing unit, that seems affordable but misses the spatial adequacy and compatibility is 9%. This could not be considered affordable since, they, lowered their standard of housing to make housing affordable

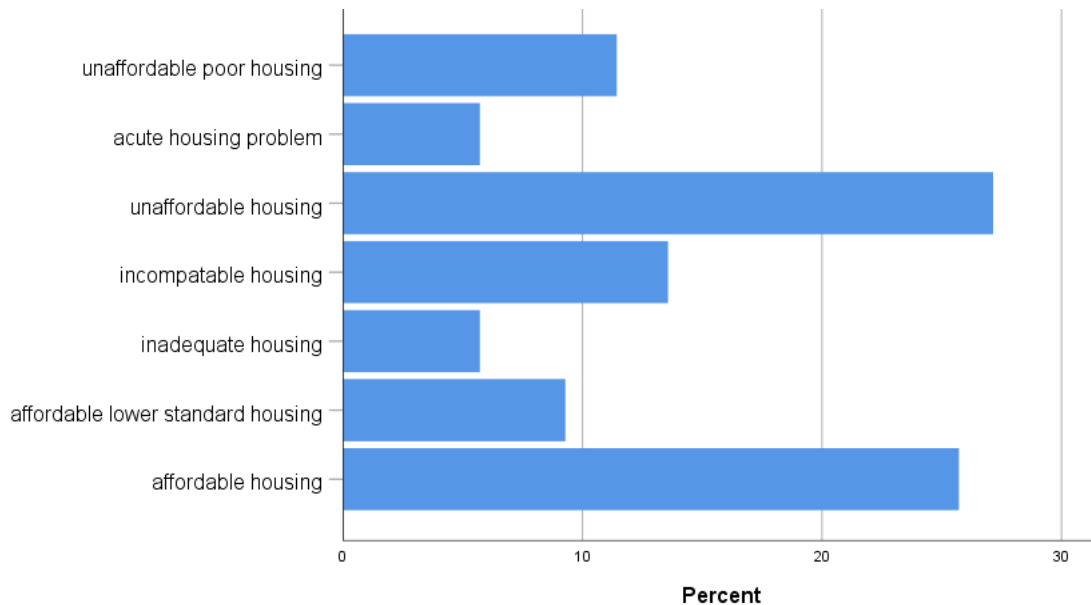


Figure 42: comprehensive affordability analysis

4.6 HOUSING STRESS AND WELLBEING

a. The general rate of housing stress in Yeka Abado Condominium.

Affordability is a very important concept to understand housing stress. For this very reason, the affordability analysis was made with several methodologies to successfully grasp the housing stress of the households.

The result of the housing stress, in general, is that the YAC is considered unaffordable for most households. Dividing the tenure into three sections namely ownership, mortgage ownership, and rent, out of the three tenures ownership is far more difficult for the dwellers. Most of the dwellers are unable to buy a unit in their complete lifetime. While rent is the most insecure tenure. Most of the dwellers who fear forced eviction are in rental tenure units. One of the main reasons pointed out by the residents is the increase in rental fees. A mortgage is the most affordable comparatively. Most households with this tenure are more likely to feel secure. There is also a financial benefit to mortgage owners since the payments are considerably low or half of the rental price. This is even prominent among government institution workers and teachers who are not direct registered beneficiaries but are utilizing a subsidy far more slowly than registered beneficiaries.

b. Housing stress by tenure type

Based on the study conducted, the majority who suffer from housing affordability problem are tenants which are about 45.7% are more prone to housing stress. Similarly, mortgage owners have considerable housing affordability problem. In general, owning a house have shown in a reduction of affordability problem.

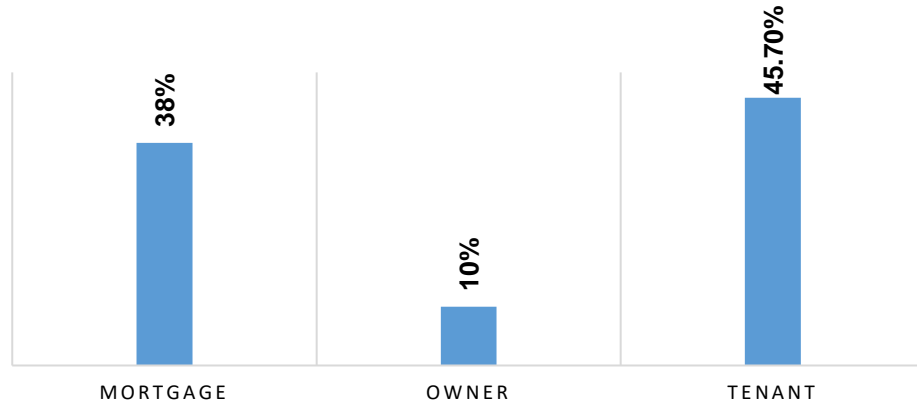


Figure 43 : housing stress by tenure type

c. Housing stress by age

The age distribution of the neighborhood is narrow. Most of the household heads are in their early 30s to early '40s. As a result, many who suffer from housing stress are aged in their early 30s and early 40s. From the linear regression analysis, older people tend to have more affordable units than younger people. The figure below shows the expenditure to income ratio and the age distribution of the neighborhood.

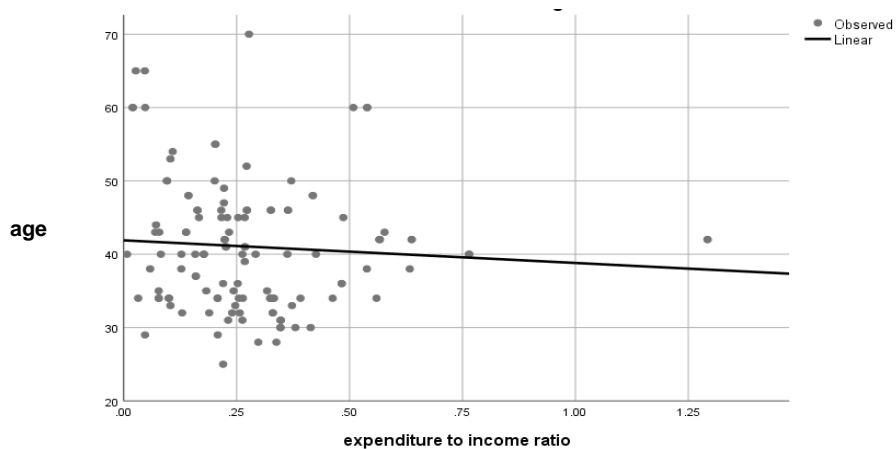


Figure 44: graph of expenditure to income ratio with age

d. Housing stress by the number of family size

Family size and housing stress are directly related. The analysis shows that an increase in household size increases the rate of being under housing stress. With a certain increase in household size, a certain family (beyond five) is less likely to experience housing stress. This cannot be seen as a positive condition. This is because the increase in the number of the household increases the risk of being overcrowded and inadequately housed.

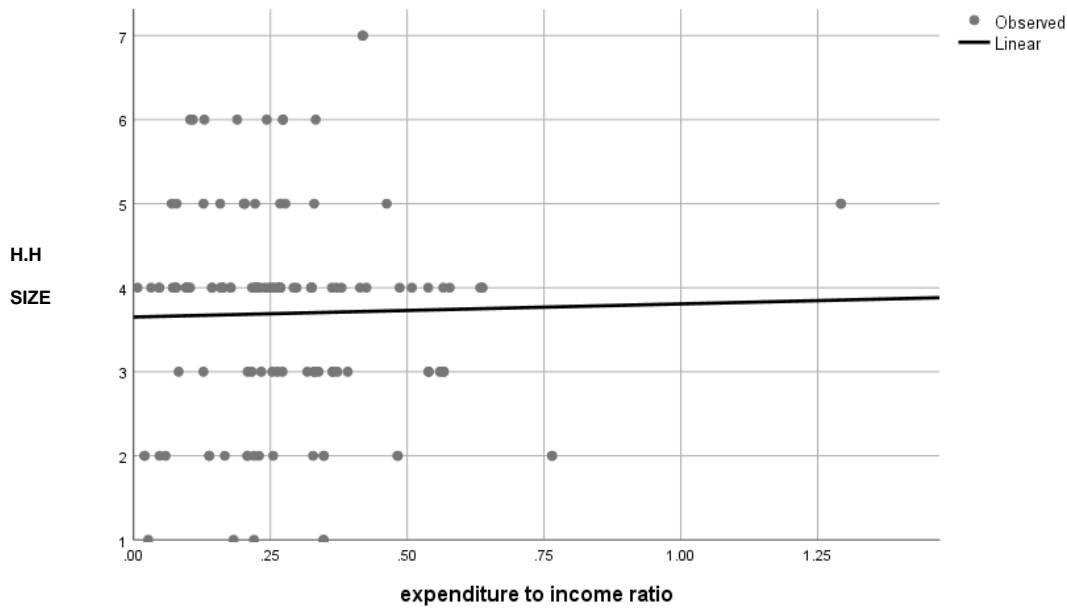


Figure 45: graph of expenditure to income ratio and household size

a. Housing stress by sex

The study has found that woman is more prone to housing stress than men. Women in the survey analysis are twice more likely to experience housing stress than their male counterparts. The result shows male have negative correlation value which is -0.035 when compared to woman. Yet, the difference between the gap of housing stress based upon sex is very low.

b. Housing stress by occupation

Both workers in the private sector, as well as the government sector, experienced a similar scale of housing stress. The correlation value of occupation with housing stress is 0.01. The finding shows that government workers especially teachers of high school and primary school are the beneficiaries of low mortgage rental. despite low income they experience a very low impact on the housing cost.

c. Housing stress vs household member contribution

The questionnaire found that, Households who have multiple sources of income namely children's support, spouse support, additional income, and remittance experience better financial strength compared to single-source income households. And comparatively less housing stress. As the findings show the 26% households have support from their families.

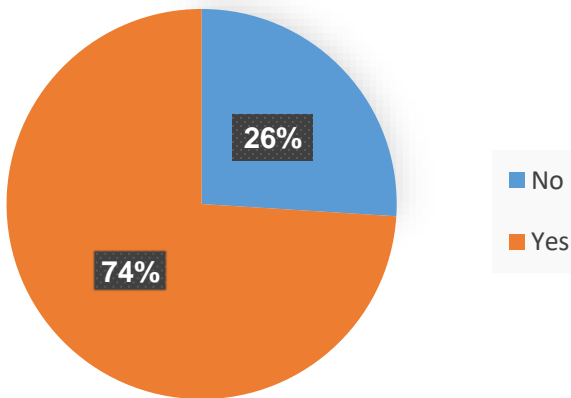


Figure 46: households with multiple sources of income

Using the ratio between supported amount of money to total income, showed that 3 households base their life on income supported by their families. For those families who get support from family member, the support accounts for 48% of the total household income. this finding portrays, 26% of households have multiple streams of income.

d. Housing stress vs wellbeing

i. General well-being

The physical well-being of the neighborhood is considered very good and good by 50.5% of household heads. Even though, being slight, the general well-being outcome is affected by increase in housing expenditure to household income ratio. This means, households with increased housing expense are more prone to lower general well-being (physical, emotional, social).

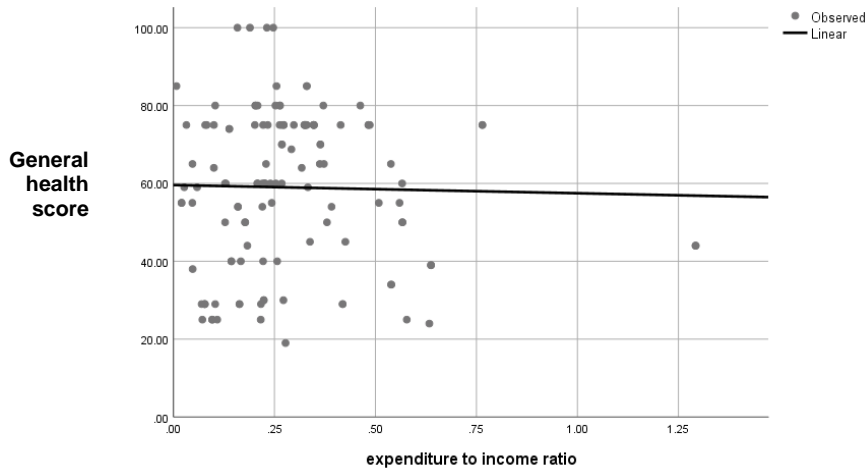


Figure 47: graph of expenditure to income ratio with general health outcomes

ii. Housing stress vs. emotional wellbeing

Housing stress and mental health are found to be highly related in the YAC neighborhood. An increase in housing stress increased the rate of mental health problems. But the severity of the mental health problem is not directly related to housing stress. Thus, on some occasions increase in the rate of housing stress is related to low mental health problems. Factors, for vulnerability to mental health, are not only dependent on housing stress. Very similarly some household heads experience a mental health problem despite surplus income and evident expenditure. The general conclusion about mental health and housing stress is that the rate of exposure to mental health increases as housing stress increases. But the severity of the mental health problem is not directly related to housing stress.

