

ASSESSMENT OF UTILITY AND COMMUNITY FACILITIES FOR THREE ADAMA CITY CONDOMINIUM NEIGHBORHOODS



Betelhem Alemu Yami

A Thesis submitted to
The Department of Architecture
School of Civil Engineering and Architecture

Presented in Partial Fulfillment of the Requirement for the Degree of Masters of
Science in Urban
Planning and Design

Office of Post Graduates Studies

Adama Science and Technology University

June, 2022

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APPROVE OF BOARD OF EXAMINERS

I, the advisor of the thesis entitled “**Assessment of Utility and Community Facilities for Three Adama City Condominium Neighborhoods**” hereby certify that the recommendation and suggestions made by the board of examiners are appropriately incorporated into the final version of the thesis.

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We, the undersigned, members of the Board of Examiners of the thesis by **Betelhem Alemu** have read and evaluated the thesis entitled “**Assessment of Utility and Community Facilities for Three Adama City Condominium Neighborhoods.**” and examined the candidate during open defense. This is, therefore, to certify that the thesis is accepted for partial fulfilment of the requirement of the degree of Master of Science in **Urban Planning and Design.**

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DECLARATION

I hereby declare that this MSc Thesis entitled “**Assessment of Utility and Community Facilities for Three Adama City Condominium Neighborhoods.**” is my original work. That is, it has not been submitted for the award of any academic degree, diploma or certificate in any other university. All sources of materials that are used for this thesis have been duly acknowledged through citations.

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RECOMMENDATION

I, the advisor of this thesis, hereby certify that I have read the revised version of the thesis entitled “**Assessment of Utility and Community Facilities for Three Adama City Condominium Neighborhoods**” prepared under my guidance by **Betelhem Alemu** submitted in partial fulfilment of the requirements for the degree of Master’s of Science in **Urban Planning and Design**. Therefore, I recommend the submission of revised version of the thesis to the department following the applicable procedures.

Major Advisor

Signature

Date

ACKNOWLEDGMENT

The satisfaction that accompanies the successful completion of any task would be incomplete without the mention of people whose ceaseless co-operation made it possible, whose constant guidance and encouragement crown all efforts with success.

Above everything, I thank my Almighty God for being and guiding me all the time during my academic study and at the time of research. Next, I would like to extend my gratitude to my advisor Asoss professor Daneil Leribo, for his excellent comments, honest criticisms, deep technical insight, and prompt response that should have been greatly acknowledged. This is all about the most valuable unforgettable gifts one top intellectual can give to his students.

I would like to express my deepest gratitude and sincere thanks to my uncle, Dr. Manaye Ewunetu managing partner of ME Consulting Engineers Ltd.UK, he made this research paper possible with his commitment, encouragement, supervision, and support from the commencement of the research. I am grateful for your support.

Last but not least, I would like to pass very special thanks to my beloved mother, my sister and to all of my friends and family whose support and appreciation have been a pivotal factors in the successful completion of my Master's Degree.

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LIST OF ACRONYMS

AARF	Association of Academic Researchers and Faculties
AAWSA	Addis Ababa Water & Sewerage Authority
AFDB	African Development Bank
ASTU	Adama Science and Technology University
BAR	Built Area Ratio
CBD	Central Business District
CPHEEO	Central Public Health and Environmental Engineering Organization
DB	Distribution Board
DEM	Digital Elevation Model
EELPA	Ethiopian Electric Light and Power Authority
ETB	Ethiopian Birr
FAR	Floor Area Ratio
FDRE	Federal Democratic Republic of Ethiopia
IHDP	Integrated Housing Development Program
GFDRR	Global Facility for Disaster Reduction and Recovery
SDGs	Sustainable Development Goals
S.C	Share Company
SPSS	Statistical Package for the Social Sciences
UN	United Nation

ABSTRACT

This study was conducted in three condominium sites to assess utility and community facilities. from the total 700 households of three condominiums, 248 participated in the study, and among whom 165 questionnaires were accidentally distributed. Accordingly, three focus group discussions with eleven participants from Dheka adii, Jelissi and Selassie condominium sites, five key informant interview with civil engineers from Adama city Housing and Municipality Bureau & condominium committees and interview with twelve residents from each condominium were also conducted. Besides, field observation in the condominium sites was held. The purpose of this research is to assess the utility and community facilities in three Adama city condominium neighborhoods. The method to evaluate the accessibility of utilities in the condominiums, site analysis were applied and proximity analysis were applied the vicinity of community facilities, proximity and site analyses method and to achieve compatibility of the neighborhood, land use and morphological analysis was applied. Finding are most of the condominiums in Adama city have access to safe water supply despite the fact that one in three condominiums does not have adequate water supply. Liquid waste management practice within the adama condominiums, sewer line and drainage system was unsatisfactory. In all 3 condominiums, schools are closer to condominium than public health facilities, shopping center and worship places. Of the three condominiums, the most compatible neighborhood is the Jelissi condominium neighborhood with the community facilities in the area. Government, NGOs, condominium residents and other private sector have to work collaboratively to fulfill the gap between the demand and supply of any utilities and community facilities in the condominium housing projects. when different domestic and foreign investors are planning to construct a school, health center, commerce center and different community benefit facilities, they ought to be consider the condominium neighborhoods where most individuals live, it need to construct inside walking distance for the inhabitant.

Keywords: Condominium, Characteristics, Community Facility, Compatibility, Utility

CHAPTER ONE

INTRODUCTION

The Ethiopian Integrated Housing Development Program is a large-scale approach to tending to the current housing shortfall, the destitute quality of the existing lodging stock, and the longer term lodging needs due to proceeded urbanization (UN-Habitat, 2011). The ministry of urban development and construction of the FDRE in collaboration with the Commercial Bank of Ethiopia has designed different housing registration and payment modes such as 10/90, 20/80 and 40/60 (Negera, 2015). The procedure is first, individuals are expected to have the least expected amount of money kept in Bank accounts called a “down payment.” Then winners are expected to pay the remaining principal loan with the corresponding interest rate within the agreed period of time per month, unless the contract entered between the champ of a condominium house and the housing office will be ended agreeing to the law (Gebremariam, 2017).

Condominium housing is one of the integrated housing development programs a title was given to the frame of housing residency where each inhabitant family owns their unit, but similarly offers possession and responsibility for the communal regions and offices of the building, such as passages, warming frameworks, and elevators. There’s no personal ownership over plots of land. All of the arrivals on a condominium location are owned by all homeowners(Cree & Feel, 1996).

Since 2005 Ethiopia has implemented a driven government led low and middle - income housing program. The initial goal of the programmers was to build 400,000 condominium units, create 200,000 jobs, promote the advancement of 10,000 smaller scale and small enterprises, enhance the capacity of the construction sector, recover inner-city slum areas, and promote home ownership for law income households(Barkan, 2020).

Community facilities development has always been basic to creating nations and developed economies. Facility systems are vital in keeping up and progressing financial growth, and foremost to worldwide sustainability. From transport systems to communication lines, all features of the economy are influenced by the accessibility and reliability of its infrastructure system(Muiga & Rukwaro, 2017).

When community facilities are well-maintained, available, appealing and safe, they shape residents' sentiments approximately the identity, legacy and standing of their neighborhood(Kelsey & Kenny, 2021). The spaces within the condominiums which are managed, planned and maintained for the utilization of all the inhabitants are known as the community spaces and those spaces act as an image or character of those apartments(Bandara et al., 2020).

A register of condominium units and common areas on location and any confinements on their utilization is commonly established in a master deed which authorizes the board of chiefs to manage condominium affairs and survey proprietors on their execution of adequate maintenance(UN-Habitat, 2011). Integration of decentralized utility systems within the condominium neighborhoods offers openings to close circles within community, while also improving resident's well-being and the environmental condition of the urban environment(Salim, 2015).

1.1 Background

The improvement of condominium housing is expected to unravel numerous issues of the urban inhabitants. It empowers to satisfy and tackles fundamental issues like water supply, shielding, and other foundations of the tenants. Many nations within the world began this program of social, financial and financial methods of reasoning (Amini Fard et al., 2015). The existing water supply system of Adama city does not satisfy the water requirement of the tremendously increasing population of the city (Negera, 2015).

The water distribution network of Adama city water supply system, the existing distribution system covers around 50% or 2575 ha of the master plan area of the town. It has also limited to the central low elevation areas of Adama town, it should be expanded to the elevated areas to solve the current water shortage of the residents (Bogale, 2016).

The water supply situation in condominium housing units, there's still a big gap between the supplies and demands of water supply services. This can be due to insufficient waters source, lacking fund, and lacking man control, powerless coordination among the offices and failure to implementing the policies, rapid population development, absence of participation of the condominium house residents, and a few other challenges within the study area(Barton et al., 2020),

There are two type community facilities, the first one is facilities of territorial importance serving the wider public but not specific client users and who would not require frequent services of the facilities: these facilities include correctional facilities, public mortuaries, funeral depots and parlors. The second one is facilities of more nearby or district noteworthiness serving specific clients who would require frequent services of the facilities: these offices include special restorative and health clinics, education facilities and social welfare services (Porter et al., 2014). Condominium neighborhood scale utility-systems can subsequently become profitable resources for neighborhoods and their situations, partly also since they give incomes and occupations for their communities (Muiga & Rukwaro, 2017).

1.2 Problem Statement

The condominium program has numerous challenges that prevent the program not to meet its objective. On account of that it does not have as many green spaces, malls and other community facility in its neighborhood as a contemporary urban community. Condominiums are only a functional not beautiful solution to the housing required in Adama. Even what should be a priority, the basic utilities for the condominium houses are not complete. Poor sanitation facilities and a terrible sewerage system proceeds to be a critical issue within the Adama condominium houses.

It is a day by day happening that sewages from septic tanks and toilets explode to contaminate the living environment and influences the wellbeing of residents. Floor drainage ditches are open and discharge a bad smell and are dangerous to children, When a house is built, constructing a physical object with four walls and a roof isn't sufficient itself. A few other facilities must be there to ease life. There must be utility such as street from the condominium, power lines, water provision, sanitation sewerage systems, parking services and so on. Even though these are essential to living a comfortable life within the houses, a few of these utilities are not completely developed. This will intensify the problem of the existing bad sewerage system. It obstructs sewer lines as a result of which surcharge of the flow on the floor. There is no periodic evacuation of waste. This results in leaking and over flow of sewage from septic tanks.

In addition despite most of the households of the Adama condominium have children, there is no school or medical facility nearby consequently they are forcing the residents to go far away the neighborhood to get access health and education. However, they often have health problems due to the dust, lack of quality and clean sidewalks to move from the condominium neighborhood to these institutions. Businesses and factories being built too close to the condominium are a big headache for the occupant of the condominium.

1.3 The Objective of the Study

General Objective:

To assess the utility and community facilities in three adama city condominium neighborhoods.

Specific Objectives:

1. To evaluate the accessibility of water and sewerage supply for the condominiums.
2. To examine the proximity of school, healthy, shopping and worship centers to the condominiums.
3. To examine the compatibility of the condominium with the neighborhood land uses.

1. 4 Research Question

1. To what extent residents are accessible to water, electricity and sewerage systems?
2. How close are the school, healthy, hooping and worship places to the condominiums?
3. Is the neighborhood land use is compatible with condominiums?

1.5 Significant of the Study

The construction of condominium houses in Ethiopia is going on, and is expected to continue for decades. There has been no exhaustive research conducted so far on the performance of utility and community facilities provision in condominium housing programs in Adama city, Ethiopia. This study clearly shows what kind of land use affect the condominium area, which has not received much attention in previous studies, and how far the community service facilities that are important to the residents should be located away from the condominium. For the problems regarding to community facilities in condominium neighborhoods this study provide the solutions, condominium ground floor leases to noise-free facilities and provides adequate buffer space between commercial centers and condominiums. This research gives a good overview of the water demand and supply situation in the condominium and the sewage supply and their problems with their solutions for the reader and condominium residents.

1.6 Scope of the Study

The study is focused on the three condominium sites from all nine sites in Adama, include neighborhood within 500 radius around the condominium to see the existing land use. The sites are selected based on the several criteria's like physical characteristics, location, master plan compatibility and urban impact. Considering the values of several parameters such as minimum population size, and skewness of the incidence rate, a 500meter neighborhood is the optimal size (Ali & Park, 2005). This research assess utilities specifically water, electricity, sewerage system and proximity and compatibility of school, healthy, shopping and worship places on the condominium neighborhoods.

1.7 Limitation of the Study

One of the constraint of the study was low level of cooperation on the part of the participants was the most challenge that make the study difficult to collect necessary data. Some accidentally selected participant were not willingness to fill the questionnaires due to various wrong perceptions they have. Among others, some people thought as a government agent spying the community's political affiliations and report to higher officials. To overcome these obstacles, it was described the study's objective as if it had no political implications, and promised not to reveal their names to anyone else. For the sake of this, only the data would be used. As a result, a number of residents have changed their mind expression.

1.8 Organization of the research

This paper consists of five chapters. The first chapter deals with the introduction, background of the study, statement of the problem, objectives of the studies, research questions, scope and limitations of the study, and paper outline. The second chapter, reviews various works of literatures on the meaning of some terms such as condominium housing, utility and community facility. Besides, the chapter reviews various literature on condominium housing, different utility and community facility in Ethiopia and in other nations. The third chapter is all about the research methodology of the study. And sources of data, ethical consideration, population size, site selection criteria's are part of this chapter. The fourth chapter discusses, analyses and interpret the data collected through the tools indicated in the third chapter of the study. Finally, the last chapter presents conclusion & recommendations. Besides, bibliography, questionnaires, interview checklist and other important documents are attached to the last part of this thesis.

CHAPTER TWO

LITERATURE REVIEW

This chapter is to give a general conceptual framework about utility and community facility provisions like water, electricity and sewerage system and community amenities in the condominium neighborhood. Related to this it incorporates circumstantial facts of previous detection, ambivalence and argument related to the theory that have been researched. Furthermore it explicates more empirical concepts about how access to electricity, water and sewerage in a condominium should be accessible, as well as the proximity of community facilities in a condominium area and the compatibility of condominium with neighborhood facilities. This method helps to analyze effective impact.

2.1 Condominium Housing and Utility

2.1.2 Water Demand vs Supply

The condominium water supply framework has significance for most urban areas since it shows how much the costs of a channeled water supply arrangement can be brought down (Kaliti et al., 2018). The cost of the public distribution arrangement can be substantially diminished in the event that the water organization gives the supply to a bunch of families like counting condominiums or cooperatives, instead of to individual households, with these bunches overseeing the association to each family (Novak, 2020).

In accordance with the experience of condominium water and sewerage systems in Brazil: The condominium water and sewerage system is based on two key concepts that differentiate it from the conventional model. The first concept effectively redefines the unit to which service is provided. The second distinctive concept behind the condominium approach is the development of a much closer relationship between service providers and users, encouraging the two parties to come to an agreement to facilitate service expansion and adaptation to local needs and constraints (Melo, 2005). Water scarcity and affordability in urban water pricing: a case study of Chile, water pricing for condominium residents may be a useful economic approach instrument to affect the environmentally, socially, and economically efficient use of water. A well-designed water rate structure should deal with multiple objectives such as the promotion of financial efficiency, value, natural and budgetary supportability, and open political acceptability (Molinos & Donoso, 2016).

There are two primary causes for water scarcity: physical scarcity and economic scarcity. Physical availability of water is dependent on natural water sources and technological advances such as desalination or rainwater harvesting techniques (Ali & Park, 2005). The water that people need comes from surface water, underground water, and other sources. Meanwhile, water demand is mainly composed of domestic water demand, ecological water demand, agricultural water demand, and industrial water demand (Meenakshi, 2011).

Modelling of prevailing water distribution network in Putrajaya, Malaysia (Arumugam et al., 2019) highly recommended that, water supply ought to meet the user request, and should be sufficient in quality and adequate in amount, be readily accessible to users with pressure, and be reasonably cheap and easily discard of after it has served its reason. In this manner, the identification of water supply sources, their conservation and ideal utilization is of uttermost importance.

Residential water consumption data can be important for sizing and operation rules in a water distribution network if well compiled. Water distribution network is conceived to provide customer with water in an adequate quantity and quality (Costa & Soares, 2020). Imbalance with lack of water resources supply and demand severely constrain economic and social development, and the distribution and use of them is imminent (Kern, 2007).

The most widely used method for estimating the demand for water within buildings is the probabilistic method developed by Dr. Roy Hunter (Williams, 2005). The Hunter method provides appraisal of the number of fixtures most likely to be operating at the same time as a work of the total number of fixtures within the plan.

2.1.2 Sewerage System

As reported by Electric Power Research Institute, (2013) waste water systems in the condominium neighborhood generally consist of three principal components. These are (i), collection system such as sewers and pumping stations (ii), treatment facilities including sludge/bio solids processing and (iii), effluent and bio solids disposal or reuse. In accordance with Hailemariam & Ajeme,(2014) waste water collection systems used for wastewater are of two fundamental types, separate or combined. Separate systems are designed for the exclusive transport of either clean wastewater or storm water and are the common practice today, whereas combined systems are designed for the transport of both sanitary wastewater and storm water.

The city clerk office provide the sewage system standard for the condominium as each unit within a project shall have a separate meter to register the consumption of gas, electricity and water within such unit so that each unit owner may be billed individually for such consumption (Office, 2019).

A sewerage system consists of the following: (i), house service connections- they connect the house to sewers in the road. (ii), sewers- these are pipes or conduits meant for carrying sewage and are laid along the roads and flow by gravity. (iii), lift stations-when sewers are at a deeper depth, lift stations are used which help to move sewage from lower elevations below the ground to the required higher elevation. Pump stations and sewage treatment plants(Costa & Soares, 2020).

2.2 Community Facilities in the Condominium Neighborhood

Communal facilities is the framework of physical facilities needed to support and sustain a community of people to live and work (Rofe, 1995). Community amenities essentially refers to small scale basic structures, technical offices and systems built at the community level that are basic for food of lives and employments of the populace living in a community (Ali & Park, 2005).

Neighborhood planning and design standards recommend that each condominium neighborhood contains a mix of land uses and densities that provide options to live, learn, work, and play. More intensive land uses are connected and focused around transit, alternative transportation modes and parks. All residents can effortlessly get to every day shopping and recreational needs in their neighborhood in any case of mode choice(Martens et al., 2014).

Co-locate commercial services, community offices and institutional uses and arrange higher thickness to utilize areas with those in adjoining neighborhoods to form a larger middle of activity accessible to both condominium neighborhoods (Amini Fard et al., 2015). Kern,(2007) testify that public amenities within the classical sense may refer to libraries, schools and clinics. In the case of condominiums, the amenities are ordinarily not publicly accessible. Particularly defend that, condominium owners share a plenty of amenities and high-rise condominium towers being built nowadays have civilities. These are made to sell a specific way of life to inhabitants, as they can appreciate these areas within or in near proximity to their condominium. (Parin, 2019)

Outdoor amenities have been considered as places that increase the social interaction among residents (Skaburskis, 2019). In the study of three condominium housing sorts in: an ancient neighborhood of low rise condominium houses, traditional high-rise housing and an innovative high-rise housing, it is revealed that the old neighborhood and the innovative showed higher levels of outdoor socializing than the traditional (Dovey et al., 2009).

Tajima's perspective about the community amenities of condominium neighborhoods is regarding the price value of condominium housing (Tajima, 2020), community institution in a condominium development ought to offer assistance to increase lodging prices through at least two channels: a better-built environment and a higher community sustained within the space.

A wide range of community facilities is essential to preserve a fitting standard of living. Their arrangement is based on the development or concentration of populace within the area served (Factors et al., 2014). Also community facility standard books states as planning for community services to meet the requirements of display and future residents of all ages and income levels, these proposition look for to guarantee that the community facilities and administrations the community wants will have the capacity to serve modern advancement beneath the Common Arrange without degrading existing service levels (Park, 2014).

Proximity analysis is usefully incorporated into a community facility walkability study, combination of different approaches. With this understanding, here on how to conduct a rigorous proximity analysis, covering general principles, guidance on key analytical decisions. In doing so, five fundamental questions that analysts must ask themselves when conducting a proximity analysis (i) what outcomes are appropriate to analyze? (ii) Unit of analysis should be used? (iii) Time periods should be compared? (iv) Comparison groups should be considered? And (v) Statistical methods should be used? (Hoover, 2006).

Physical proximity to services and facilities makes a decisive contribution to a neighborhood's financial performance, personal quality of life, and the determination of people and neighborhood locations. For individuals, physical access to basic services and facilities is an important determinant of social inclusion, ability to meet basic needs, and ability to fully participate in social and economic development. In order for cities to achieve social and economic sustainability at the local level, it is important to provide a certain level of services and facilities to all neighborhoods (Dengkil et al., 2019).

Walking neighborhood is a model to define the maximum distance of the community facility to the residential area also extent to which the built environment is friendly to the presence of people living, shopping, visiting, enjoying or spending time in an area (Diyanah I & Hafazah , 2011). The maximum distance to the community facilities is shown in the figure 2.1 below.

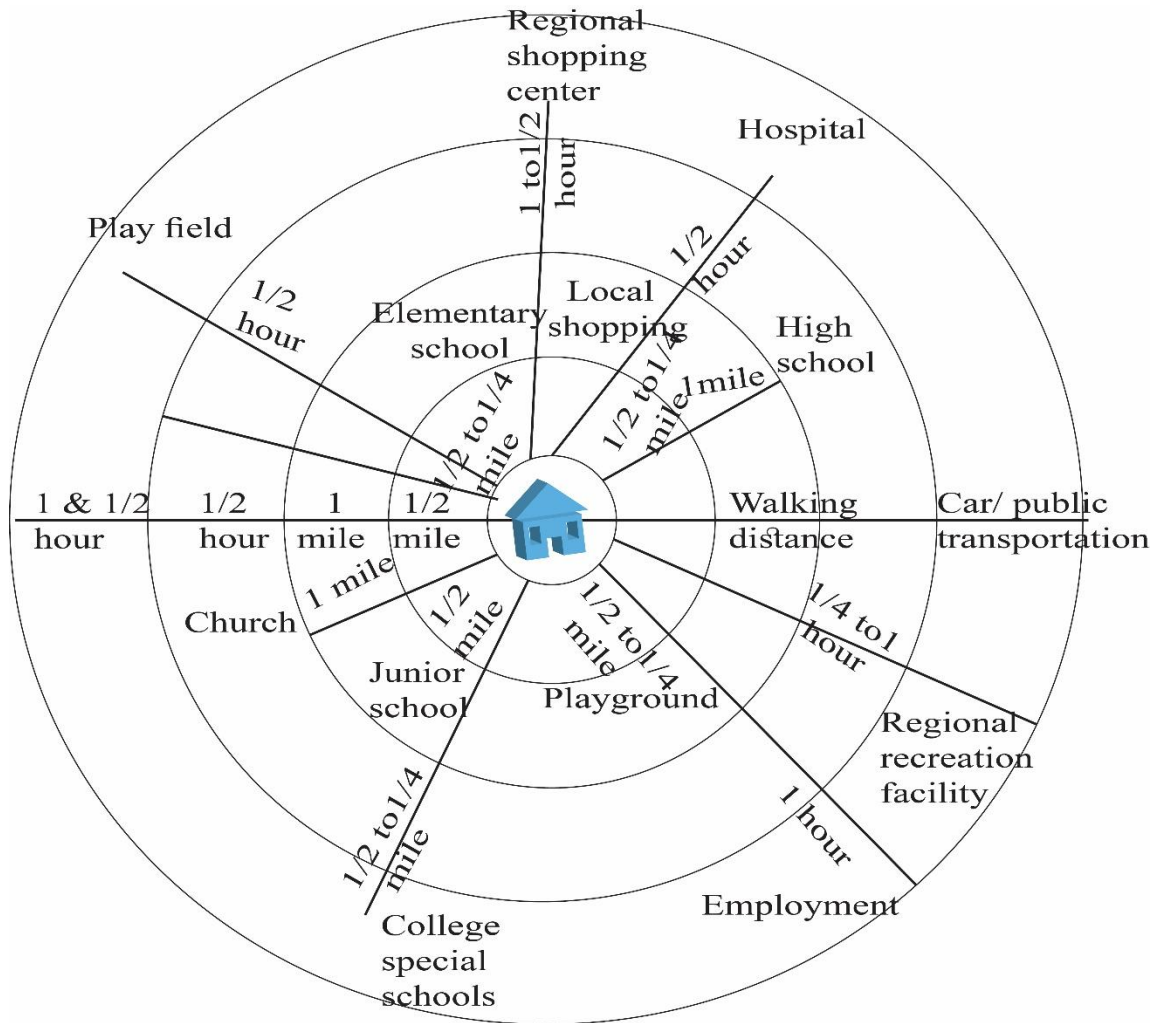


Figure2. 1 Maximum Distance for Community Facilities

Source: - (Harvey, 2011)

2.3 Compatibility of Condominium Neighborhood

According to the neighborhood compatibility analysis article (Muiga & Rukwaro, 2017), neighborhood planning areas comprise of a blend of existing platted or vested improvement undeveloped empty zones, infill zones and small neighborhoods. The compatibility of new advancement with existing adjacent neighborhoods might be considered as a portion of the survey of any proposition for development inside the neighborhood arranging zone area.