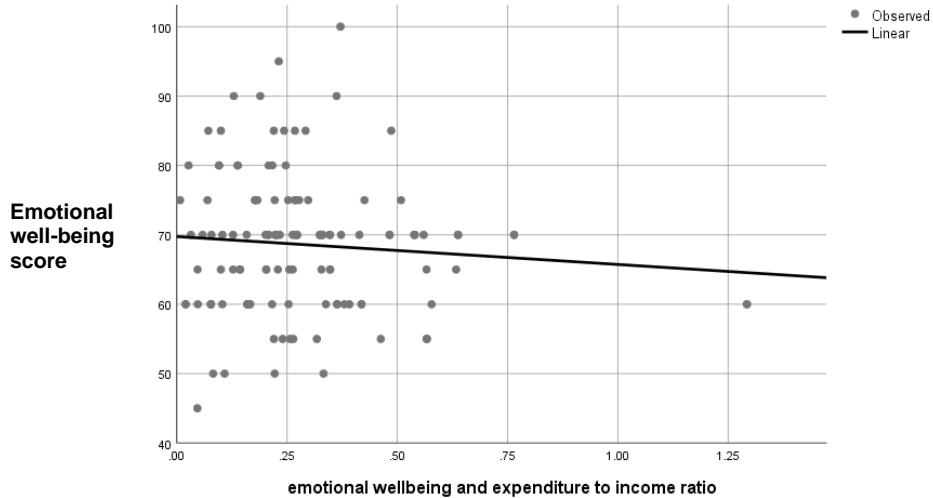


Figure 48: graph of emotional wellbeing and expenditure to income ratio

iii. Housing stress and physical wellbeing

The physical well-being of the neighborhood in YAC is not related to housing stress. Households that are poor in physical well-being are predominantly from age-related, underlining health problems, previous injuries are the main cause. The households who report their betterment of physical wellbeing give reason to age, absence of injury, exercise, and low or moderate daily activities.

The physical activities analyzed by the Rand SF-36 questionnaire include, running, lifting heavy weights, participation in strength sports, lifting and climbing stairs, bending, kneeling etc..

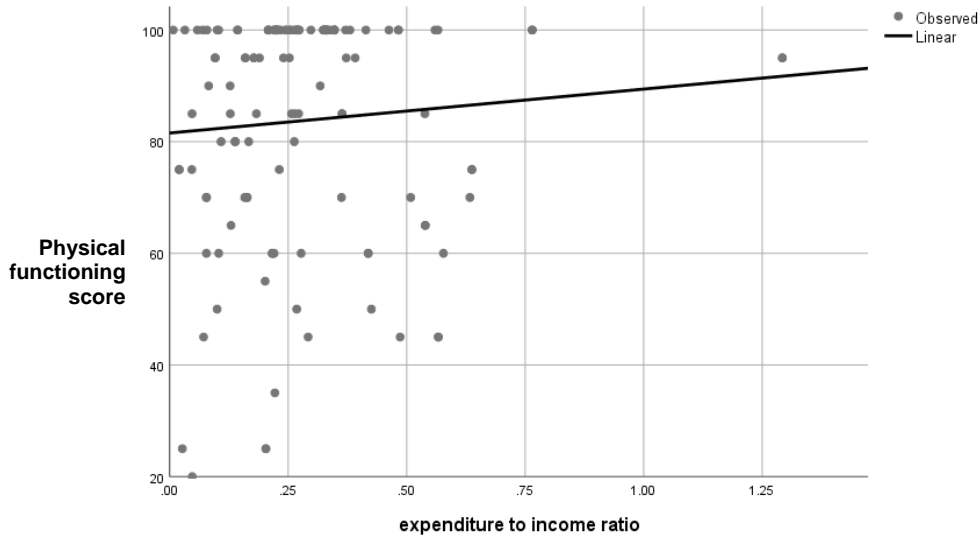


Figure 49: expenditure to income ratio versus physical functioning.

e. Social wellbeing

i. General social well-being score

The social well-being of YAC is considered to be improving over time. Many respondents report declines in crime and an increase in social integration. One of the main reasons for the improvement of the social integration is the formation of household associations and increase in a number of owners that dwell within their house. Yet, many households are not actively found within their home, especially in working days. As a result, a day-to-day interaction within the neighborhood is far lower.

Some households build a fence on their floor to avoid unwanted intrusion. As a result, many household heads say those fences responded negatively to social interaction. The most commonly meeting space in the neighborhood is either within an individual's unit or within the compound which is commonly unsuitable for many households.

ii. Housing stress vs. social wellbeing

Housing stress and social well-being are related indirectly. The majority of the respondents experiencing housing stress are characterized by reducing the number of social expenses and avoiding social gatherings, replying negatively to the neighborhood social fabric. Meanwhile, some of the respondents with low levels of housing stress also experience avoiding social gatherings due to work so that they could make sufficient money that their family needs. As a result, they engage in multiple works and focus on income creation.

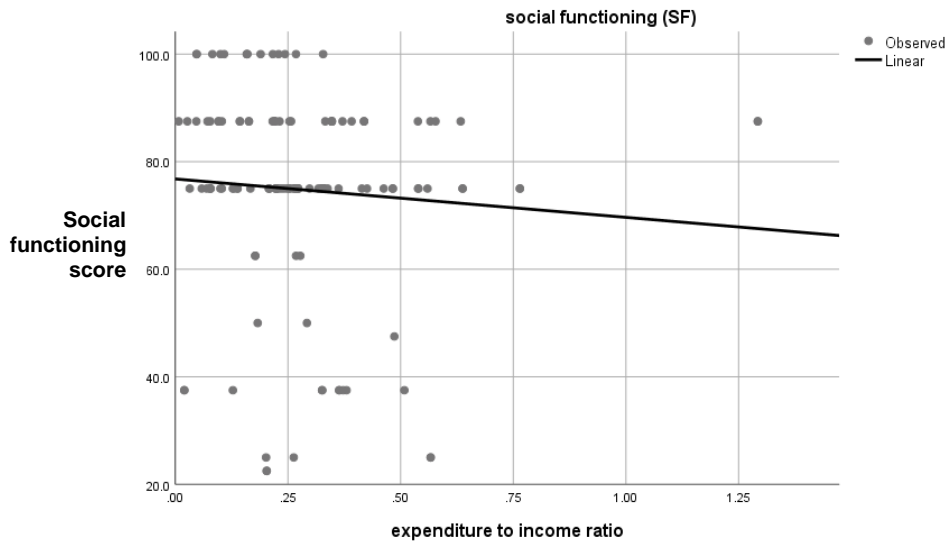


Figure 50: social functioning versus expenditure to income ratio

iii. Housing stress and housing history

Households who previously reported several moves out are more likely to respond to housing stress in YAC. Thus, the traumatic effect of several move-outs is not seen in this case. Rather, in most cases, people with several moves out experiences respond better emotionally.

4.7 SELECTED LIFE STORIES OF DWELLERS

Life story is one of data analysis method in social studies to get insight on a given topic. The aim of a life story is to get in-depth information onto an individual. There are different types of life stories presentation methods, those include autobiography, biography and Captivity narrative. This life story uses, the captivity narrative method in which the main players in the case share their thoughts.

4.7.1 Life Story 1: Mr. Nebeyo⁵



AGE = 35	SEX = MALE	DURATION OF STAY= 4 YEARS	MARITAL STATUS= M MARRIED FAMILY SIZE= 5
UNIT TYPE = 2 BEDROOM			
AREA= 72 METER SQUARE			
RENT TO INCOME RATIO		WILLINGNESS TO PAY	
0.25		NO	
REPORTED PHYSICAL HEALTH PROBLEM	REPORTED MENTAL HEALTH ISSUE	REPORTED SOCIAL WELL-BEING ISSUE	
YES	NO	NONE	
PERCEIVED ADEQUACY	PERCEIVED AFFORDABILITY	PERCEIVED TENURE SECURITY	
NO	NO	NO	

Table 19: life story1 housing and household profile (source: author)

Mr. Nebeyo is a 35 years old health professional working in St. Paulos Hospital Millennium Medical College, the second-largest hospital in Ethiopia. When he graduated in 2014 he was assigned to work in the regional state of Oromia in a small town called Abomsa in the eastern Showa area. As he remembers it, life in Abomsa was both a good and bad experience. The good thing was it was where he got married to his co-worker and current wife. The bad thing was the harsh climate issues, the less infrastructure and underdeveloped of the area were far beyond what he could wrest with.

After a few months of their marriage in 2017, his wife Helena shifted to Addis Ababa for work with their first baby girl, while he was still working in Abomsa. In the process, a rental unit was required to

⁵ Name change for privacy (not real name)

accommodate his baby and wife. Based on the need, the housing needed was, a two-bedroom to accommodate both immediate and extended family, closer to her workplace, pleasing and safe neighborhood. Including the affordability of the rent.

As it turns out, the Yeka Abado condominium was considered the best choice for their housing need. And searching for the accommodation was started by informing brokers. After several visits, a unit in the Abado condominium was considered to be suitable. At this point, Nebeyo is not part of the decision-making because he was working elsewhere. Helena considered it to be temporary. The home aimed to help her settle for a few months and then move out to a more suitable house. But as the day increases, the housing she was considering suitable was becoming unaffordable. Even though there was a chance to move out, the hustle of moving too many times and making housing decisions without her partner made her stressed at the time. As a result, she continued to live within the unit until they make their decision collectively.

After completing his service duty in that area. He shifted to St. Paul millennium Hospital following his child and wife in Yeka Abado Condominium. After Nebeyo joined his family, he began planning to better house his family but the cost of housing was already unaffordable at the period of his arrival. Since his joining, he has experienced several rent fee increases. “The owner of the unit asks for rent payment despite reaching the end of the month,” he says. He thinks there is no appropriate, affordable home to live in. the rent price nationally is considered unappropriated by his standards. He believes that owning a house is his dream, and he plans to save more for the future but the economic difficulty is disabling him.

RENT INCREASE OVER PERIOD					
year	2017	2018	2019	2020	2021
Amount	2200	2800	3500	4500	6000

Table 20: life story rent increase over period (source: interview)

To improve their quality of life and get better housing they spend several hours every week working through extra work. They think Economic inflation, increase in rent, and land price is a hurdle for them to own a house. They now avoid expensive trips, vacations, recreational and entertainment for saving purposes. They also avoid the maintenance cost of the house because they don't feel belonged in the home. Both he and his wife use public transport, and despite being compatible with Helina's

workplace, Nebeyo claims that the housing is incompatible with his work. He has to travel 25 km to work. At least a taxi or a public service bus is required both in the evening and in the morning. For this reason, back pain was a common problem he has to face daily. “I sometimes choose to stay home due to fatigue and tiredness after restless days,” he says.

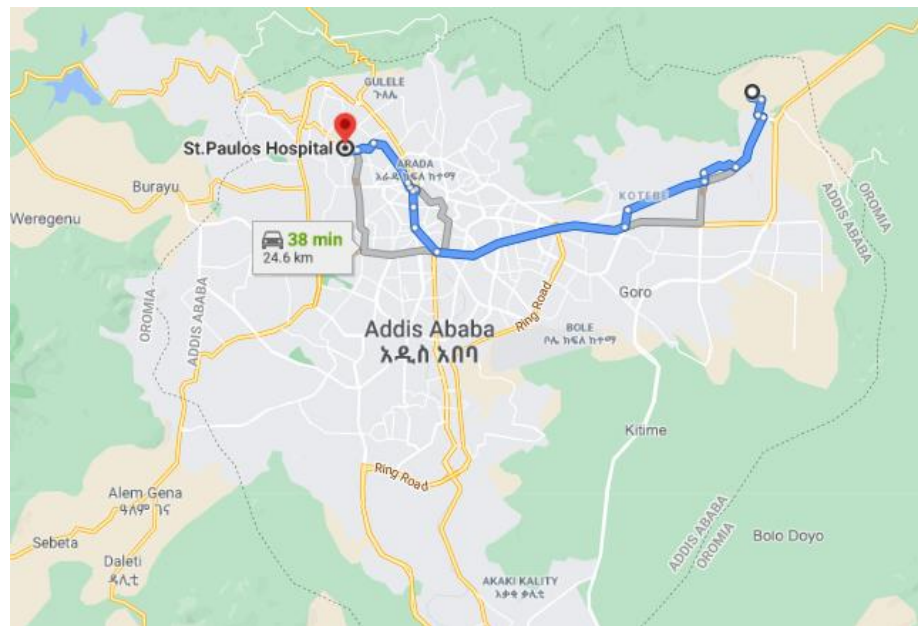


Figure 51: map of travel by life story 1 to go to work (source author: using google map)

4.7.2 Life Story 2: Miss Kadijah⁶



AGE = 35	SEX = MALE	DURATION OF STAY= 4 YEARS	MARITAL MARRIED SIZE= 5	STATUS= FAMILY
UNIT TYPE = 2 BED ROOM				
AREA= 72 METER SQUARE				
MORTGAGE TO INCOME RATIO		WILLINGNESS TO PAY		
0.33		Yes		
REPORTED PHYSICAL HEALTH PROBLEM		REPORTED MENTAL HEALTH ISSUE	REPORTED SOCIAL WELL-BEING ISSUE	
NONE		NO	NONE	
PERCEIVED ADEQUACY		PERCEIVED AFFORDABILITY	PERCEIVED TENURE SECURITY	
NO		YES	YES	

Table 21: life story 2 housing and household profile (source: interview)

Miss Kadijah is one of the dwellers in YAC. Her age is between 35 and 40. She and her family shifted to yeka abado due to the opportunity of the lottery draw of the beneficiaries in 2016. She had four children at that time. Kedeja remembers the moment as her happiest moment in her life. She has been saving for years to get her one-bedroom unit. As a family, they struggled to get housing that is adequate for their family in private rental units. So many times, they experienced several move-outs as well as two forced evictions.

MORTGAGE INCREASE OVER PERIOD					
year	2017	2018	2019	2020	2021
Amount	1500	1500	1500	1500	2000

Table 22: a life story. Mortgage increase over period (source: interview)

⁶ Name changed for the case of privacy

As a family, their main source of income comes from her husband who works as Addis Ababa to Djibouti route truck driver. Despite inconsistency in his income, he provides plenty of income to his family. Miss Kadijah also supports her family by selling products he sometimes brings from Djibouti. She also has a spot where she sells goods in the market locally called “gulit”. Whenever she gets the chance, she tries to become a broker for rental units in her vicinity. In the afternoon, she sells sambusa on the nearby walkway. As a result, they get sufficient income monthly for their households.

She can easily get along with anyone. Her sociable character helped her to work in the housing association several times. As she says “her social engagement with other people is strong and healthy”.

Her current housing problem is the issue of inadequacy of space. Her four children, a maid, she and her husband make a seven-membered household in a one-bedroom unit. As a result, she suffers from a lack of space to sleep with her children, and guests and buy household furniture. Six months ago, as her neighborhood leaves a two-bedroom unit, she rented her unit and moved into the two-bedroom unit. She felt safe and secure for months. She also bought large furniture and household items. Unfortunately, one month ago the owner of the house asked her to move out because they plan to move in. Now Kadijah says she cannot return to her one-bedroom unit for two reasons. One, the rental agreement is far longer than her immediate need for housing. Secondly, the furniture and household items she bought won't fit in the one-bedroom unit. She is stressed out in searching for an adequate affordable and compatible unit.

Despite these challenges, Kadijah has been exercising in the morning for the past three years. She is also active daily. “A good diet with good daily activity is good for health” she says. Every week she goes to the local church. In her stressful and emotional problems, she uses prayer as a tool to maintain her inner peace and emotional wellbeing.

Miss Kadijah, does not want to continue to live in Abado for long. She believes she will someday own her detached private plot housing. She is now saving for her future house. As she says if she gets a decent house, she may even sell the one-bedroom unit she currently owns.

PART 5 : CONCLUSION AND RECOMMENDATION

4.1 CONCLUSION

Affordability (what is the extent of the housing affordability problem?)

the final conclusion on the extent of affordability leads to a server housing affordability problem. Some of the leading results include: one in five households reported the neighborhood as unaffordable. Similarly, 60% of households suppress their health, clothing, and food expenses from time to time. Thus, using in the methodology section, only 28% of houses are affordable. Considering their buying capacity, most households are unable to purchase the condominium units per the current price.

Housing adequacy and compatibility with the dwellers?

Compatibility: In the case of compatibility, more than 50% of households consider their units and neighborhoods incompatible with their needs. While a significant percentage of (37.6%) do not consider the Yeka Abado condominium as their primary choice of location. Similarly, the units are not their primary choice of typology.

Adequacy: 75% of the dwellers desired their units were wider or to have an addition of another room. The other aspect is they use a single room for multiple purposes to mitigate the lack of space. For example, in many households living room is used for family gathering space, sleeping space, and dining. Besides that, using person per bedroom, a commonly used method for measuring overcrowding, on average 2.7 % person per bedroom. Many households also avoid social gatherings within their home due to spatial adequacy. Thus, spatial adequacy is a significant problem in YAC.

Wellbeing and housing stress

After all of these measurements, it's time to analyze the findings of well-being with respect to expenditure to income ratio. Thus 34 % of the households are currently under housing stress. With a small standard deviation of 0.12. Within the long term, even more, households are expected to get into housing stress.

Thus, the general health outcome scores low in people with a higher expenditure to income ratio. This means that the health situation of the people decreases with their ratio increase.

The social functioning also decreases as the ratio increase. Gives a clue that housing stress might contribute to low social health and functioning.

Yet, physical functioning results are not directly related to housing stress. People with higher physical functioning are found to be those who are under housing stress or higher rate of housing expenditure. The long-term impact of housing stress is not clearly known since this study takes consideration of current wellbeing status. And since this study is correlative not experimental, there might have an effect on the variable of physical well-being. Further research must be conducted in a very well controlled sample.

Emotional health on the other hand shows that it deteriorates as the expenditure to income ratio increases. Similarly, energy and fatigue results and bodily pain results show no connection with housing stress.

4.2 Recommendation

5.2.1 Policy recommendation:

- *increasing the housing ladder for all income groups.*

The research has found that most of the YAC dwellers preferred YAC by comparing it to other housing options. Dweller's responses show that the housing options for different economic capacities are limited within Addis Ababa. as a result, there exists a huge demand for certain housing types forcing demand-based price increases. To solve this problem the use of different housing options is crucial.

- *policies and directives must consider wellbeing and housing stress.*

At the policy level, housing stress and well-being are not mostly considered. At the end of the day, the goal of housing the citizens is to create a well-functioning, healthy society. Standing upon a large and ever-increasing housing demand, psychological as well as societal wellbeing could not be met.

So that, the well-being of the society improves, health packages for households in housing stress are preferable.

- *Integrating affordable housing provision projects with other major expenditures*

The housing expense consists of monthly non-rental expenses like electricity and tap water services. Thus, using sustainable and renewable resources and cost reduction techniques is attainable to reduce the household's housing stress.

Reduction in housing expenses could help in many cases, yet to support those results, expenditures like food and health must be considered. The continuation and well establishment of health care services for economically disadvantaged households.

- *Increasing communal spaces for the problem of spatial adequacy.*

There exists a communal space in the condominium site, increasing those spaces and developing them properly is helpful. Using those several spaces communally helps in spatial adequacy. Many activities which do not require special privacy could be practiced communally. For example, washing activities (which is currently limited to within unit activity), and playgrounds (which is currently underdeveloped) could be used collectively. Hence, the design of such spaces in housing projects will make them more affordable.

- *Facilitate and create additional income creation methods for the dwellers*

Dwellers and real estate brokers in YAC state that There is large traffic waiting for condominium housing both to get rent or win the lottery. Consequently, providing better social and physical amenities may cause a rise in housing prices.

- *Establish an institution for researching housing-related topics.*

The affordable housing types in the context of Addis Ababa is limited to certain types of houses. On top of that there is lack of strong housing demand and supply information for decision making. As a result, there must be an institution that:

- collects information related to housing
 - tests convenient housing solutions and post-evaluates housing development projects.
 - Proposes policies and directives at the national and regional levels.
- *Integrate private sector involvement in affordable housing provision*

Responses from the questionnaires show that people expect the housing need to be met by the government organ only. They seem to consider provision of affordable housing is a mandate of the government. In the government side, this should not be the load to carry alone. The private sector like all sectors must be involved in the provision of affordable housing.

Some of the reported problems by the private sector's involvement are considered to be a lack of housing finance. Where, There are no mortgage banks until 2021 in Ethiopia. Other banks may give loans for mortgages but are only limited to stuff. The second problem is a scarcity of building materials where materials like cement and reinforcement bar are not easily available. Thirdly, the provision of land with high prices has made making affordable housing provision a harder task. Other than the above-mentioned problems there exists:

- Prohibitive rental income tax that does not attract real estate development for rental housing and discourages the construction of rental houses and buildings.
- The absence of a legal clause that promotes the construction of rental houses. i.e., the non-enactment of a legal entry on building tax legislations and the property tax proclamation that promotes rental houses construction.
- “The absence of alternative financing institutions for housing construction and the un-investment of institutions with adequate financial resources in the provision of long-term housing loans through appropriate prices”
- Thus, some groups propose the idea of PPP (public-private partnership) in the provision of housing while some scholars, politicians, and practitioners prefer the establishment of policy change in the housing provision field.

5.2.2 Recommendation for future research

- *Integrating the housing study with health professionals.*

The aspect of health in the study uses a premade questionnaire which is commonly used in medical studies. Yet, using strong medical knowledge by collaborating with health professionals could improve the results of this research in future contexts. For example, the use of brain imaging could drastically improve the results to absolute certainty.

- *Improve the quality of the measurement*

The indicators used internationally fall into two types of traps. One of the traps is using the economic indicators to show all the affordability problems. The second one is considering all affordability problems are the same.

As a result, the classification of housing affordability problems used in this paper is a good method. The method uses a combination of parameters in identifying several housing affordability problem types. The overall method uses three elements in the measurement tool. Those are economic affordability, adequacy, and compatibility of units.

- *Expanding the research to other housing types like government-owned kebele housing and high-end residential estates.*

Heading beyond the IHDP program is crucial. There are several housing types in Addis Ababa. Some of the prominent housing types are the kebele housing. The housing is made available primarily in the Derg time. Currently, it is characterized mainly as a low-income group owned physically

deteriorated slum. Studying such cases is main in full understanding of housing affordability problem in the context of Ethiopia as well as Addis Ababa

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ANNEX-1 PUBLISHABLE MANUSCRIPT

Addis Ababa University, Ethiopian Institute of Architecture, Building Construction and City Development
(EiABC)

Housing and Sustainable Development (HASD)

ANALYSIS OF HOUSING AFFORDABILITY AND THE IMPACT OF HOUSING STRESS ON WELL-BEING

By Natnael Tadesse and Imam Mohamoud Hassen.

JUN 2022.

ABSTRACT

Most researches indicate that despite several efforts to reduce housing demand in Addis Ababa, Ethiopia, the housing price, rent, and mortgage prices are considered beyond the capacity of the many city dwellers. For this clear reason, affordable housing in all tenure types is considered unattainable in many cases of households. Some research indications seem that housing stress is affecting the well-being of citizens. This research investigates beyond the observations and through scientific analysis of housing affordability to determine the scale of housing affordability stress as well as the well-being of selected neighborhoods in Yeka Abado Condominium. To reach a considerable conclusion, the methodology employed includes housing affordability measurements (ratio methods), adequacy and compatibility questionnaires, analysis of the relationship between the housing affordability stress and wellbeing, RAND SF-36 internationally accepted questionnaire is used. To further analyze longitudinal affordability additional interviews are employed. The main result of the study shows that housing unaffordability in all tenure types shows that an increased *housing expenditure* decreases *well-being outcomes*. Overall, 75% of the residents' dwell in units that are unaffordable, inadequate, and incompatible with their needs. similarly, 45.7% for rental tenure, 38.5% for mortgage tenure, and 10% for ownership tenure housing stress was recorded. Based on the relationship of housing stress and well-being mental and social functioning have been affected by housing stress. The study further forwarded that the housing affordability issue is more complex than economic affordability. The paper also indicates that those different aspects of affordability affect the well-being of dwellers. economic

affordability must be considered thoroughly by all target groups and tenure types (both the owner and tenant). Furthermore, existing beneficiaries of the IHDP program should get strategic relief and an alternative affordability housing ladder.

Keywords: housing stress, affordable housing, wellbeing, adequacy, compatibility

1. INTRODUCTION

Despite considerable attention, the problem of urban poverty, urban decay, and slum urbanism passed the 20th century and is still the headache of the 21st century both nationally and internationally. Among those problems, lack of adequate housing and homelessness is considered hot issue among countries. For example, European efforts to rebuild their cities shortfall from fulfilling the current housing demand (UN-Habitat, 2016). While North American countries experience housing deterioration due to aging (UN-Habitat, 2016). Similarly, Africa's economic hardship created impediments to the construction of new housing which fits the current population. As a result, the urban expansion of most African cities is characterized by inadequate housing or slums.

Ethiopia as a country in Africa has a similar problem in housing and urban decay. In fact, most of the housing condition in Ethiopia is considered to be slums. The problem is even prominent in the capital city Addis Ababa, due to the kebele house which deteriorated over the years without maintenance and high population increase both through natural increase as well as migration to the city. Overall, the initiation of government has been minimal in the provision of housing until 2005. No policy or clear strategies have been apparent in housing development, especially since 1991. Yet, to mitigate this problem, the government of Ethiopia at that period (EPRDF) launched a large-scale housing project for low and middle-income groups. The program was called "the IHDP" program. The program had several integrated goals to be met like job creation that targets urban poverty.