Report of Saratoga neighborhood compatibility analysis defines the compatibility from an architectural perspective, neighborhood compatibility based on different components counting the in general measure, exterior materials, overall massing, rooflines, and perceptibility from the street and adjoining uses (Davidson, 2018).

Urban design compatibility analysis by Consulting, (2016) delineates the compatibility as, advancement or re development that's competent of coexisting in harmony with, which will not have an undue physical or utilitarian adverse impact on existing or proposed advancement within the range or pose an unsatisfactory chance to natural or human health.

Rancho, (2004) point of view about the neighborhoods compatibility is, having an architectural style, visual style, visual bulk, massiveness, height, width, and length, which is comparable with the neighborhoods and harmonizes with existing structures in the neighborhoods and within itself. And it is also the relationship of buildings to buildings or components of a building to each other.

2.5.1 Neighborhood Compatibility Guidelines

(A) Land Use Compatibility

From neighborhood compatibility analysis perspective about the commercial areas is, the aim of permitting neighborhood commercial employments inside chosen ranges is to offer neighborhoods openings to have required merchandise and administrations within walkable separations. Neighborhood commercial employments are expecting to peacefully coexist with their neighborhoods (Meenakshi, 2011).

Porter & Smith, (2010) to help determine compatibility between uses, land use compatibility matrix that can be used to assess if the intensity and design of a proposed development is appropriate to surrounding uses and will complement and enhance the character of each land use typology area.

Davidson, (2016) discussed neighborhood compatibility in terms of land use compatibility, the proposed residential development does not influence the current private arrival use of the encompassing range as there will be no antagonistic impact with respect to clamor, vibration, air quality, security, wind and sun shadows. The siting of the townhouse buildings should be guarantee “eyes on the street”. Visual connections and characteristic surveillance ought to build up by orienting the units towards the mews. Advance, the development will be found on the exterior of any dangerous lands and the shore wall will meet all required security guidelines (Jaramillo et al., 2020). Table 2.1 illustrate the land use compatibility matrix, what kind of land use is fully compatible, moderate compatible, neutral and incompatible with the residential & complex residential area like condominium. 0 means fully compatible, 1 moderate compatible, 2 neutral, 3 moderately compatible and 4 fully compatible.

Table2. 1 Land use compatibility with residential matrix

		Residential	Complex residential
Economical	Daily & weekly shopping	0	0
	Monthly shopping	2	1
	Yearly shopping	2	2
Medical & healthy facility	Local scaled (doctor offices, pharmacy)	0	0
	District scaled (general clinic)	2	2
	Regional scaled (professional clinic)	4	3
	City scaled (professional hospital)	4	4
Educational	Land use types	0	0
	Kindergarten	0	0
	Primary school	0	0
	Secondary school	3	2
	Technical school	3	3

Source: - (Taleai, 2015)

2.4 Empirical Review

Assessment of the water distribution network of Adama city water supply system Bogale, (2016) in the process of identifying the major factors for intermittent water supply experienced in Adama city water distribution network reveals that shortage of water service pressure at different junctions due to topographic and size of pipes. Also most parts of the central network are suffered from lower flow velocities of less than 0.5m/s due to unnecessarily congestion of the pipe network (Hailemariam & Ajeme, 2014).

To assess the challenge and openings of water administrations in condominium housing of Addis Ababa there's a certain finding that one of the major causes of the water supply issues within the zone was electric control interference. Other than water quality issues, deficiency in the sum of water and unpredictable timing in water dispersion (Abebe, 2018).

In the article on condominium street furniture in Mekelle city by Hagos,(2014) revealed that the arrangement of blocks and space between buildings, most of the buildings within the location are in close organization with each other with no work shared in common indeed the open space. Also the blocks don't have a great look due to the random and unpleasing pattern of the satellite dishes and the other capacities like hanging clothes on the front veneer.

In the study of assessment of the liquid waste management practice of condominium houses in Addis Ababa by Abebe & Demoze, (2017) to determine the current management status of effluents the finding was, that liquid waste management practice within the condominiums site sewer line and the vehicle was unsuitable since of the need of waste management supervision of concerned bodies, weak policies and organization outline works, an incline of the constructed treatment plant and an adequate number of vehicle and carelessness of inhabitant.

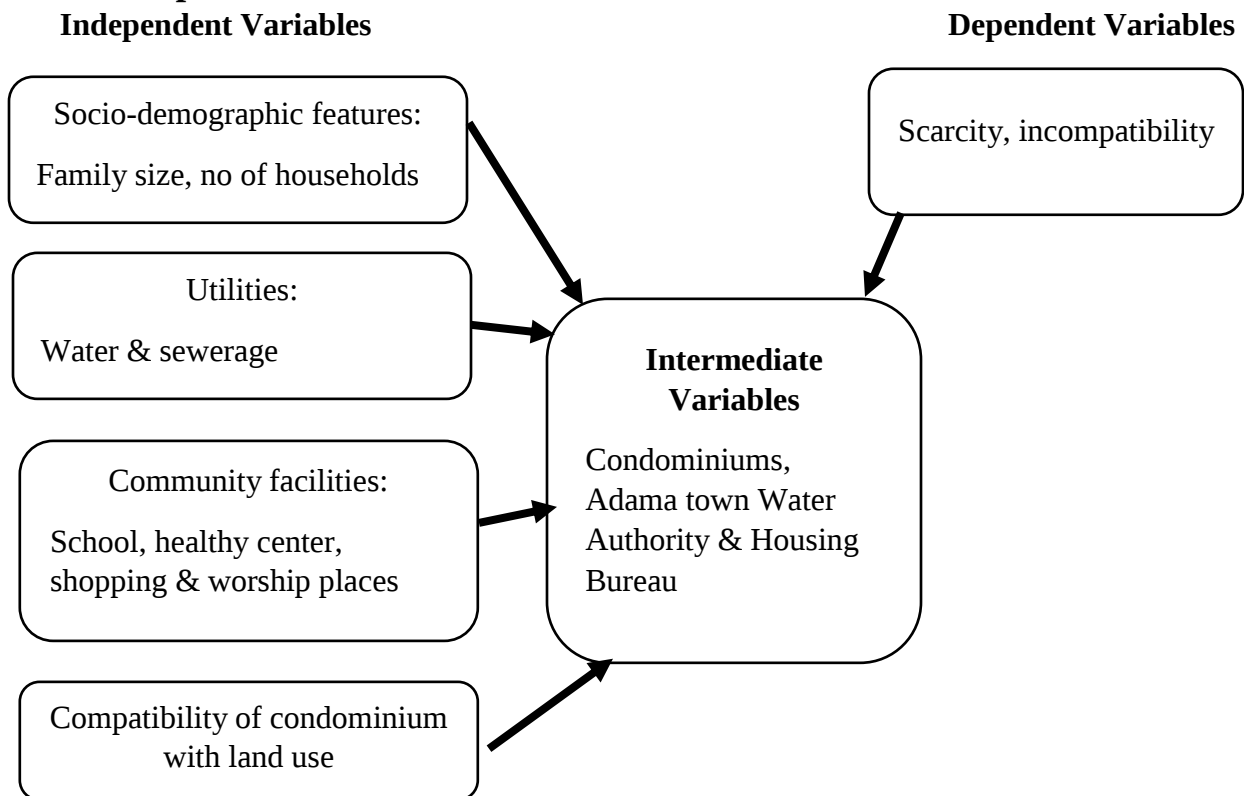
Solange et al., (2015) assessed the quality of drinking water distributed in condominium residents, the quality of the water expended within the condominium examined is lacking most of the time being more apparent some time recently support method. Another calculation that may clarify the enhancement in water quality is that after cleaning the concentration of remaining chlorine was over 0.2 mg/L.

2.5 Lesson Learned

The utility is an essential component of condominium development and the quality and control of infrastructure is the first priority when constructing condominium spaces. Also adequate and proximate communities serve as a backbone for development and are basic for residents' wellbeing, security, and quality of life. But nowadays these utility provision is as much a financial problem as a structural one.

Major gaps in the previous studies about neighborhood character in condominiums with the case of utility and community facilities are in terms of location, most studies focused only on the premises of condominiums and did not pay attention to the neighborhoods around it. Also in terms of data collection and analysis, the method used by many studies was focused only on qualitative portion, quantitative parts has not been well explored. In addition to that much attention has been paid to how the vacant lot and communal spaces in the compound are used by the occupant.

2.6 Conceptual Frameworks



CHAPTER THREE

MATERIAL AND METHODS

This section provides an overview of the data is needed for each specific objectives of the research and how it collected, interpret and analyses the way that this research want. Also it shows a design of the study to ensure valid and reliable results that address the research aims and objectives.

3.1 Description of the Study Areas

The study areas are located in the Oromia region in Adama city, on the absolute location of Dhaka adii with $8^{\circ} 33' 56''$ N & $39^{\circ} 19' 57.8''$ E, Jelissi with $8^{\circ} 32' 40.91''$ N & $39^{\circ} 17' 27.58''$ E, and Selassie district with $8^{\circ} 33' 21.29''$ N & $39^{\circ} 15' 43.68''$ E. with the range of elevation of 5296-5424m. The Jelissi condominium site is built in wider coverage than Dheka on an area of 17,000 m². This condominium is said to be one of the oldest in Adama, located outside the city, will house up to 270 households. The 3rd selected condominium with an area of 16,542 m² has the largest number of households related to other condominiums in the city. Figure 3.1 shows relative location of Adama city from Adiss Ababa city.