STATEMENT OF THE PROBLEM

The meaning associated with owning a home is beyond just a shelter in the Ethiopian community. It is a means of expression of status, a measure of success, or lucky if he or she is a beneficiary of the IHDP program. This is due to the housing affordability problem in Addis Ababa both in the rental as well as in ownership tenure. The demand in the city of Addis Ababa is increasing, supply is far from meeting the demand. On the other hand, rental prices are rising. It is common to hear the city dwellers

of Addis Ababa complain about the unaffordability of units or several move-outs in search of adequate and compatible units. The program which aimed in solving the housing problem, the IHDP program is criticized by many researchers for not targeting low- and middle-income groups as intended. For this reason, many beneficiaries report that they rented out their units to pay their monthly mortgage.

Thus, the general housing affordability problem in Addis Ababa lacks scientific research. Many of the studies which are made lack adequate measurement and the use of adequacy and compatibility. The researchers claim a vast generalization without measurement or only using an economic aspect of affordability.

Furthermore, the relationship between housing affordability stress and well-being has been studied in some countries and has shown some relationships. But the strength of the data lacks further research in different parts of the world. Similarly, in the case of Addis Ababa, integrating affordability analysis with proper measurement and relating it to the well-being outputs of dwellers is crucial in both national as well as international housing studies. Thus, no such study exists for Addis Ababa.

OBJECTIVE OF THE STUDY

The specific objectives are:

- To analyze the rate of housing affordability problem?
- To study the relationship of housing adequacy of the units with the dwellers?
- To study the relationship of compatibility of the units with the dwellers?
- To study housing stress by age, family size, and occupation relationships?
- To Analyze general well-being including physical, mental, and social functioning, and the link with housing stress?

2 LITERATURE REVIEW

Definition of housing: Generally, humans are 90 % of the time within interior spaces(McCoy, 1998). For such a case dwelling could have a significant part in human life. Yet scholars like Amos Rapoport argues the initial aim of dwellings were not for sheltering purpose (Lozar and Rapoport, 1970). In support of his argument, he raises the idea of many South American, South-East Asia, and parts of

Australia who people live without proper dwelling. Due to this reason, he proposes that building a home cannot be universally considered “Basic”.

Even though it could be argued on the necessity of housing is a universal concept, housing for modern men and women has significant importance. The inability to afford whatever tenure type will create housing stress and homelessness(Wendell Cox, 2021). Housing stress and homelessness are related to bad well-being outcomes and low quality of life. For modern men and women housing is a place of recreation, procreation, and a place of taking our last breath. In general, most of us cannot think of living without some kind of shelter or interior space. Due to this reason, a complete single word or statement could not be made to define housing(Robinson and Adams, 2008).

Housing Affordability Measurement: The most widely used international concept of measuring housing affordability, which is the “25% rule” was founded in eighteen hundred the United States. According to David Hulchanski, the idea emerged from the American expression “one week’s pay for one month’s rent”. (Hulchanski, 1995). Adopting this concept most mortgage lenders and policymakers started using it.

The other concept that is widely used is “housing expenditure to income rule of thumb” which was the result of studies in the 19th century. The pioneers in this concept are Ernest Engel’s and Herman Schwabe(Meen, 2018). Following their footsteps, many researchers have been trying to make studies but failed due to three main reasons which are “conceptual difficulty”. “Practical difficulty”, and “appropriate definitions on cost and income”. With such a problem, researchers were not able to form solid ground to study affordability. (Meen, 2018). In the process of understanding housing affordability measurements looking at them from general to specific is crucial. The study made by Eastern Mediterranean University showed that studies in general use three major types of affordability measurement categories. Those are conventional approaches, rarely used approaches, and emerging innovative approaches. Thus the table below shows the summary of the measurement tools(Stephen, Id and Hoskara, 2019).

Housing And Mental Well-Being

The relationship between housing and mental well-being is studied adequately to show their relationship. Yet the studies are underdeveloped. In the case of high-rise buildings studies show that they are subjected to detrimental health effects, especially on mental well-being. This is because of

“social isolation “due to decreased social isolation within the buildings. Lack of access to playground and stigmatization of high-rise lifestyle affects highly mothers with children and children themselves(Robinson and Adams, 2008).

Housing And Physical Well-Being

Housing is strongly linked to physical well-being. Such problems may arise from faulty design considerations, physical deterioration, and escalation in monetary value.

In general, building design is mainly aimed at housing human beings. Using data from field surveys and deploying available technology through analysis of personal preferences, architects, planners and engineers build what is best for the dweller. Without such a process buildings built will function weaker in the health aspect of the built environment. According to (McCoy, 1998) five architectural dimensions are linked with psychological stress. Namely “stimulation”, “coherence”, “affordance”, “control”, and ‘restorative”.

Housing And Social Well-Being

In homes that are adequate, affordable, and have a stable living environment, there is a stronger benefit for educational, health, and employment success of all age groups. For example, the impact of stable housing has been seen and documented in aiding children. And children without affordable housing were vulnerable to “mental health problems”, “developmental delays”, and “poor cognitive outcomes” according to (Battersby, Ezratty and Ormandy, 2020)

There is also a relationship between housing instability and which could directly interfere with future success. For example, children in sustainable and affordable housing are more likely to do not fail in school or drop out as a consequence.

Housing Adequacy

Safety and a healthy environment must be a concern in both the design and construction phase of a dwelling. Considerations must be given to physical, environmental, and social factors of a given housing with extreme scenario assumptions. For example, a given project must consider physical considerations like climate, topography, tectonic forces, heat waves, etc. on the other hand social factors like economy, and culture. So, any dwelling must function without disrupting any of the scenarios above mentioned.

in defining the term, UN reports say, human rights to adequate housing as “The right of every woman, man, youth and child to gain and sustain a safe and secure home and community in which to live in peace and dignity(Kothari, 2020).” From a legal perspective, adequate housing is a human rights issue. In fact, the 1948 universal declaration of human rights declaration included adequate housing in its standard of living section. (De Schutter, 2014). Another international treaty is the 1966 international covenant of economic social and cultural rights article 11 paragraph 1.

Housing Compatibility:

Unlike adequacy, compatibility is related to a specific household. Since every family’s need is specific, the overall challenges of every family are different. Some households may suffer from a large number of family members while some households may have members with old age, and others from members with disability. All of those situations create a contextual problem to be addressed in individual households.

Housing must be it suitable (Robinson and Adams, 2008). Some activities are specific to certain family types. For example, despite spatial adequacy, a household with small kids and elders may not be able to climb a stair. As a result, those families try to avoid living in higher stories. If that is not the case incompatibility of activity will occur. In the case of neighborhoods, households may choose to engage in economic activity within their home. But the housing use regulation location of the house within the neighborhood affects their decisions.

3 RESEARCH METHOD

This research is mainly categorized as and is case study research. In the case of study research, the use of both qualitative and quantitative data gives the research the richness it needs for reaching a convincing end. For such a reason, using a mixed-method is suitable for the research.

Both internationally accepted standard questionnaires, as well as customized questionnaires, were used for the overall study. Several questions are closed-ended and a comparable number of questions reside to open-ended questions with the choice to answer the question or not to answer the questions.

In general, the main source of data in this research is a questionnaire. The questionnaires are divided into three categories.

- e. *Wellbeing related:* both mental and physical well-being are experiential. This makes health-related questions fall short of explaining in an acceptable manner across different researches. To solve this problem, a standardized international questionnaire is used.

The international reputed questionnaire used in this research is Short Form-36 (SF-36). Rand SF-36 is a tool used to describe the quality of life (QOL) and general wellbeing. The tool has eight scales within it. Those include “physical functioning, physical role, pain, general health, vitality, social function, emotional role, and mental health.”

- f. *Economic related:* in the study of housing stress and affordability income and expenditure are important. Income and expenditure are characterized by different patterns and names across the globe. Following this assertion customized questions that much the culture of expenditure and income is introduced.
- g. *Social and personal related:* career, age, household size, and social interaction questions will entertain in this part of the questionnaire.
- h. *Physical:* in general, the housing condition will be assessed in this part of this questionnaire.

The questionnaire was distributed to the different types of owners and tenants.

In-depth Interview: Beyond a questionnaire, people may have opinions and ideas to be reflected. With unstructured interview, giving only the topic, participants were able to explain experiences and thoughts related to the study. The interview results are then analyzed and interpreted with other data collection methods and as a standalone result.

Observation: To understand compatibility and adequacy observation was used alongside the questionnaires and mappings. Social service usage, and recreational and entertainment activities were analyzed through observation in addition to interviews.

The central theme of this research thus measuring affordability uses through merged tools mentioned in the literature review. This is done due to the strength and weaknesses of each method. The two major categories of measurement tools are income ratio method and residual income method. Some of the income ratio method used in this research is:

House price to income ratio: this tool is a better tool in measuring purchasing ability of a household. This tool is used to measure current abilities of a household's ability to own a home.

Residual income method: is a better tool in measuring affordability. This method is used to measure general affordability of the houses.

Rent to income method: since all households are not owners, significant number of dwellers are renting the units from landlords.

Expenditure to income: this method is used to measure pattern of expenditure and proportion of housing expense.

Research Design: The initial stage of this research was collecting related research on affordability and housing affordability measurements, challenges of affordable housing, the impact of affordable housing, previous researches on mental wellbeing and physical wellbeing in relationship with affordability.

Secondly, using a mixed method, a survey questionnaire was prepared for the household heads and stakeholders. The questionnaires are both standard and customized questionnaires. In the case of standard questionnaires especially for health-related issues "Short Form-36 (SF-36)" was used. In the case of physical wellbeing "physical component summary (PCS)" and for mental

wellbeing questionnaires "mental component summary (MCS) were used. (Ware *et al.*, 1994). Even though it's important to use internationally accepted standard questionnaires, it will not be adequate to grasp all variables due to differences in many aspects around the world. To mitigate this problem custom questionnaires were prepared based on the research questions and aims of the research. Future more as a third step, interview to households who have been selected from different categories. The aim of selected household interview is to get further information and strengthen the research through collecting additional information from the perspectives of the households or stakeholders.

Sample size and sampling method: Since the population size is finite, we could determine the size of a sample easily and unambiguously. Yet the problem is the population size is too large. As a result, using a systematic sampling is important. As presented in the data collection procedure below, the process of data collection started with defining representative sub neighborhoods and blocks through pilot survey and informant interviews. As per the result of the survey and interview result the total

population was determined to be 450 total from selected sites. The Method of determining sample size uses Yamane's formula. This is due to its standard across researches as well as simplistic and easy understandability.

4. FINDINGS AND DISCUSSION

Assumed affordability of the units: Most households think that their unit is affordable. As many says (75%) "Was and somewhat is affordable" they think rent increase over a long period would significantly risk the affordability of the unit to each household. A significant percentage (23%) of the households consider the units are unaffordable. the only reason for this type of household is the inability to find low-cost housing.

Expenditure income ratio: The study has found that 34 percent of the households are under housing stress (are paying more than 30% of their income). The standard deviation of the expenditure income ratio measurement also is small, which is 0.12. Based on the standard deviation value we could determine that many people are on the verge of becoming under housing stress. Overall neighborhood's average expenditure to income ratio is 0.26%. Some strict measurements of affordability place 25% of housing expenses as a benchmark for housing affordability stress. If such measurement is used in YAC, more than 50% of all dwellers are considered under housing affordability stress.

Buying capacity (price to income) ratio: The analysis of the price to income ratio is based upon the median annual income and up-to-date price of units found from brokers. The standard price to income ratio recommends the price of the units should not be higher than three times the annual median income. But the finding shows that 9 percent only have an annual median income equal to one-third of a one-bedroom unit price. This figure increases with the addition of bedrooms. Thus, only 5% of the population can buy a two-bedroom unit, and 99 percent cannot afford a three-bedroom. This clearly shows the affordability issues for secondary beneficiaries.

Rent affordability: Considering the time frame to be monthly income rent affordability is analyzed. The average rent-to-income ratio is 0.27. The standard measurement of rent affordability proposes the rate not exceed more than 30%. So, the average rate shows that 27% is the rent-to-income analysis. Out of the total respondent, 35 percent of the dwellers suffer from housing stress. This implies that

28.3 percent of them spend more than 30% of their income on housing expenses. Clearly, the data shows that on average half of the dwellers are in housing stress or in the process of becoming in housing stress in near future. Considering a less substantial increase in income for households

Expenditure comparison: Housing is by far the highest expenditure of families every month. In YAC the housing expenditure takes more than 32% followed by food which takes 29% of the housing expenditure. Among the basic necessities, the listed expense is made for clothing. From the total housing expenditure, 2 % of the expense goes to clothing. The savings of YAC are also low. The average saving for the neighborhood is 4% out of the total expenditure. Since many of the households travel a long distance to work, the transportation expense is also considerably high. The summary of the mean expenses of the major categories is presented below.

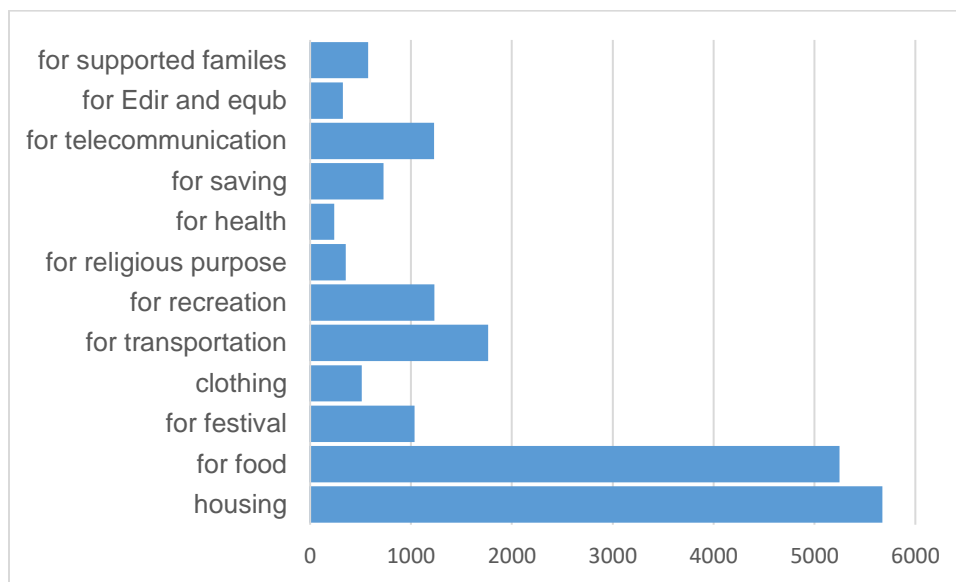


Figure 52: comparison of household expenses (birr)

Mortgage to income: The mortgage is the main housing transferring mechanism in the IHDP program. The affordability of the units was primarily conceived to be fulfilled through mortgage payment. By far, many households who could not afford mortgage payments have rented their unit to cover the mortgage payment. As a result, the amount of housing stress due to the mortgage payment is low. Only 16% of the total mortgage owners suffer from paying more than 30% of their income.

Comprehensive affordability: As mentioned in the methodology section, the affordability problem must be understood in several contexts. Using sub-elements hidden under the hoods of housing affordability a very well-established claim could be generated. Thus, the analysis shows that 25

percent of the dwellers are economically affordable, spatially adequate, and compatible with their needs.

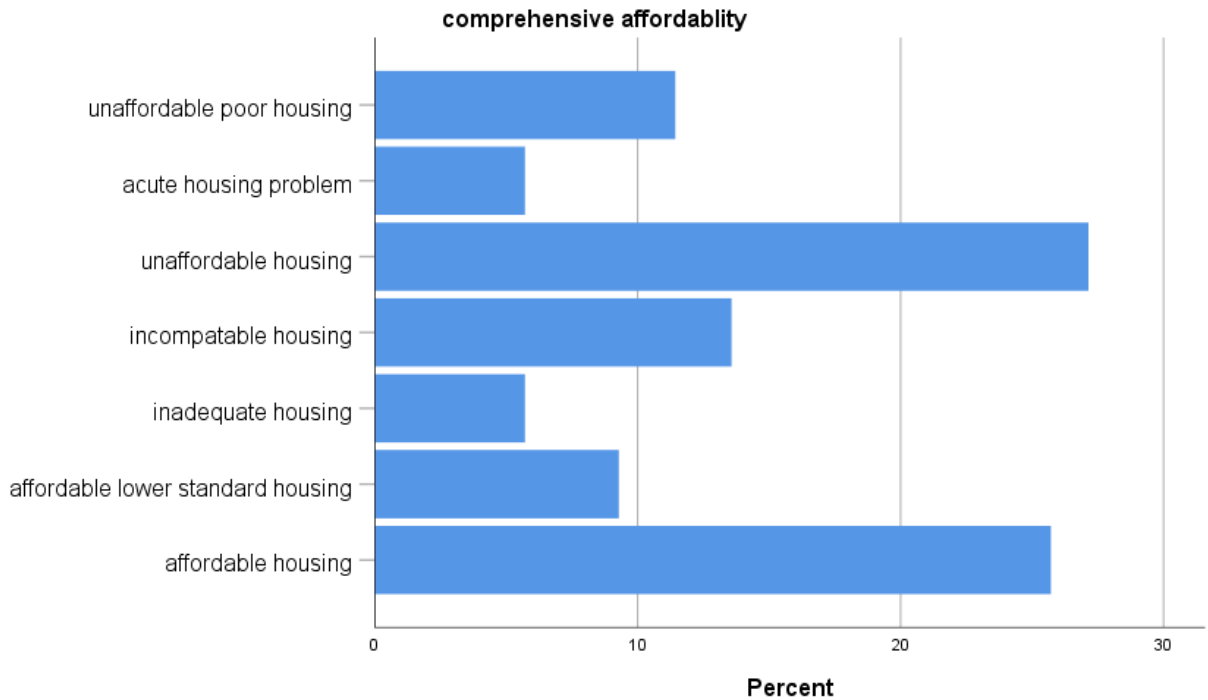


Figure 53: comprehensive affordability analysis

Longitudinal affordability: Using the household's monthly residual income, the time required to buy the units is calculated. The first part of the calculation considers that if the unit prices are the same in the coming years. at the same time the residual income and decrease and increase in demand for other goods are also considered constant. The result shows that:

- 40% of the sample will never be able to buy a studio unit in YAC with their current residual income and current price or it takes more than 30 years of mortgage with zero interest rate.
- 52% of the samples cannot afford to buy a bedroom unit in YAC with their current residual income and the current price of units.
- 95% of the samples cannot afford to buy two-bedroom units in YAC with their current residual income and the current price of units.
- 99% of respondents cannot afford to buy a three-bedroom unit in YAC with their current residual income and the current price of units.

HOUSING STRESS AND WELLBEING

a. The general rate of housing stress in Abado condominium.

Affordability is a very important concept to understand housing stress. For this very reason, the affordability analysis was made with several methodologies to successfully grasp the housing stress of the households.

The result of the housing stress, in general, is that the YAC is considered unaffordable for most households. Dividing the tenure into three sections namely ownership, mortgage ownership, and rent, out of the three tenures ownership is far more difficult for the dwellers. Most of the dwellers are unable to buy a unit in their complete lifetime. While rent is the most insecure tenure. Most of the dwellers who fear forced eviction are in rental tenure units. One of the main reasons pointed out by the residents is the increase in rental fees. A mortgage is the most affordable comparatively. Most households with this tenure are more likely to feel secure. There is also a financial benefit to mortgage owners since the payments are considerably low or half of the rental price. This is even prominent among government institution workers and teachers who are not direct registered beneficiaries but are utilizing a subsidy far more slowly than registered beneficiaries.

b. Housing stress by age

The age distribution of the neighborhood is narrow. Most of the household heads are in their early 30s to early '40s. As a result, many who suffer from housing stress are aged in their early 30s and early 40s. From the linear regression analysis, older people tend to have more affordable units than younger people. The figure below shows the expenditure to income ratio and the age distribution of the neighborhood.

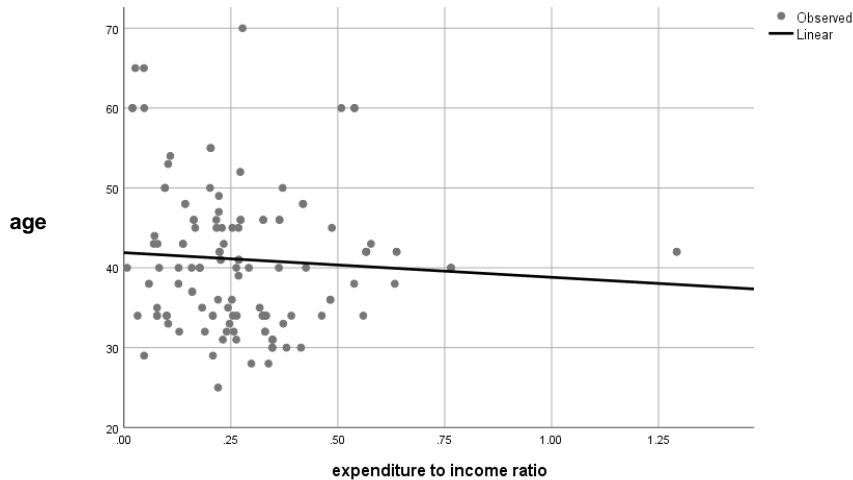


Figure 54: graph of expenditure to income ratio with age

c. Housing stress by the number of family size

Family size and housing stress are directly related. The analysis shows that an increase in household size increases the rate of being under housing stress. With a certain increase in household size, a certain family (beyond five) is less likely to experience housing stress. This cannot be seen as a positive condition. This is because the increase in the number of households increases the risk of being overcrowded and inadequately housed.

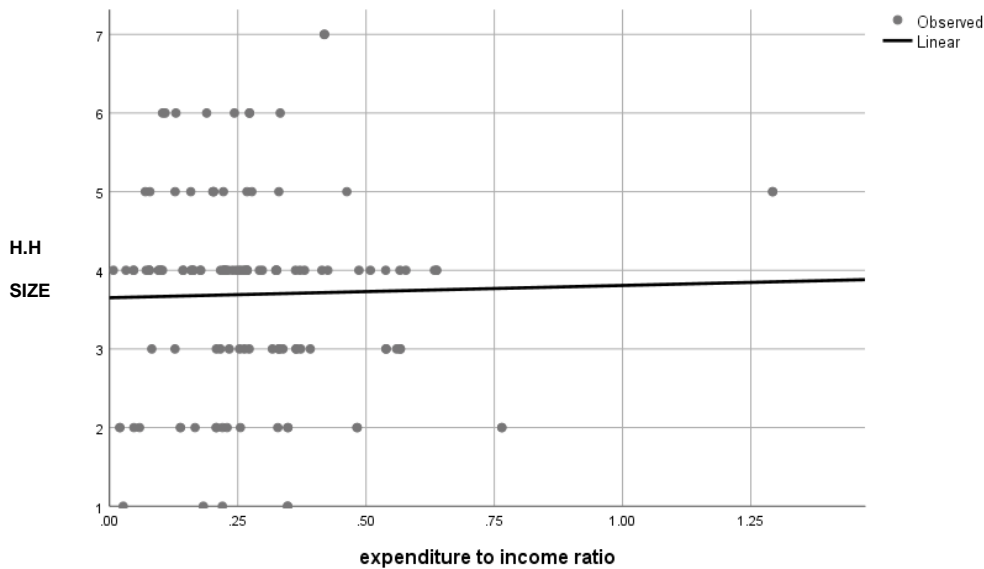


Figure 55: graph of expenditure to income ratio and household size

d. Housing stress by sex

The study has found that woman is more prone to housing stress than men. Women in the survey analysis are twice more likely to experience housing stress than their male counterparts. The efforts made by the government to the inclusion of a woman in the lottery process lack effectiveness. This is shown by housing stress

e. Housing stress by occupation

Both workers in the private sector, as well as the government sector, experienced a similar scale of housing stress. The finding shows that government workers especially teachers of high school and primary school are the beneficiaries of low mortgage rental. That despite low income they experience a very low impact on the housing cost.

f. Housing stress vs household member contribution

Households who have multiple sources of income namely children's support, spouse support, additional income, and remittance experience better financial strength compared to single-source income households.

Housing stress vs wellbeing

i. Housing stress vs. emotional wellbeing

Housing stress and mental health are found to be highly related in the YAC neighborhood. An increase in housing stress increased the rate of mental health problems. But the severity of the mental health problem is not directly related to housing stress. Thus, on some occasions increase in the rate of housing stress is related to low mental health problems. Factors, for vulnerability to mental health, are not only dependent on housing stress. Very similarly some household heads experience a mental health problem despite surplus income and evident expenditure. The general conclusion about mental health and housing stress is that the rate of exposure to mental health increases as housing stress increases. But the severity of the mental health problem is not directly related to housing stress.