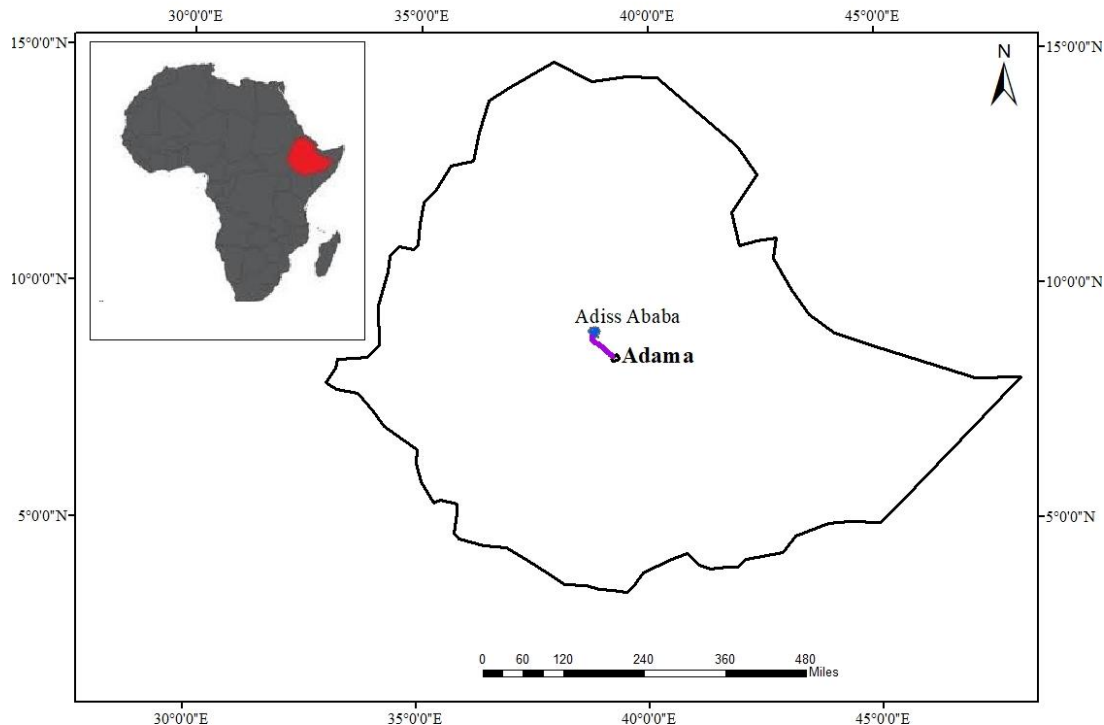


Figure3. 1Description of the study area

3.2 Selection of Case Study Area

From the condominium neighborhoods in Adama city, three of them (Jelissi, Dheka adii & Selassie condominiums) were chosen purposively for their family size, land use and landscape, location, physical character and access as shown in Table 3.1 below.

Table3. 1 Site selection criteria

Criteria	Description	Dheka site appraisal	Jelissi site appraisal	Selassie site appraisal
Location	-is site is walkable? -is the site accessible by public transportation?	-the site is located in roadside in sub arterial street that connect 04 district, ASTU and genda gara district	-the site is located in 317m from the sub arterial street in N & 294m from arterial street in S direction	-the site is located on the outskirts of the city. But it is roadside in the sub-arterial street.
Types of permit	-single-family detached units? -attached residential or multiple-family residential units? -non-residential condominium units?	-the site is both single-family detached units, multiple-family residential units and shop condominium units	-the site is both single-family detached units, multiple-family residential units and shop condominium units	-it is residential purpose condominium with single, and multi-family unit and retail activity on the ground of 5 blocks.
Physical character	-mixture of land use? -services access in surrounding environment?	-many activities are processed in the corner of the courtyard. -church, schools, clinics and banks are in walking distance.	-industry, school and church is located in 300m radius from the condominium.	-the site is easily connected with the street. -industry, services and retail activities are exist in far distance from the site.
Land use compatibility	-is there transition areas between major facilities and sensitive land uses?	-the courtyard of the site is very loud. No transition area from that retail activity to residential area.	-there is no formal mitigation measures.	-as long as the site is located at the peripheral land of the city, there is less major facilities.
Master plan compatibility	-compliance policies, guideline and priority for various socio-economic activities?	-the master plan guideline prepare by city municipality isn't well implemented.	-policies and priorities in the master plan are not well implemented.	-there is some policies and rule provided by city house bureau.
Urban impact	-+ or – impact on adjacent and existing facilities?	-the existing facilities has both impact regarding to noise, smell in the condominium.	-in the construction process the only consideration was achieve the	-there is no consideration of + and – impact on existing facilities.

As shown in Figure 3.2 below the map shows location of all the 9 condominium sites in Adama city. Of these, the green arrows shows the selected site for the study.

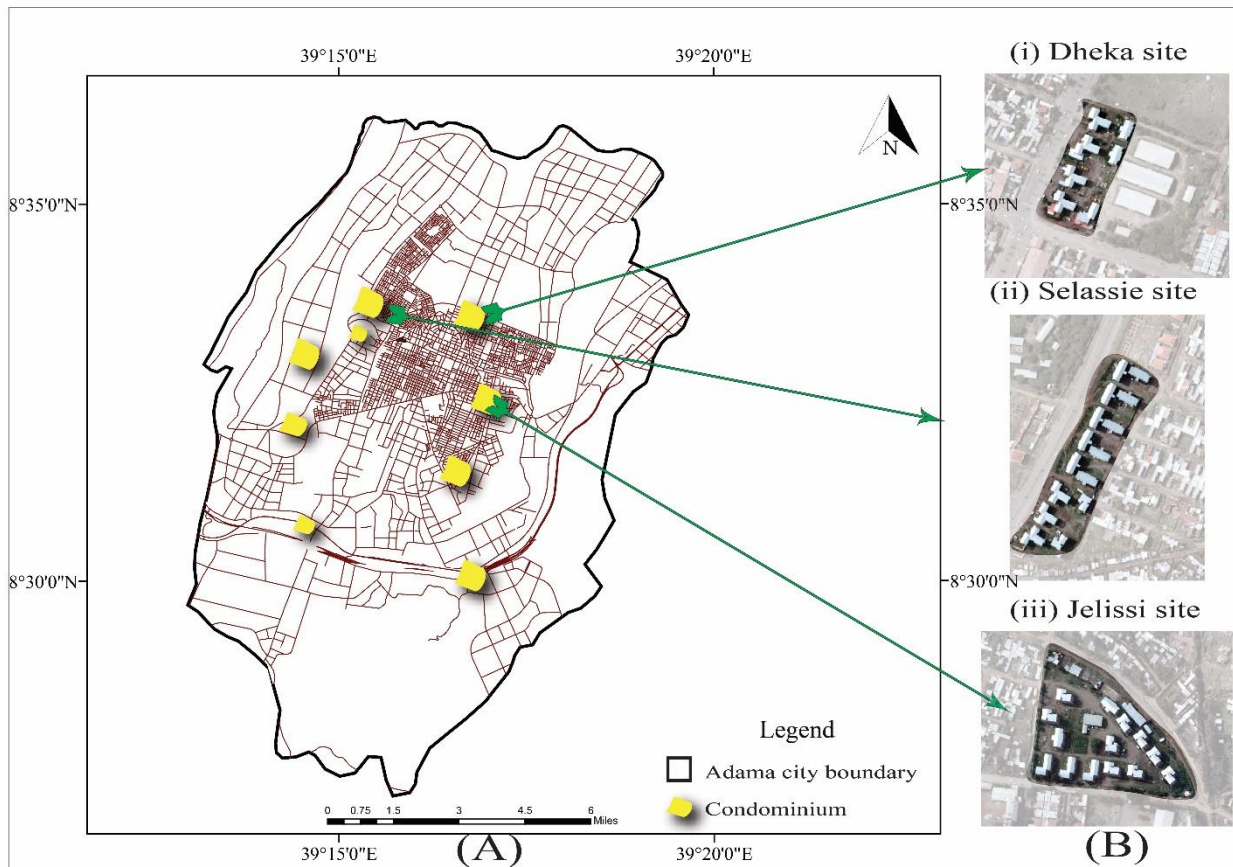


Figure 3. 2 : (A) Condominium sites in Adama city
(B) Condominium chosen for the study

3.3 Sampling

In the collection of the spatial data in the condominium neighborhood from Dhaka adii, Jelissi and Selassie district condominiums probability sampling techniques is held. It involves simple cluster random sampling selection allow to make strong statistical inferences about the whole residents. These 3 condominium sites have different population sizes so it have to do the sample sizes separately. Since the population for the study is known or is finite, adopted a formula from Bernard, & Morgan (1970).Table 3.2 shows the individual & total sample size of three condominium sites in Adama.

The formula is

$$S = \frac{X^2 NP(1 - P)}{d^2(N - 1) + X^2 P(1 - P)}$$

Where

S = Required Sample size

X² = Degree of freedom at the desired confidence level

(1.96 for 95% confidence level. X²=1.96² =3.841)

N = Population size

P = Population proportion (expressed as decimal) (assumed to be 0.5 (50%))

d² = Degree of accuracy (5%), expressed as a proportion (0.05);

Accordingly,

$$N=700$$

$$X^2=3.841$$

$$P=0.5$$

$$d^2 = (0.05)^2 = 0.0025$$

$$S = \frac{3.84 * 700 * (0.5) * (0.5)}{(0.05)^2 * (700 - 1) + 3.84 * (0.5) * (0.5)}$$

$$S = \frac{1068}{2.7075}$$

$$S = 394.4$$

$$S = 394.4$$

$$S = 248.1994 \approx 248 \text{ samples}$$

Thus, the total number of samples or participants to be taken, according to the formula indicated above, from a total of **700** households is **248**

Table3. 2 Sample size for the 3 condominium sites

Attributes	Dhaka adii	Jelissi	Selassie	Total
Total household number/	140	260	300	700
Population proportion	50%	50%	50%	-
Confidential level (%)	95%	95%	95%	-
Confidence Interval	8%	8%	8%	-
Sample size	66	89	93	248

The key informant interview is held among the committees elected by the residents in the local language Amharic. The focus group discussion was held with housewives living in the yard. Well-structured series of questions that summed up the reality of what they have seen, what they thought was a big problem and experienced since living in a condominium courtyard. Table 3.3 shows the selected condominium buildings regarding to the utility, sewerage and compatibility variable from all buildings.

Table3. 3 Selected building for the study

Condominium sites	Selected buildings		
	For water supply	For sewerage system	For compatibility
Dheka site	20 building from 3 rd floor	20 building from ground floor & studio	15 buildings from 2 nd floor & studio
Jelissi site	40 building from 3 rd floor	32 building from ground floor& studio	18 buildings from all floor
Selassie site	35 building from 4 th floor	28 building from all floor	25 buildings from all floor

3.4 Utility Accessibility

To determine the Adama city's water supply and demand, questionnaires, interviews, and discussions were conducted with condominium residents. To determine the water supply and demand for water in the condominium, the first step was to determine the minimum daily and weekly water consumption of residents and individuals. As a result, it is possible to determine whether there is a scarcity of water in the yard. Residents were interviewed and discussed with the residents to find out about the sewage disposal system in the condominium complex and to understand the previous experience with the sewerage system.

160 number of residents were interviewed for their minimum daily and weekly water consumption and supply status to describe the level of scarcity. Similarly the sewerage condition on their houses. When residents fill out questionnaires to understand access to water and sewerage system in the condominium, paper, pencil, and binder to help speed & text quality are used.

In addition to this, by the time of extensive discussion with some residents and the condominium committees. Data was collected by writing down by note book what the resident was saying and recording those issues that were not comfortable with it over the phone.

3.5 Facility Proximity

For this, the community facilities, schools, health and medical services, shopping centers and worship places found around the sites were observed directly. Their location were mapped using GIS and their capacity & distance were measured for each sites by using Google earth analysis is used to show the distance from the condominium to the nodal point where the condominium resident goes shopping and other community amenities. Following the identification of potential community service facilities near the condominium, structured questionnaires were prepared to determine the location and reason for residents' choice of school, health facility and shopping area. In addition to the structured questionnaires in Amharic language and interviews to understand the interactions. As walking in neighborhood standard the maximum distance of the elementary school & local shopping facilities to the residential area is $\frac{1}{2}$ mile which means in walking distance, to high school & church 1 mile and 1 & half mile to the hospital.

Buffer analysis determining the distance between schools, health facilities, business centers and other community service facilities from the condominium. For feature data, the tools found in the proximity toolset can be used to discover proximity relationships of community facilities with the condominium. These tools output information with buffer features or tables. Buffers are usually used to delineate protected zones around features or to show areas of influence. Proximity standards recommend that community facilities are located to service diverse communities in 300m-500m, and accessible to widest possible range of community members in convenient and central locations. These locations are to be well served by a range of transport, particularly public transport.

3.6 Land Use Compatibility

To understand whether the condominiums were compatible with the land use of the surrounding environment, it is important to first look at the data collected on the public and private lands. In order to know this, the current land use seen by surveying the neighborhood with the guidance of neighborhood base map.