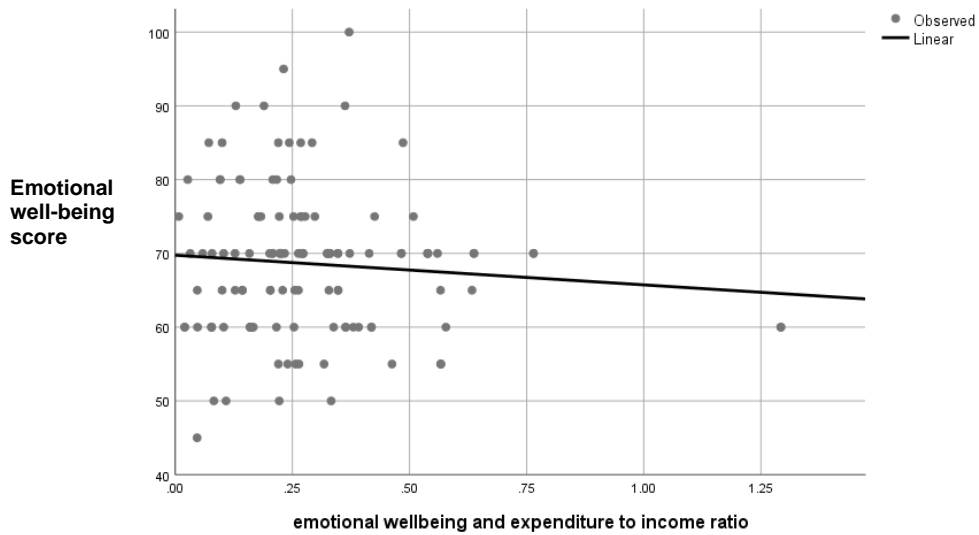


Figure 4: graph of emotional wellbeing and expenditure to income ratio

b. Physical wellbeing

i. General physical wellbeing

The physical well-being of the neighborhood is considered good by many household heads. There is a habit of exercising, engaging in a walk, or general consciousness of physical well-being in the area.

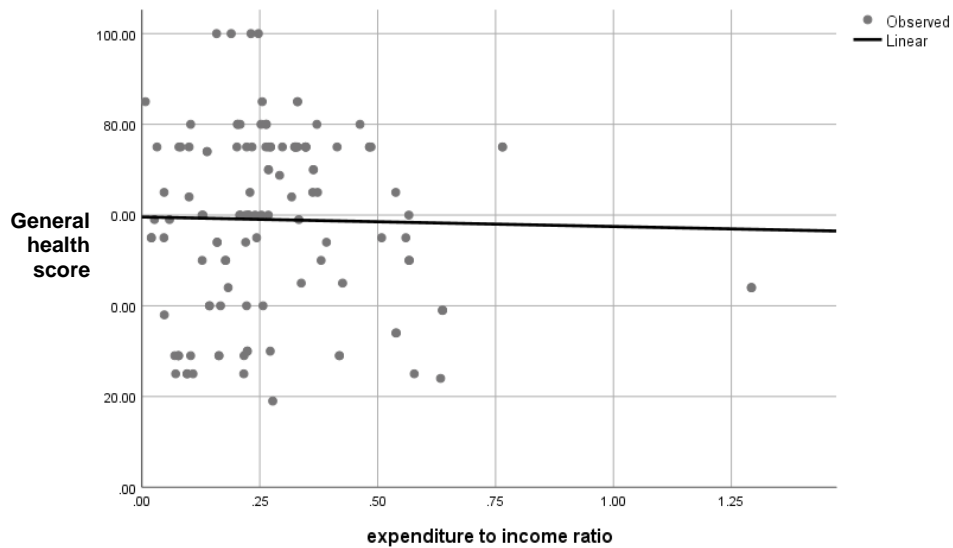


Figure 5: graph of expenditure to income ratio with general health outcomes

ii. Housing stress vs. physical wellbeing

The physical well-being of the neighborhood in YAC is not related to housing stress. Households that are poor in physical well-being are predominantly from age-related, underlining health problems, previous injuries are the main cause. The households who report their betterment of physical wellbeing give reason to age, absence of injury, exercise, and low or moderate daily activities.

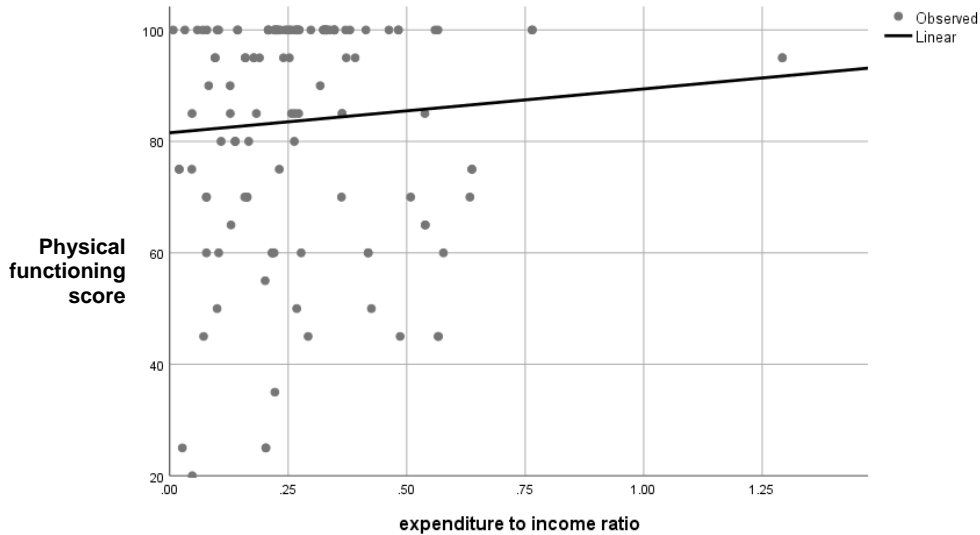


Figure 6: expenditure to income ratio versus physical functioning.

c. Social wellbeing

i. General social well-being score

The social well-being of YAC is considered to be improving over time. Many respondents report declines in crime and an increase in social integration. One of the main reasons for the improvement of the social integration is the formation of household associations and an increase in the number of owners that dwell within their houses. Yet, many households are not actively found within their home, especially on working days. As a result, day-to-day interaction within the neighborhood is far lower.

Some households build a fence on their floor to avoid unwanted intrusion. As a result, many household heads say those fences responded negatively to social interaction. The most commonly meeting space in the neighborhood is either within an individual’s unit or within the compound which is commonly unsuitable for many households.

ii. Housing stress vs. social wellbeing

Housing stress and social well-being are related indirectly. The majority of the respondents experiencing housing stress are characterized by reducing the number of social expenses and avoiding

social gatherings, replying negatively to the neighborhood social fabric. Meanwhile, some of the respondents with low levels of housing stress also experience avoiding social gatherings due to work so that they could make sufficient money that their family needs. As a result, they engage in multiple works and focus on income creation.

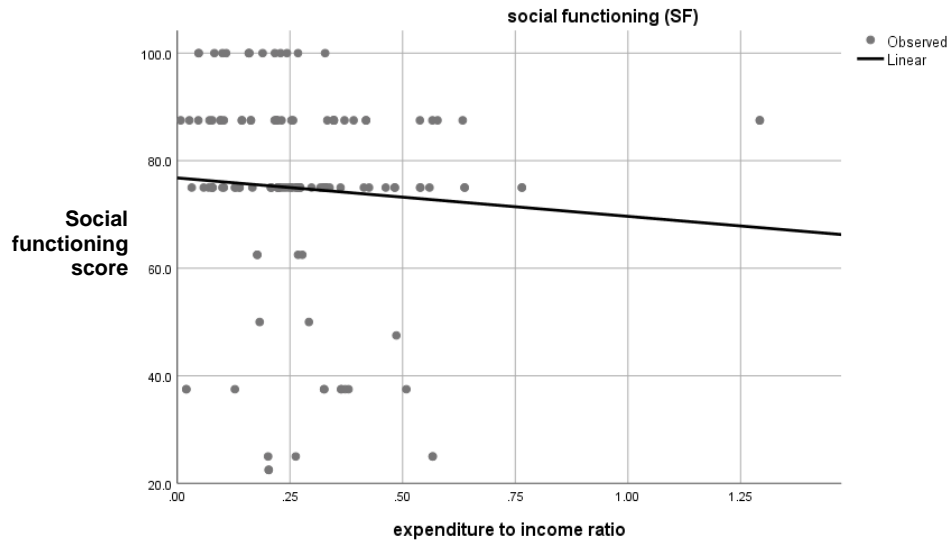


Figure 7: social functioning versus expenditure to income ratio

5. CONCLUSION AND RECOMMENDATIONS

CONCLUSION:

Affordability (what is the extent of the housing affordability problem?)

the final conclusion on the extent of affordability leads to a server housing affordability problem. Some of the leading results include: one in five households reported the neighborhood as unaffordable. Similarly, 60% of households suppress their health, clothing, and food expenses from time to time. Thus, using in the methodology section, only 28% of houses are affordable. Considering their buying capacity, most households are unable to purchase the condominium units per the current price.

Housing adequacy and compatibility with the dwellers?

Compatibility: In the case of compatibility, more than 50% of households consider their units and neighborhoods incompatible with their needs. While a significant percentage of (37.6%) do not

consider the Yeka Abado condominium as their primary choice of location. Similarly, the units are not their primary choice of typology.

Adequacy: 75% of the dwellers wished their units were wider or had an addition of another room. The other aspect is they use a single room for multiple purposes to mitigate the lack of space. For example, in many households living room is used for family gathering space, sleeping space, and dining. Besides that, using person per bedroom, a commonly used method for measuring overcrowding, on average 2.7 % person per bedroom. Many households also avoid social gatherings within their home due to spatial adequacy. Thus, spatial adequacy is a significant problem in YAC.

Wellbeing and housing stress

After all of these measurements, it's time to analyze the findings of well-being with respect to expenditure to income ratio. Thus 34 % of the households are currently under housing stress. With a small standard deviation of 0.12. Within the long term, even more, households are expected to get into housing stress.

Thus, the general health outcome scores low in people with a higher expenditure to income ratio. This means that the health situation of the people decreases with their ratio increase.

The social functioning also decreases as the ratio increase. Gives a clue that housing stress might contribute to low social health and functioning.

Yet, physical functioning results are not directly related to housing stress. People with higher physical functioning are found to be those who are under housing stress or higher rate of housing expenditure.

Emotional health on the other hand shows that it deteriorates as the expenditure to income ratio increases. Similarly, energy and fatigue results and bodily pain results show no connection with housing stress.

RECOMMENDATIONS

- *Improve the housing policy by increasing the housing ladder for all income groups.*

The research has found that most of the YAC dwellers preferred YAC by comparing it to other housing options. Dweller's responses show that the housing options for different economic capacities are limited within Addis Ababa. as a result, there exists a huge demand for certain housing types forcing demand-based price increases. To solve this problem the use of different housing options is crucial.

- *policies and directives must consider wellbeing and housing stress.*

At the policy level, housing stress and well-being are not mostly considered. At the end of the day, the goal of housing the citizens is to create a well-functioning, healthy society. Standing upon a large and ever-increasing housing demand, psychological as well as societal wellbeing could not be met.

So that, the well-being of the society improves, health packages for households in housing stress are preferable.

- *Integrating affordable housing provision projects with other major expenditures*

The housing expense consists of monthly non-rental expenses like electricity and tap water services. Thus, using sustainable and renewable resources and cost reduction techniques is attainable to reduce the household's housing stress.

Reduction in housing expenses could help in many cases, yet to support those results, expenditures like food and health must be considered. The continuation and well establishment of health care services for economically disadvantaged households.

- *Increasing communal spaces for the problem of spatial adequacy.*

Using several spaces communally helps in spatial adequacy. Many activities which do not require special privacy could be practiced communally. For example, washing activities, and playgrounds could be used collectively. Hence, the design of such spaces in housing projects will make them more affordable.

- *Facilitate and create additional income creation methods for the dwellers*

Dwellers and real estate brokers in YAC state that There is large traffic waiting for condominium housing both to get rent or win the lottery. Consequently, providing better social and physical amenities may cause a rise in housing prices.

- *Establish an institution for researching housing-related topics.*

In the registration and transferring of the IHDP program, many people complain about the legitimacy of the registration and transferring process. As a result, for future projects, there must be an institution that:

- collects information related to housing
 - tests convenient housing solutions and post-evaluates housing development projects.
 - Proposes policies and directives at the national and regional levels.
- *Integrate private sector involvement in affordable housing provision*

The private sector involvement in the provision of affordable housing in the case of Ethiopia is said to be limited. The main reason for this is considered to be a lack of housing finance. There are no mortgage banks until 2021 in Ethiopia. Other banks may give loans for mortgages but are only limited to stuff. The second problem is a scarcity of building materials where materials like cement and reinforcement bar are not easily available. Thirdly, the provision of land with high prices has made making affordable housing provision a harder task. Other than the above-mentioned problems there exists:

- Prohibitive rental income tax that does not attract real estate development for rental housing and discourages the construction of rental houses and buildings.
- The absence of a legal clause that promotes the construction of rental houses. i.e., the non-enactment of a legal entry on building tax legislations and the property tax proclamation that promotes rental houses construction.
- “The absence of alternative financing institutions for housing construction and the un-investment of institutions with adequate financial resources in the provision of long-term housing loans through appropriate prices”
- Thus, some groups propose the idea of PPP (public-private partnership) in the provision of housing while some scholars, politicians, and practitioners prefer the establishment of policy change in the housing provision field.