The method used to analyze the collected data was transformed into research data by using GIS software, and it was determined which land use suited for the condominium as described in various land use standards. Land use analysis shows the zoning classification within a radius of 500 m in the condominium area to delineate the neighborhood commercial, public uses, town houses and residential areas. This method is used to find out whether the land use and zoning are compatible with each other and to see whether the buffer area exists in the commercial area and the production area with the residential area. In addition to land use analysis other morphological and perceptual analysis are involved to address the compatibility of condominium neighborhood. Accordingly, in order to understand the compatibility of condominium buildings, an in-depth compatibility investigation of street junction and street section, building and other built infrastructure in the condominium neighborhood is needed.

As land use compatibility is achieved when major facilities and sensitive land uses can coexist, the measurement are often a source of noise, dust, odor and other emissions rather than safety criteria which may have potential impacts on surrounding land uses. AOI distance & MSD, which specific separation distance that would prevent adverse effects are the measurement of incompatibility. For the condominium residential area AOI distance is 500m and MSD to local commercial center is 1600m, to block factory 1000m, to wet corn or flour mill 750m and iron & steel factory 2000m (Harvey, 2011).

3.7 Data Analysis Techniques

Evaluating data using logical and analytical reasoning to carefully examine each component of the data that will be collected or provided. Qualitative and quantitative data analysis is used in this research data. Counting of condominium blocks on the premises, analysis of the number of females and males filling questionnaires, sample size calculations, etc. are data obtained through the quantitative data analysis method. In this research data obtained through the qualitative data analysis method will consists of words, pictures, maps, descriptions, and observations. For accessibility of water supply in condominiums, the minimum domestic water requirement per person has been calculated based on the Adama Water and Sewerage Authority target average per capital water consumption and mean is 44 l/d. for the proximity of educational facilities, healthy center, shopping and worship places collected data the mean value is 600m from the condominiums.

Table3. 4 Research matrix

Objective	Independent variable of the study	Dependent variable of the study	Data processing software	Collected data
☐ To evaluate the accessibility of utility supply for the condominium neighborhood of the study areas	-water supply -water distribution -water source -sewerage system -solid waste system	-water scarcity -electricity disruption -healthy problem	-SPSS -Arc Map -Adobe Illustrator -AutoCAD	- daily water consumption - sewerage system
☐ To examine the proximity of community facilities in the condominium neighborhood in the study areas.	-school -healthy center -worship places -shopping centers	- long commuted distance	-SPSS -Arc Map -Adobe Illustrator -AutoCAD	-no of schools -no of healthy centers -commercial centers -church & mosques
☐ To examine the compatibility of condominium with neighborhood facilities	-Street network -Building -Open spaces	-street performance -space between building -noise	- SPSS -Arc Map -Adobe Illustrator -AutoCAD -Sketch up	-land use -street junction -open spaces area -building setbacks & height

3.8 Ethical Consideration

Ethical issues are considered in the research. All participants were informed well first about the purpose and significance of the study, and asked their consent before the interview was conducted and the distribution of questionnaires was held. In all cases, identity, address, and name of participants are kept confidential and anyone who wants to withdraw from participation is acceptable without any precondition. Besides, in conducting an observation and taking some pictures of the houses, the consent of resident was asked. Finally, throughout the process, there is neutrality in collecting and interpreting the data collected.

CHAPTER FOUR: RESULT AND DISCUSSION

4.1 Water and Sewerage Accessibility

4.1.1 Water Supply Accessibility

Major domestic water sources for all condominium neighborhoods are from Awash River. Alternative water supply sources for Adama condominiums such as boreholes, dam and storage, river intakes and springs. The new project which has used River Hawas as a surface source was a relief to users both in quantity and quality and is also with a better possibility of improvement and expansion activities in the near or far future. The raw water intake is located some 11 km North-West of the town and 3 km downstream of Qoqa Dam. Figure 4.1 illustrate the water supply source for Dheka adii, Jelissi and Selassie condominium which is Awash River.

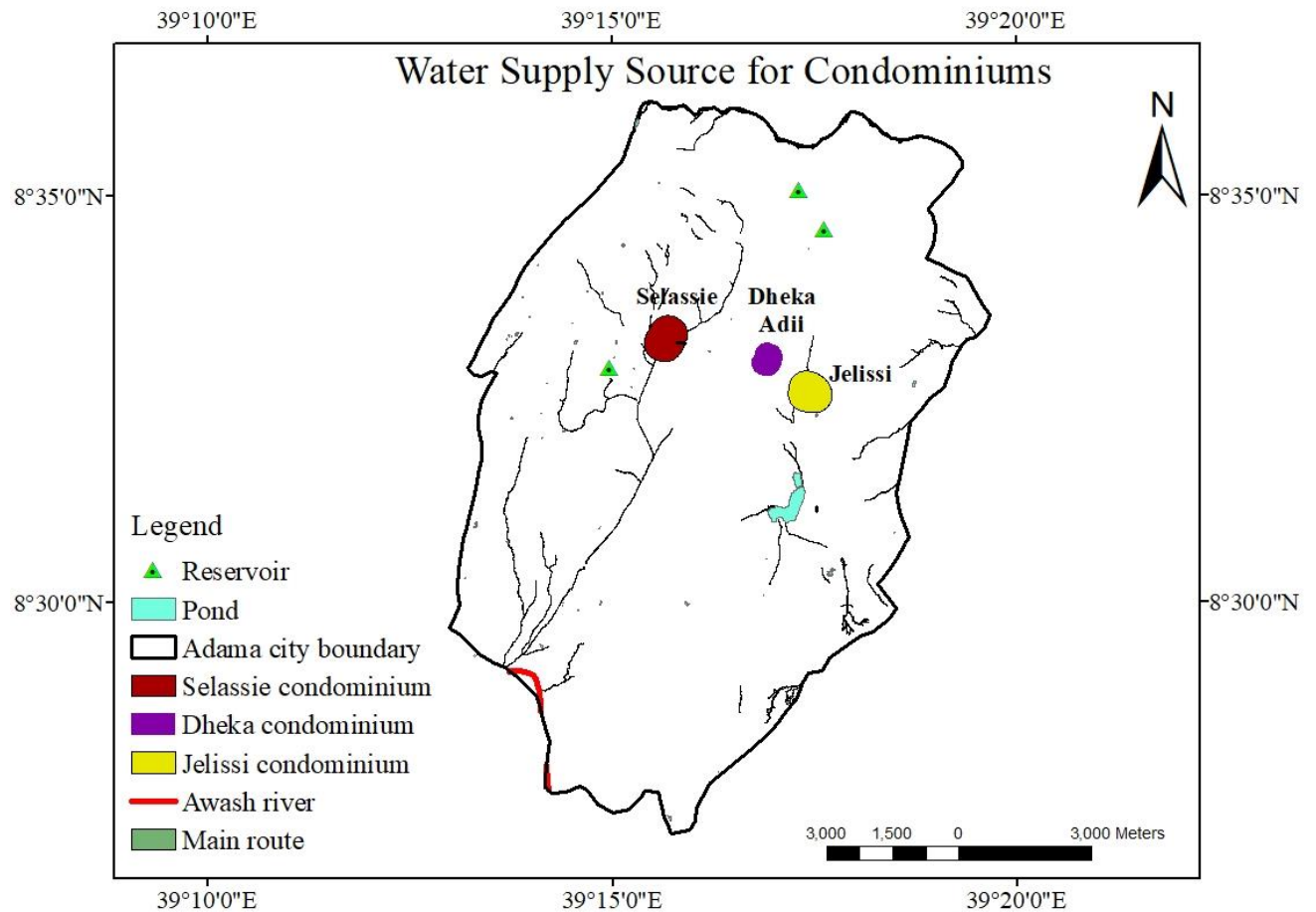


Figure4. 1 Water Source for Condominiums

Surface water from Awash river and Qoka dam is treated at Adama water treatment plant having a production capacity of 38,000m³/day. Rocks occurring in the northeast of Melka Jilo and Qoka areas have high permeability, consisting of many thermal springs having discharge capabilities ranging from 3,283m³/day to 68,947m³/day. Therefore, the total current water production is about 106,947m³/day.

Calculating the Water Usage per Person and Per Household

To find out the average daily water demand for condominium residents, in a paper questionnaire, it was revealed the water appliance during the day and for how long they manipulate as shown in the below table. This information was obtained at a data collection held 3 months ago.

Domestic water demand is the amount of water needed for drinking, food preparation, washing, cleaning, bathing and other miscellaneous domestic purposes. Table 4.1 shows the daily indoor human water requirement for different use of activities including leakage assuming there is adequate water supply coverage.

Table4. 1 Composition of Per-Capita Water Demand for Different Purposes

Appliance	Minimum liter per capital per day		
	Dheka site	Jelissi site	Selassie site
Cooking	2.5-4	1.8-2	1.6-2.5
Bath	5-10	8-9	10-15
Dish Washing	3-5	4-5	3-4.5
Toilet	2.5-3	2.5-4	2.5-3
Cloth washing	15-20	12-18	15-18
Other	2.5-4	1.5-2.5	1.5-3
Total	44	40.5	46

The minimum domestic water requirement per person has been calculated based on the Adama Water and Sewerage Authority target average per capital water consumption is 44 l/d, 40.5 l/d and 46 l/d in Dheka, Jelissi and Selassie condominium respectively.

Considering five persons living in a house hold the total average domestic water requirement per a house hold has been calculated $44 \text{ l/d} \times 5$ which gives 220 l/d in Dheka condominium, $40.5 \text{ l/d} \times 5$ which gives 202.5 l/d in Jelissi condominium and $46 \text{ l/d} \times 5$ which gives 230 l/d in Selassie condominium.

The daily water demand changes with the season and days of the week. The ratio of the maximum daily consumption to the mean daily consumption is called the maximum day factor and usually varies between 1.0 and 1.3. According to the Adama Water Supply project stage IIIA a maximum day demand of 1.2 is adopted for the city of Adama.

Table4. 2 Daily average water demand formula

Average Day Water Demand (ADD)	Daily average water demand
Maximum Day Water Demand (MDD)	$1.2 \times \text{ADD}$
Peak Hour Water Demand (PHD)	$2.3 \times \text{ADD}$

According to the Adama water supply project stage IIIA, the hourly water usage varies according to the following pattern (i) low usage 23:00 – 05:00 hours, (ii) high morning 05:00 – 11:00 hours, (iii) moderate 11:00 – 18:00 hours and (iv) high evening 18:00 – 23:00 hours. So the maximum day & peak hour water demand for the all households calculated as in table 4.3 below,

Table4. 3 Maximum & peak hour daily demand of potable water required per house hold

Attributes	Condominium sites		
	Dheka site	Jelissi site	Selassie site
Average day water demand(ADD)	0.22m^3	0.202m^3	0.23m^3
Maximum day water demand($1.2 \times \text{ADD}$)	0.264m^3	0.24m^3	0.276m^3
Peak hour demand ($2.3 \times \text{ADD}$)	0.506m^3	0.46m^3	0.52m^3

For the total households,

Table4. 4 Maximum & peak hour daily demand of potable water required for total households

Attributes	Condominium sites		
	Dheka site	Jelissi site	Selassie site
Average day water demand(ADD)	30.8m ³	52.52m ³	69m ³
Maximum day water demand(1.2 × ADD)	36.96m ³	62.4m ³	82.8m ³
Peak hour demand (2.3 × ADD)	70.84m ³	119.6m ³	156m ³
Water availability	7 days/week	6 days/week	2 days/week

According to resident's interview, 90% of the residents of Dheka condominium have no water supply problems, while 10% of those living on the third floor are experiencing water shortages. In Jelissi condominium, 31.7% of residents say they have water shortage problems in their homes & 63.3% said they did not have problems with water supply. In particular, 83.1% of the residents of Selassie condominiums faced a serious water supply problem.

Table4. 5 Is there water shortage problem in the houses?

Response	Condominiums					
	Dheka adii		Jelissi		Selassie	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
Yes	-	-	19	31.7	54	83.1
No	36	90.0	38	63.3	7	10.8
Sometimes	4	10.0	3	5.0	4	6.2
Total	40	100.0	60	100.0	65	100.0

4.1.2 Liquid Waste Disposal

As can be seen from the inspection of condominiums, Dheka condominium has better liquid waste disposal system than Jelissi and Selassie condominiums. Selassi & Dheka adii condominium located in front of the main road and there is a nearest drainage line. However Jelisii condominium is located far from the main road, so the drainage line is farther away from the condominium, which follows the main street.