Recommendation for future research

- *Integrating the housing study with health professionals.*

The aspect of health in the study uses a premade questionnaire which is commonly used in medical studies. Yet, using strong medical knowledge by collaborating with health professionals could

improve the results of this research in future contexts. For example, the use of brain imaging could drastically improve the results to absolute certainty.

- *Improve the quality of the measurement*

The indicators used internationally fall into two types of traps. One of the traps is using the economic indicators to show all the affordability problems. The second one is considering all affordability problems are the same.

As a result, the classification of housing affordability problems used in this paper is a good method. The method uses a combination of parameters in identifying several housing affordability problem types. The overall method uses three elements in the measurement tool. Those are economic affordability, adequacy, and compatibility of units.

- *Expanding the research to other housing types like government-owned kebele housing and high-end residential estates.*

Heading beyond the IHDP program is crucial. There are several housing types in Addis Ababa. Some of the prominent housing types are the kebele housing. The housing is made available primarily in the Derg time. Currently, it is characterized mainly as a low-income group owned physically deteriorated slum. Studying such cases is main in full understanding of housing affordability problem in the context of Ethiopia as well as Addis Ababa.

Authors statement (Contribution and Declaration):

We confirm that the manuscript has been read and approved by all named authors and that there are no other persons who satisfied the criteria for authorship but are not listed. We further confirm that the order of authors listed in the manuscript has been approved by all of us.

Conception and design of study: ...; Acquisition of data: ...; Analysis and/or interpretation of data: ...; Paper writing:

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ANNEX 2: PHOTO'S



photo 1: night view of YAC



photo 2: compound of YAC



photo 3: traffic junction in YAC in the morning



photo 4:G+7 blocks in G7 area



photo 5: G+5 blocks of YAC



photo 6: G+7 blocks



photo 7: large number of people waiting for transportation in YAC



photo 8: large number of people waiting for bread shop in the morning in YAC



photo 9: view of sampled site in meskelegna area



photo 10: parking space in YAC compounds.



photo 11: cloth drying in the communal verandah and theft protection grills.



photo 12: government transferred Sami open market in YAC



photo 13: playing field in YAC.



photo 14: waste thrown in a walk way. YAC

ANNEX 3: YAC PLANS AND SUPPORT LETTERS

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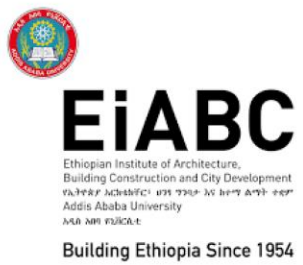
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አዲስ አበባ ግንቦት 27፣ 2013 ዓ.ም.
Ref Nr. EiABC/HC/042/2021

ተማሪ ናትናኤል ታደሰ፤ በአዲስ አበባ ዩኒቨርሲቲ፣ የኢትዮጵያ ኦርኮቴክቸር፣ ህንጻ ግንባታ፣ እና ከተማ ልማት ኢንስቲትዩት (EiABC) አንድ የትምህርት ክፍል በሆነው የ “Chair of Housing” በሚያካሂደው “Housing and Sustainable Development” በተሰኘው የድኅረ ምረቃ የትምህርት ፕሮግራም ውስጥ ትምህርቱን በመከታተል ላይ ይገኛል።

ከድህረ ምረቃ ትምህርቱ ጋር በተያያዘ የመመሪያ ጽሁፍ ለማቅረብ መረጃዎችን እያሰጠበ ይገኛል። የመመሪያ ጽሁፉ በአዲስ አበባ፣ በተለይም የየካ ክ/ክ የካ አባዶ የጋራ መኖሪያ ቤቶች እና ኗሪዎች ላይ ያተኮረ ሲሆን፤ ለጥናቱ አስፈላጊ መረጃዎች ለሱም ሆነ እሱ ለሚያሰማራቸው መረጃ ሰብሳቢዎች በመስጠት ትብብር ታደርጉለት ዘንድ በአክብሮት እንጠይቃለን።

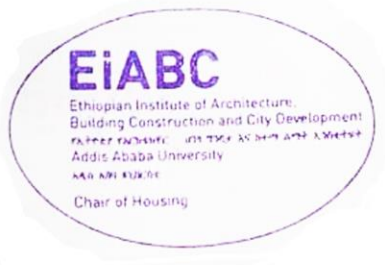
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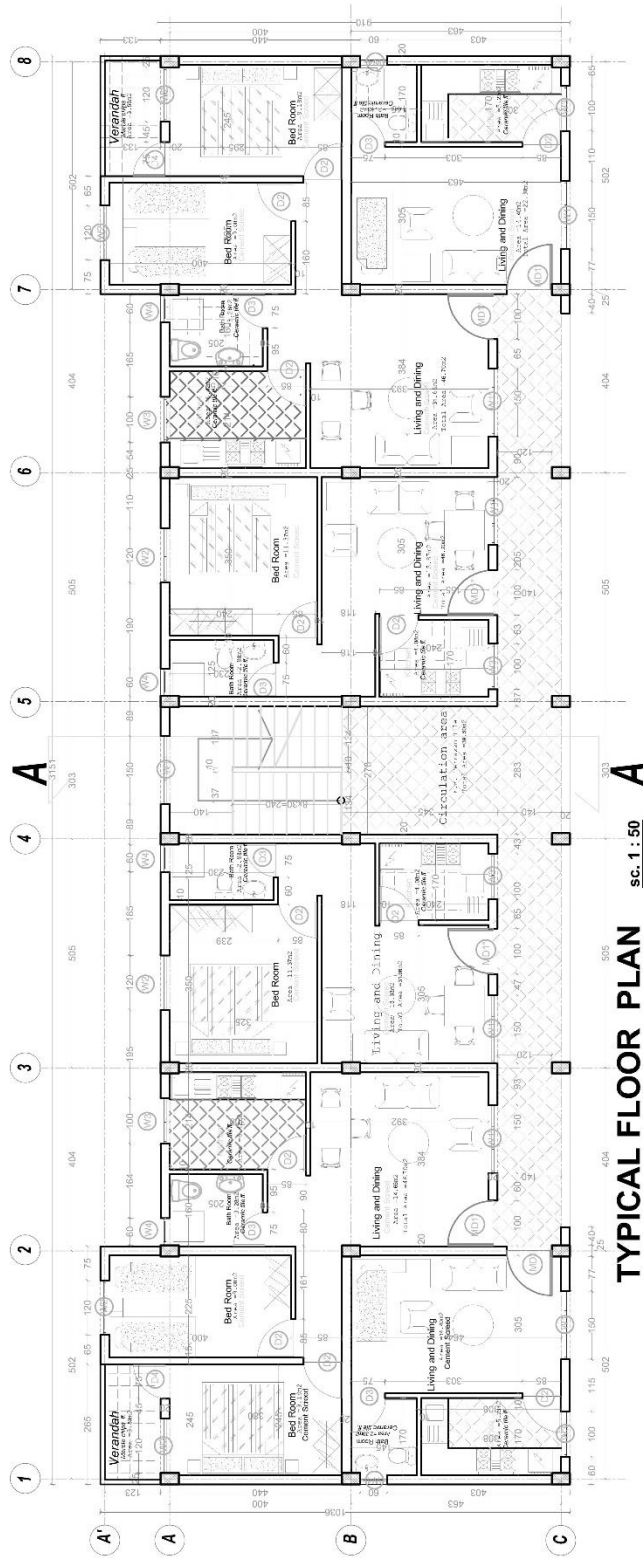


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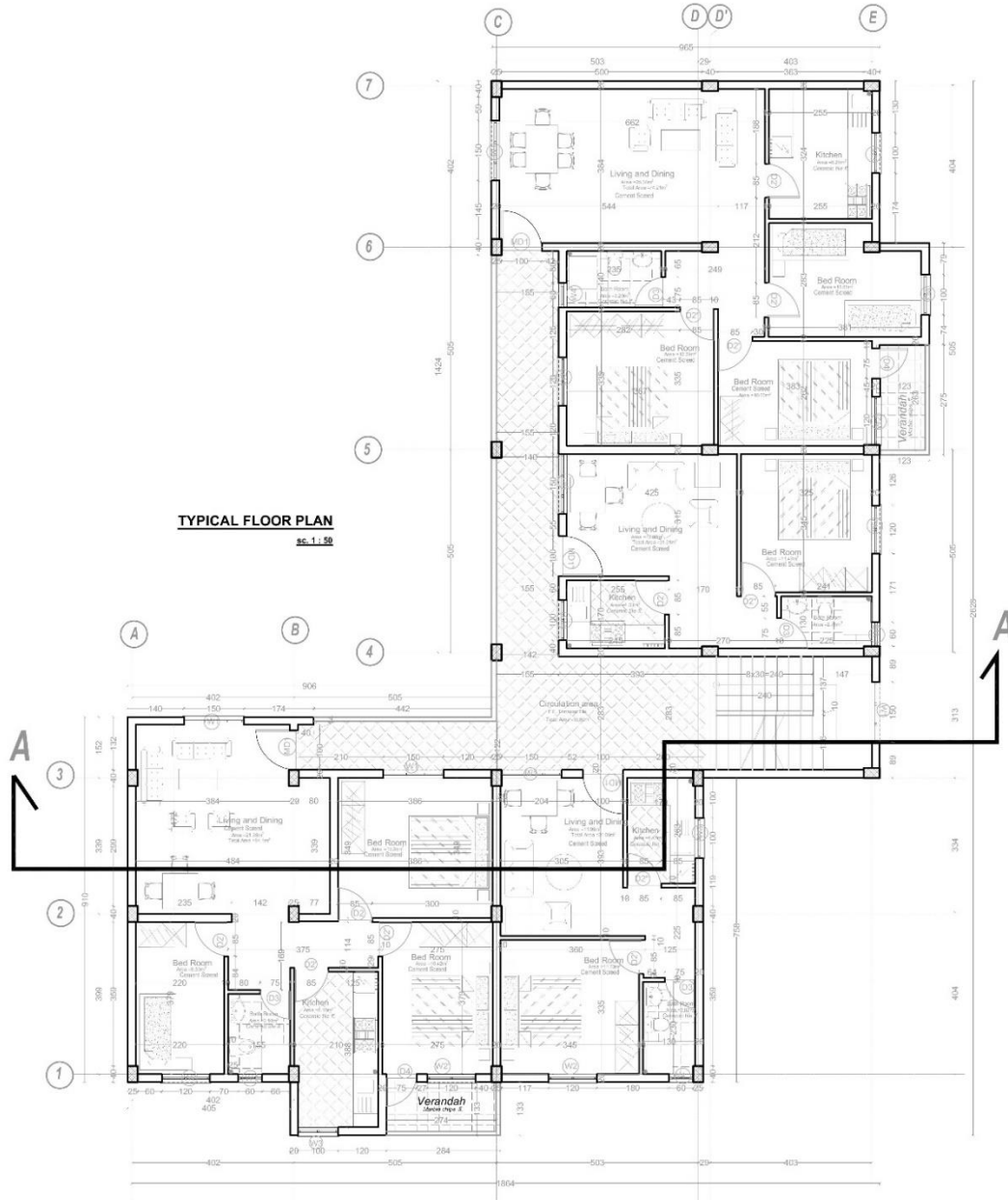
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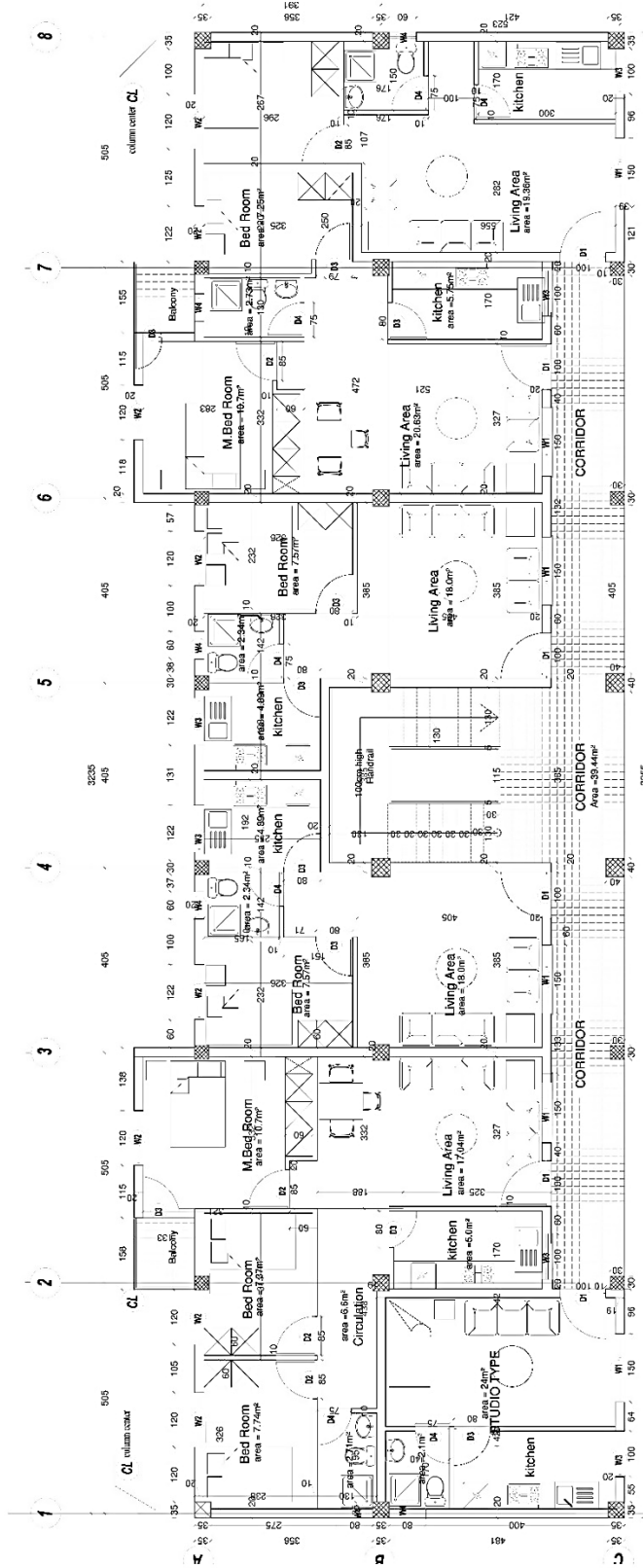