The Amount of Grey Water Produced & that will be Unused and per Person

Before expressing the amount of grey water produced and that will be unused it is necessary to calculate the total amount of potable water required per person and per house hold.

Table4. 6 Grey Water Usage per Person

Appliance	% of total daily use			Used as grey water
	Dheka	Jelissi	Selassie	
Cooking	9.8	8.8	9.2	No
Bath	23.5	33.6	33.9	Yes
Dish Washing	11.7	11.3	8	Yes
Toilet	7.8	6.7	5.5	No
Cloth washing	39.2	33.6	30.8	Yes
Other	7.8	6.3	7.7	No
Total grey water	74.4	78.5	72.7	-
Total non grey water	25.4	21.8	23.6	-

Based on data from table 4.6 and 4.7, the amount of grey water produced is determined. Viable grey water can be collected from cloth washing, bath and dish washing. The total percentage of water used for those items is 74.4% in Dheka, 78.5% in Jelissi & 72.7% in Selassie condominium. Note that toilet water accounting 7.8% of water usage meaning that potable water used as toilet flushing would be eliminated while leaving 66.6% of grey water for floor washing or gardening. Considering table 4.7 the amount of grey water produced per person and per household that will be unused is 0.035m³/c/day and 0.175 m³/day respectively in Dheka, 0.032m³/c/day and 0.16 m³/day respectively in Jelissi and 0.037m³/c/day and 0.185 m³/day respectively in Selassie condominium.

Table4. 7 Amount of grey water produced per day

Attributes	Condominiums		
	Dheka	Jelissi	Selassie
Amount of Grey Water Produced per person	0.035m ³ /c/day	0.032m ³ /c/day	0.037m ³ /c/day
Amount of Grey Water Produced per household	0.175 m ³ /day	0.16 m ³ /day	0.185 m ³ /day
No of households	140	260	300
Amount of Grey Water Produced	24.5 m ³ /day	41.6 m ³ /day	55.5 m ³ /day

In Selassie condominium solid waste & other blockages like diapers are obstructing the pipe and preventing wastewater from leaving the house. Also the pipes are cracked and leaky, allowing rainwater to enter the sewer system and exceed its capacity. In spite of drainage line across the buildings, waste water collects in the yard creating structural issues that also cause damage to plants and flowers, an increase in bugs and a swampy mess.

The Jelissi condominium regarding sanitation committees of the site, there are three septic tankers developed to accumulate the grey water & latrine wastewater together. But the waste over flow inside the condominium compound due to the deficiently estimated of the septic tank to hold the squander, chock-full of the tanker and out let by strong squander & the slop issue amid building of the sewerage channels. The Selassie condominium during the site inspection it can be seen clearly the waste over flow inside the condominium and made a little pond. This was a series of health problems in the residential by that time.

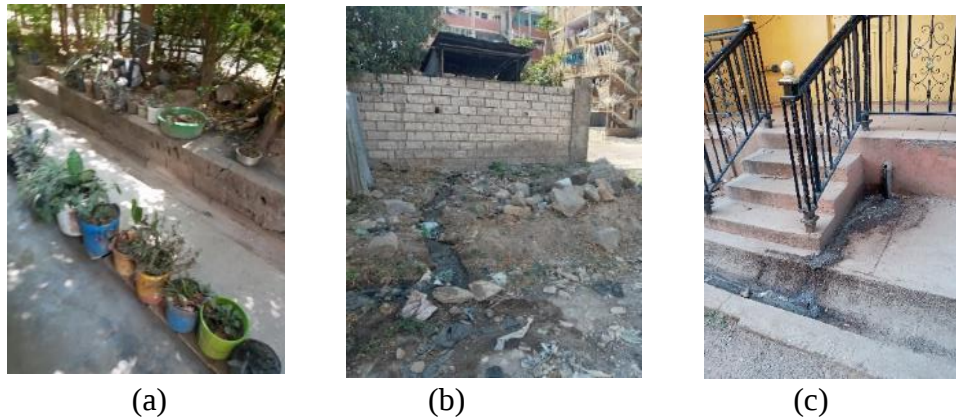


Figure 4. 2 (a) Existing sewerage system in Dheka adii condominium
 (b) Existing sewerage system in Jelissi condominium
 (c) Existing sewerage system in Selassie condominium

As illustrated in figure 4.2 above the first image shows the rainwater runoff ditch in Dheka condominium is well-maintained, clean. On the contrary, images on the 2nd and 3rd show the ruins of the sewage disposal system in the Jelissii and Selassie condominiums and the rupture of the pipes in an unattractive and unhealthy manner.

Selassie condominium has two septic tankers constructed to accumulate the grey water & toilet wastewater together. But the waste over flow inside the condominium compound due to the insufficient size of the septic tank to hold the waste, chock-full of the tanker and out let by solid waste & the slop problem during constructing of the sewerage pipes. Even if the septic tank is too large it is difficult to collect the grey water & the toilet wastewater together in one two tankers. During observation the waste over flow inside the condominium and make a little pond. This was a series health problem of the residential by that time.

4.2 Facility Proximity

Previous studies have shown that in order to understand the proximity of the services to the condominium residents, it is important to look at the land use in the neighborhood. The results of land use clearly indicate were the schools, health facilities, businesses, places of worship, and government facilities are located and available to the public.

4.2.1 Education

According to analysis for proximity obtained by GIS software of schools in every 200m interval from where condominiums are located. Accordingly, there is only 1 private school at a distance of 200m from Dheka condominium compound and 3 public and 1 private schools at a distance of 200m-400m. In Jelissi condominium there is no school within 200m of the condominium and only 1 public School away from the 200m-400m. In the Selassie condominium, from the condominium premises up to 200 m and 200m-400m there is only 1 public school each as shown in table 4.8 below.

Table4. 8 Number of educational facilities within 600m from the condominium

Interval	No of schools in condominiums		
	Dheka adii	Jelissi	Selassie
0-200m	1	-	1
201-400m	4	1	1

64% residents of Dheka, 58% of Jelissi and 72% of Selassie condominium residents have children and there are schools in these neighborhoods within 400m. Among them public schools are medhanialem primary school, tiwab Adama School, Mana baramsa school and Biruh tesfa primary school and private schools such as Excel academy and holy angels academy can be mentioned. Also in Selassie condominium there are Goro secondary school and maraki nursery schools are exist.

20% of parents living in Dheka condominium think their private school is close to their children and 2.5% of parents for government school. This indicates that the vast majority of households send their children to public and private schools far from where they live. The software SPSS calculates the percentage of these parents, 30% of residents send their children to a private school and 12.5% teach at a public school away.

There is no public school in walking distance that means in 400m from Jelissi condominium, so residents attend private and public schools far from the neighborhood on various scales. According to the SPSS data analysis, 11.7% of residents send their children to a private school in the neighborhood, 30% to a remote government school, and 55% of their children attend a private school away from the neighborhood.

There are public and private schools near Selassie condominium neighborhood, better than the Dheka adii & Jelissi condominiums neighborhoods in 400m distance. According to the SPSS data analysis, 26.2% of their children attend public schools near the condominium, while 1.3% of parents enroll their children in a private school in the neighborhood. Parents who send their children to out of neighborhood public schools account for 15.4% and 46.2% of parents who attend out of neighborhood private schools.