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TYPICAL FLOOR PLAN sc.1 : 50 **A**





TYPICAL FLOOR PLAN (Residence and upper shop floors)
SCALE 1:50

ANNEX 4: STRUCTURED QUESTIONNAIRE

1. HOUSE HOLD INFORMATION

1.1 H.H name:

1.2 Age: 1.3 Occupation:

1.4 Family Size: 1.6 Block number:

1.5 Marital status: 1.7 Unit number:

1.8 Tenure type:

Rent. Owner. Owner with mortgage

2. WORK AND CAREER

Primary work place

2.1 City 2.2 sub city

2.3 Wereda 2.4 institution

2.5 Location name /special name

Secondary work place

2.6 City 2.7 sub city

2.8 Wereda 2.9 Institution

2.10 Location name /special name

3. PERCEIVED AFFORDABILITY

3.0 When did you come to Abado condominium?

3.1 What is your primary reason for choosing to live in Abado condominium?

3.2 How satisfied do you think you are with Abado condominium neighborhood?

Very satisfied. Satisfied

Somewhat un-satisfied

Extremely unhappy

3.3 Are you happy with the house you live in in Adado condominium?

Very happy. Happy

Somewhat happy unhappy

Extremely unhappy

3.4 Are you willing to live in the house for longer period of time?

3.4.1 If yes, how long do you plan to live in?

3.4.2 If no, what is your main reason?

3.5 Have you struggled to pay your rent or mortgage in your stay in Adado condominium?

Yes no

If your answer is yes, what was your experience?

3.6 How affordable do you think is your house in Abado condominium?

Very affordable moderately affordable
 Somewhat affordable unaffordable
 Extremely unaffordable

What is your reason,
 Explain,

3.7 In your stay in Abado condominium, have you suppressed other expenses like food clothing and health for housing expense?

Yes No

3.7.1 If yes, how often do you suppress other expenses?

always usually
 sometimes rarely
 Never

4. COMPATIBILITY

4.1 Do you think your house in Abado condominium is compatible with your family?

very compatible mostly compatible

somehow compatible less compatible

Not compatible

4.2 What would be your preferred housing type and location with similar housing price?

4.3 Does your house and neighborhood limit your need for sports activities?

Always usually sometimes
 Rarely Never

4.4 Does your house and neighborhood limit your need for washing and cleaning activities?

Always usually sometimes
 Rarely Never

4.5 Does your house and neighborhood limit your need for social meeting and social activities like weddings and funerals?

always usually
 sometimes rarely never

4.6 Does your house and neighborhood limit your need for recreation and entertainment?

always usually
 sometimes rarely never

4.7 Does your house and neighborhood limit your need to exercise your religious activities?

always usually
 sometimes rarely never

4.8 **Neighborhood service satisfaction**

Satisfaction level	Excellent	Very good	good	Bad	Very bad
Health center					
Primary school					
Secondary school					
college					
Religious center					
bank					
Fire service					
telecommunication					
transportation					
Market					
Sports center					
Recreational center					

4.9 How do you rate the crime in the Abado condominium neighborhood?

Very high high
 medium low
 Very low

4.10 What kind of crime do you hear within Abado condominium?

4.11 Within your stay in the neighborhood did crime increased or decreased?

- a. Increased b. decreased c. is constant d. I don't now

4.12 Within your stay in the neighborhood, have you been a victim of crime

Yes/no _____

If yes, what was the incident?

4.13 Do you feel safe to move within the neighborhood at any time (including night time)?

- a. Always b. usually c sometimes d. rarely e. never

4.14 Have you been threatened by your identity in your neighborhood?

a. Always b. usually c sometimes d. rarely e. never

5.2 How often do you think are you worried?

4.15 Do you think the streets and roads are safe and repaired?_____ (Yes /no)

a. Always b. usually c. sometimes d. rarely e. never

4.16 Have you experienced a noise pollution within the neighborhood?

5.3 Have you experienced several move out before your current house?

If yes for 4.16, how intense is it?

If yes, how many? _____

If yes for 4.16, what is the source?

4.17 Have you experienced an odor pollution within your neighborhood?(yes/no)

5.4 Have you or your family experienced disruptive move (that forced children to change school or a member of your family to stop work)

If yes, how many? _____

5.5 Do you get verbal arguments from officials or owners about your house

If yes what was the incident,

5. Tenure security

5.1 Are you worried of forced eviction?

A. yes b. no

if yes, what is the main reason _____

5.6 Have you experienced a verbal abuse from owner or official?

Yes/no?

Explain the situation?

5.7 Do you have legal rental agreements? (Yes/ no)

If yes, in how long does the agreement last for?

6. SECONDARY PROPERTY PREFERENCE

Type	Rent	Buy	willingness
1 Informal house			
2 Kebele house			
3 Rental housing			
4 Private house		HCB /CHIKA	
5 condominium			
6 Apartment			
7 Land			
8 Others			
9 Others			

7. Longitudinal affordability

	2015	2016	2017	2018	2019	2020
Rent						
Mortgage						
Maintenance						

8. Housing history

Location	Family size	No of bed rooms	Privacy	Presence of services
1				
2				
3				
4				
5				

9. Economic aspect

No	Family member	Age	Source of income	Income amount	Monthly contribution to the household	Educational background
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						

10. Total monthly expense

Expense type	Amount
Food	
Transportation	
Entertainment	
Religious	
Health	
Savings	

Telecommunication

Idir and ikub and other social expenses

Supported families

Others 1

Others 2

11. Housing expense

Type	Amount
Maintenance	
Mortgage	
Rent	
Electric bill	
Water bill	
Security	
Waste management	

Over the past five years did your or other family member income increased?

	2015	2016	2017	2018	2019	2020
Income amount						

ID No: _____

ANNEX 5: SF-36 Questionnaire

This questionnaire asks for your views about your health. For ALL questions, please tick, cross or colour the circle that most closely matches your response. There are no right or wrong answers. Please answer ALL questions.

1. In general, would you say your health is:	Poor <input type="radio"/>	Fair <input type="radio"/>	Good <input type="radio"/>	Very good <input type="radio"/>	Excellent <input type="radio"/>
2. Compared to one year ago, how would you rate your health general in now?	Much worse now than one year ago <input type="radio"/>	Somewhat worse than one year ago <input type="radio"/>	About the same as one year ago <input type="radio"/>	Somewhat better than one year ago <input type="radio"/>	Much better than one year ago <input type="radio"/>
3. The following questions are about activities you might do during a typical day. Does your health now limit you in these activities? If so, how much?					
			No, not limited at all	Yes, limited a little	Yes, limited a lot
a. Vigorous activities, such as running, lifting heavy objects, participating in strenuous sports			<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b. Moderate activities, such as moving a table pushing a vacuum cleaner, bowling, or playing			<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c. Lifting or carrying groceries			<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
d. Climbing <u>several</u> flights of stairs			<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
e. Climbing <u>one</u> flight of stairs			<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
f. Bending, kneeling or stooping			<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
g. Walking more than a mile			<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
h. Walking several blocks			<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
i. Walking one block			<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
j. Bathing or dressing yourself			<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

4. During the past 4 weeks, how much of the time have you had any of the following problems with your work or other daily activities as a result of your physical health?						
	None of the time	A little of the time	Some of the time	Most of the time	All of the time	
a. Cut down on the amount of time you spent on work or other activities	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
b. Accomplished less than you would like	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
c. Were limited in the kind of work or other activities	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
d. Had difficulty performing the work or other activities (e.g. it took extra effort)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
5. During the past 4 weeks, how much of the time have you had any of the following problems with your work or other regular daily activities as a result of any emotional problems (such as feeling depressed or anxious)?						
	None of the time	A little of the time	Some of the time	Most of the time	All of the time	
a. Cut down on the amount of time you spent on work or other activities	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
b. Accomplished less than you would like	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
c. Did work or other activities less carefully than usual	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
6. During the past 4 weeks, to what extent has your physical health or emotional problems interfered with your normal social activities with family, friends, neighbours, or groups?						
	Not at all	Slightly	Moderately	Quite a bit	All of the time	
7. How much bodily pain have you had during the past 4 weeks?						
	None	Very mild	Mild	Moderate	Severe	Very severe

8. During the past 4 weeks, how much did pain interfere with your normal work (including both work outside the home and housework)?					
	Not at all	A little bit	Moderately	Quite a bit	Extremely
9. These questions are about how you feel and how things have been with you during the past 4 weeks. For each question, please give the one answer that comes closest to the way you have been feeling. How much of the time during the past 4 weeks...					
	None of the time	A little of the time	Some of the time	Most of the time	All of the time
a. did you feel full of life?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b. have you been very nervous?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c. have you felt so down in the dumps that nothing could cheer you up?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
d. have you felt calm and peaceful?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
e. did you have a lot of energy?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
f. have you felt downhearted and depressed?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
g. did you feel wornout?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
h. have you been happy?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
i. did you feel tired?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
10. During the past 4 weeks, how much of the time has your physical health or emotional problems interfered with your social activities (like visiting friends, relatives, etc.)?					
	None of the time	A little of the time	Some of the time	Most of the time	All of the time
11. How TRUE or FALSE is each of the following statements for you?					
	Definitely false	Mostly false	Don't know	Mostly true	Definitely true
a. I seem to get sick a little easier than other people	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

b. I am as healthy as anybody I know	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c. I expect my health to get worse	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
d. My health is excellent	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

ANNEX 6 : :BROKER'S SEMI STRUCTURED QUESTIONNAIRE

Name: _____ / _____ / _____ Sex _____ Age _____

Yr of experience _____ approximate deals Completed within the years? _____

1. What is your educational background?

2. How did you become a real-estate broker?

3. What is the price/rent of a **studio** in the past five year?

	5 years ago	4 years ago	3 years ago	2 years ago	1 years ago	now
rent						
purchase						

4. What is the price/rent of a **one bed room** in the past five year?

	5 years ago	4 years ago	3 years ago	2 years ago	1 years ago	now
rent						
purchase						

5. What is the price/rent of a **two bed room** in the past five year?

	5 years ago	4 years ago	3 years ago	2 years ago	1 years ago	now
rent						
purchase						

rent

purchase

6. What is the price/rent of a **three bed room** in the past five year?

	5 years ago	4 years ago	3 years ago	2 years ago	1 years ago	now
rent						
purchase						

7. What determines housing price and rent in Abado condominium?

8. What are the determinant factor out housing price and rent?

9. Have you experienced a tenant in forced eviction? _____

If so how common is it?

10. As a broker do you deal other properties other than condominium? (Example informal house, private property etc.)

- a. Yes b. no

11.1 If yes, what is the current and future price of the property?

Property type 1 _____

	5 years ago	4 years ago	3 years ago	2 years ago	1 years ago	now
rent						
purchase						

Property type 2 _____

	5 years ago	4 years ago	3 years ago	2 years ago	1 years ago	now
rent						
purchase						

Property type 3 _____

	5 years ago	4 years ago	3 years ago	2 years ago	1 years ago	now
rent						
purchase						

11. In case of a housing which side do you favor?

- a. Owner
- b. buyer/ tenant

12. What bad experience have you experienced due to bad brokers?