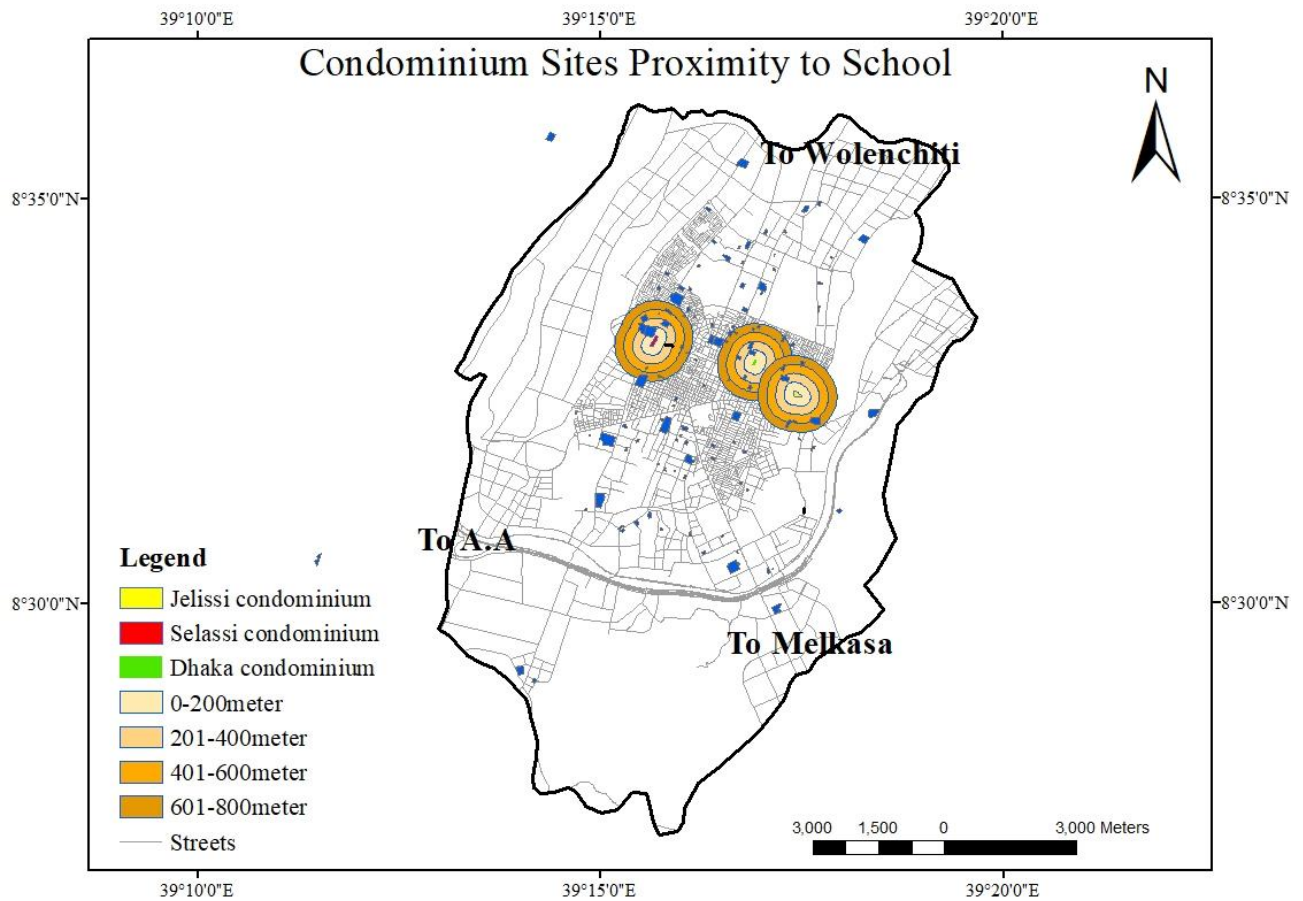


Figure4. 3 Condominium sites proximity to schools

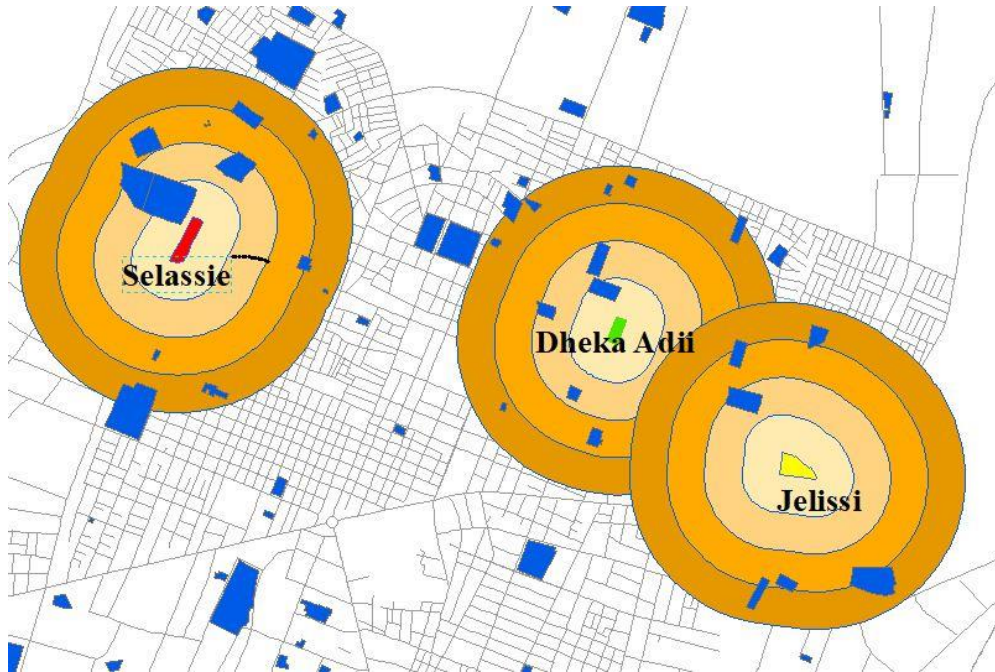


Figure 4. 4 Condominiums proximity to school

Table4. 9 Schools preferred by households

		Dheka adii		Jelissi		Selassie	
		Frequency	Percent	Frequency	Percent	Frequency	Percent
	Public in the neighborhood	1	2.5	-	-	17	26.2
	Private in the neighborhood	8	20.0	7	11.7	8	12.3
	Public outside the neighborhood	5	12.5	18	30.0	10	15.4
	Private outside the neighborhood	12	30.0	33	55.0	30	46.2
	Total	26	65.0	58	96.7	65	100.0
Missing	System	14	35.0	2	3.3	-	-
Total		40	100.0	60	100.0	65	100.0

4.2.2 Medical and Health Facilities

In Dheka adii condominium, there are no health facilities within 600m of the condominium. In particular, there are no medical facilities within a distance of 800m around Jelissi condominium. Selassie condominium neighborhood has 1 health facility namely Rodas medium clinic at a distance of 200m-400m from the compound and 2 health facilities at a distance of 400m-600m as shown in table 4.10 below.

Table4. 10 Number of Medical & healthy facilities within 600m from condominiums

Interval	No of Healthy center in condominiums		
	Dheka adii	Jelissi	Selassie
0-200m	-	-	-
201-400m	-	-	1
400m-600m	-	-	2

Due to the lack of health facilities in all 3 condominium neighborhoods and nearby, 40% Dheka residents who get treatment far from their homes in a private hospital. It is followed by 17.5% of residents who go to a governmental hospital far from the neighborhood, thirdly 15.2% of residents get the treatment from the private clinic in the neighborhood, and fourth to residents who are forced to go to a private or public hospital as shown in figure 4.5 and 4.6.

The largest number of Jelissi condominium residents often go to a government hospital far from the condominium neighborhood for treatment when they become ill. Mentioning the name of the hospital, Haile Mariam General Hospital is located near to mebrat nodal point. According to the SPSS percentage analysis, these residents make up 48.3% of the total population. Then, in the second tier, the majority of residents choose private medical care facilities far from the neighborhood. When these are determined by a percentage, they make up 25% of the population. A large number of 3rd-degree residents say that the choice of treatment places varies according to the type of illness, the age and gender of the patient, and accordingly the choice of treatment.

According to interviews with condominium residents and neighborhood residents, private and public health facilities in the neighborhood are not fully serviced. Most are specialist neck surgeons, ophthalmologists and dentists. On top of that, their price is never considered for residents. According to discussions with the condominium and outsider residents, Haile Mariam General Hospital, a well-known and multi-purpose government hospital in Adama.

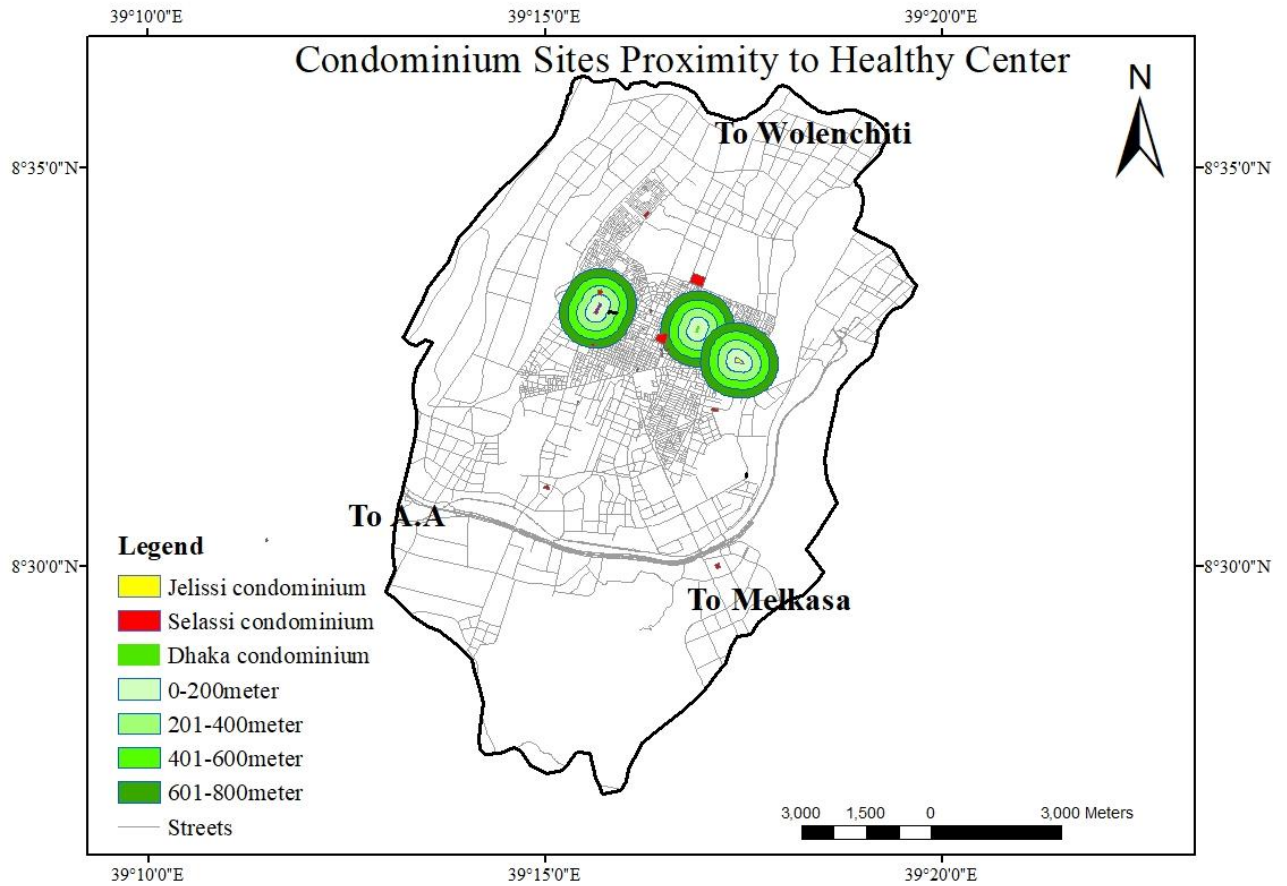


Figure 4. 5 Condominium sites proximity to healthy center

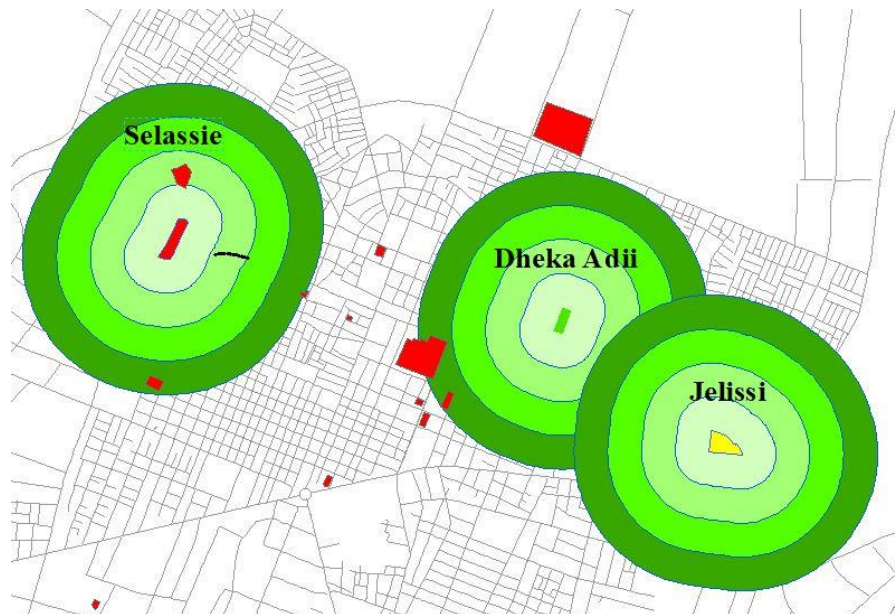


Figure4. 6 Condominiums proximity to healthy center

Table4. 11 Healthy center preferred by households

	Dheka adii		Jelissi		Selassie	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
Public clinic neighborhood	5	12.5	1	1.7	-	-
Private in the neighborhood	6	15.0	3	5.0	1	1.5
Public clinic outside the neighborhood	7	17.5	30	50.0	39	60.0
Private outside the neighborhood	16	40.0	15	25.0	14	21.5
Depend on the type of the illness	6	15.0	11	18.3	11	16.9
Total	40	100.0	60	100.0	65	100.0

As table 4.11 above the majority residents of Selassie condominium are who go to a government hospital far from the neighborhood to be treated. According to the SPSS percentage analysis, these residents take 58.5% of the whole households in the condominium. Second, the majority of the population accounted for 21.5%, with outpatient hospitals and outpatient clinics. In third tier 16.9% of residents go to private or public health care, depending on the severity of the illness, age group and gender. Only 1.5% of the population is treated at the government-run clinic in the neighborhood. This shows that there is no public health service near the condominium neighborhood, which is similar to the two condominiums, and that the residents are not satisfied with their quality and price despite being a small health center in the neighborhood.

4.2.3 Shopping Center

From the observation of all 3 sites there are no commercial nodes on the premises and also in the neighborhood. In addition to that according to the focus group discussions with the residents of all, the scale varies but they travel up to 1 km from their place to make a business & to buy what they want.

From counting during a site inspection in Dhaka adii condominium 3 ground floors out of 7 buildings rent for shop, bar & restaurant, pharmacy, butchery and hotels. Also in Selassie district 5 ground floors out of 15 building rent for stores, cake bakery, café, beauty salon and laundry.

Table 4.7 shows commercial compounds, it include the nodal places in the city such as the Post office, Franco, and Mebrat areas serve as retail districts not only as residents of these condominiums, but also as the largest commercial hub in the entire city inhabitants. Residents also get transportation facilities by taxis, Bajaj cars and private cars to get to these places. Residents of Dheka and Selassie condominiums also take taxis to get to these places in front of the condominium and residents of Jelissi condominium have to travel up to 300 m.

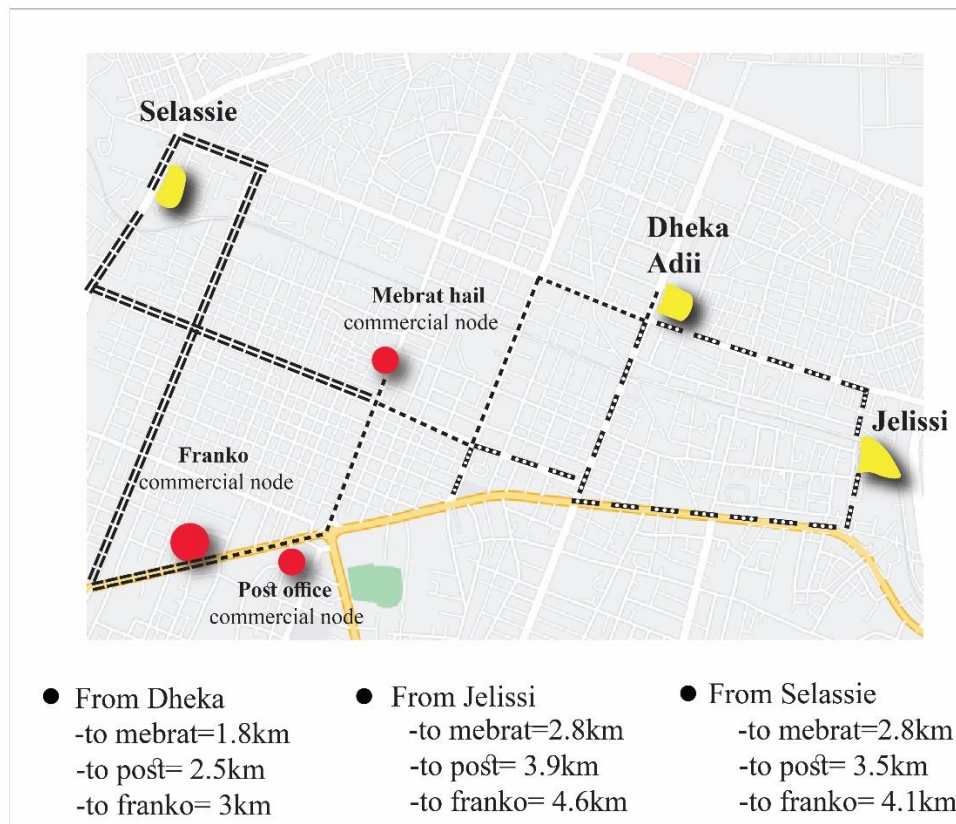


Figure4. 7 Major commercial nodes distance from condominiums

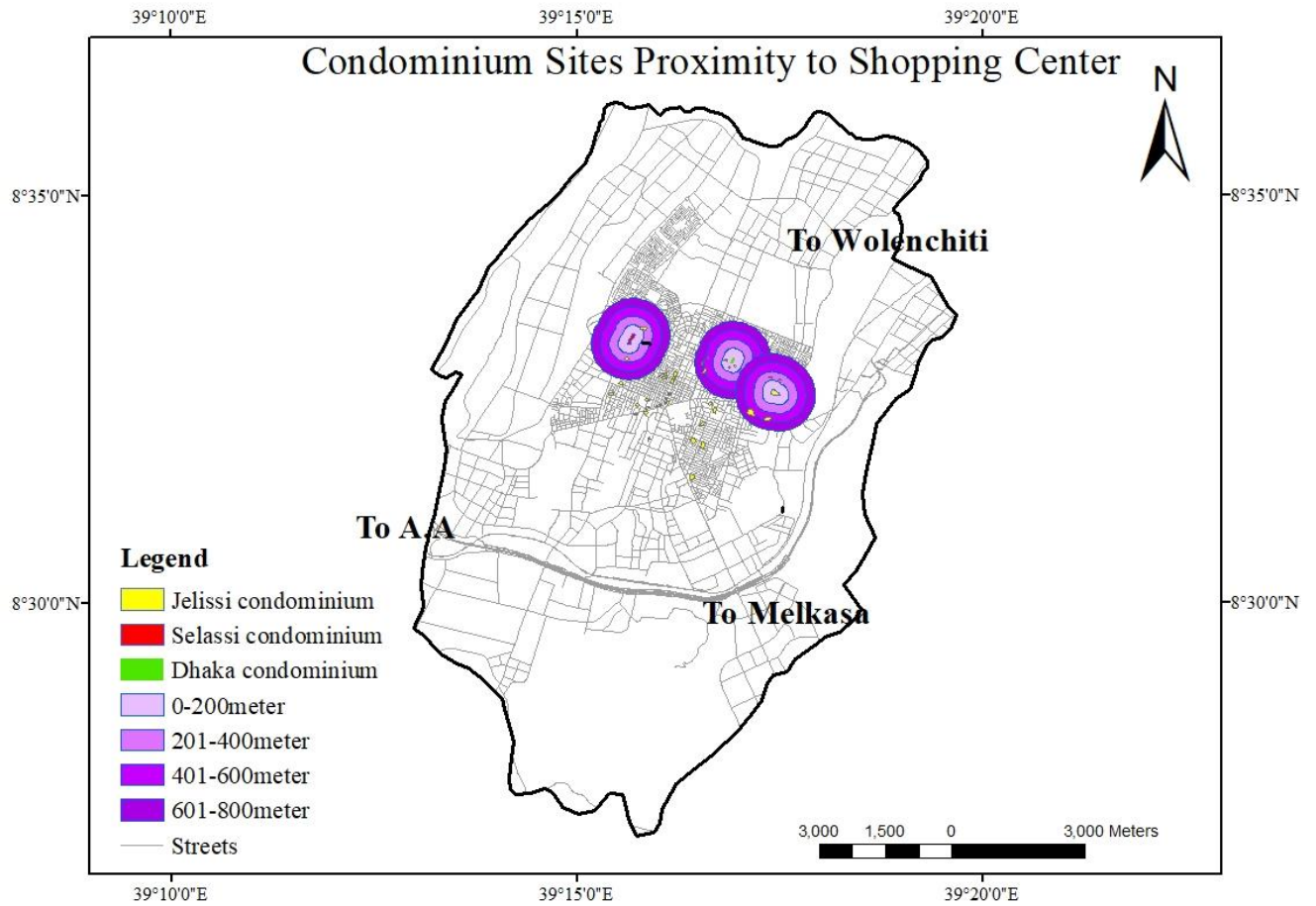


Figure4. 8 Selected condominium sites proximity to shopping center

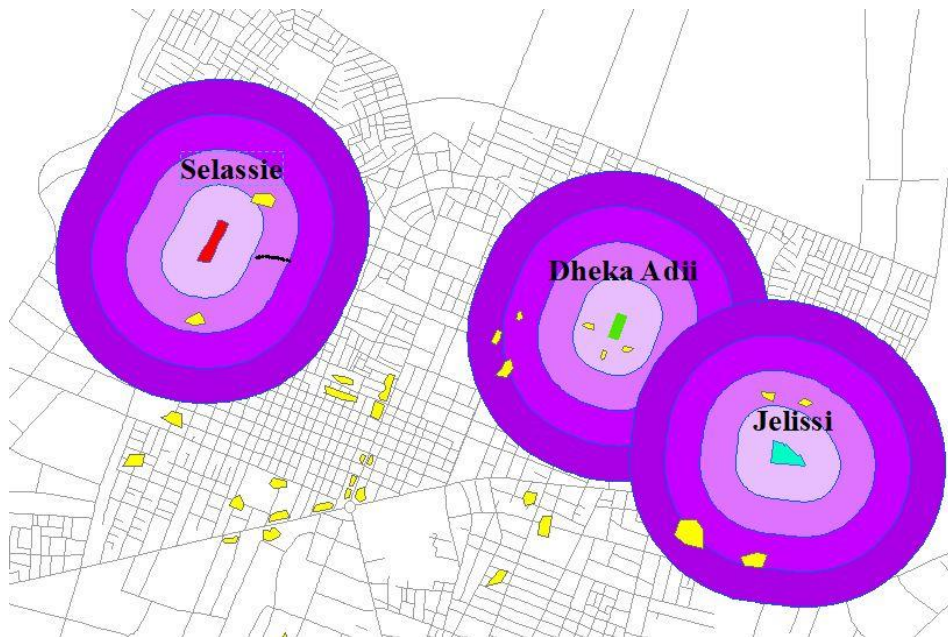


Figure4. 9 Condominiums proximity to shopping center

Table4. 12 Number of shopping mall in 200m interval from condominiums

Interval	No of shopping center in condominiums		
	Dheka adii	Jelissi	Selassie
0-200m	3	-	-
201-400m	-	2	2
400m-600m	1	2	-

Figure 4.10 below illustrate mixed use buildings in Dheka adii and Selassie condominium. Of the 7 buildings in Dheka condominium, three buildings ground floor residents use the house for commercial purposes as well as residential property. As learned from contacting the Adama Housing Bureau Head and floor plans, Selassie condominium was designed to be rented as a shop for the 5 floors of the 15 buildings. Floors are now leased for shops, hairdressers, bakeries and laundry.



(a)



(b)

Figure4. 10 (a) Pharmacy in Dheka condominium

(b) Bakery in Selassie condominium

Table4. 13 Shopping distance

Response	Dheka adii		Jelissi		Selassie	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
From the yard	4	10.0	7	11.7	3	4.6
Outside the yard	29	72.5	35	58.3	57	87.7
From both	7	17.5	18	30.0	5	7.7
Total	40	100.0	60	100.0	65	100.0

As shown in tables 4.13, residents buy almost everything they need from outside the condominium premises. According to interviews and discussion with Dheka condominium residents, 72.5% of residents purchase the basis daily needs from Mebrat hail, Franco and Zikale nodal market places which means more than 1 km from the condominium. Only 10% of the residents obtain goods from shops in condominium premises as established retail uses on the ground floor. Likewise 58.3% of residents of Jelissi condominiums used to travel 2k.m away, mebrat, franco and 17 district market place. This is because there is no market place in a proximate area. Only 11.7% of the residents buy from the small shop and business premises in the compound. Similarly, 87.7% of Selassie condominium residents also prefer to shop in the city's main shopping malls, not the neighborhood.

4.2.4 Worship Places

Figure 4.11 shows the proximity analysis to determine the existence of worship places from the selected condominium sites in 200meter intervals. Accordingly, there is only one Protestant worship place at a distance of 200 m from the Dheka condominium, and at a distance of 200 m-400 m there are three churches and one mosques. There are one orthodox worship places up to 200m from the Jelissi condominium and there are two different types of worship places within 200m-400m. Below figure illustration worship places in 500m distance buffer from the condominiums.

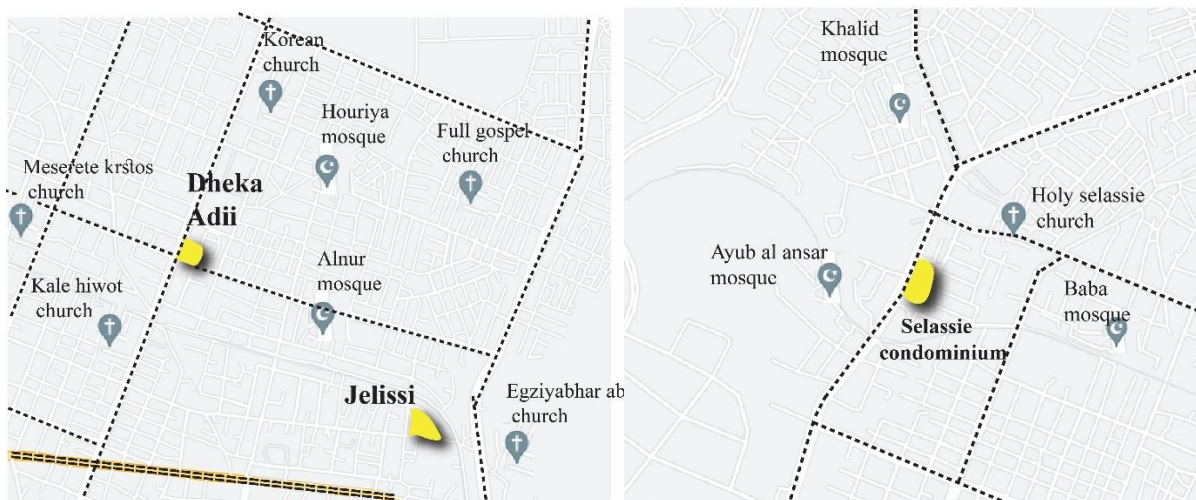


Figure4. 11 Neighborhood worship places within 500m

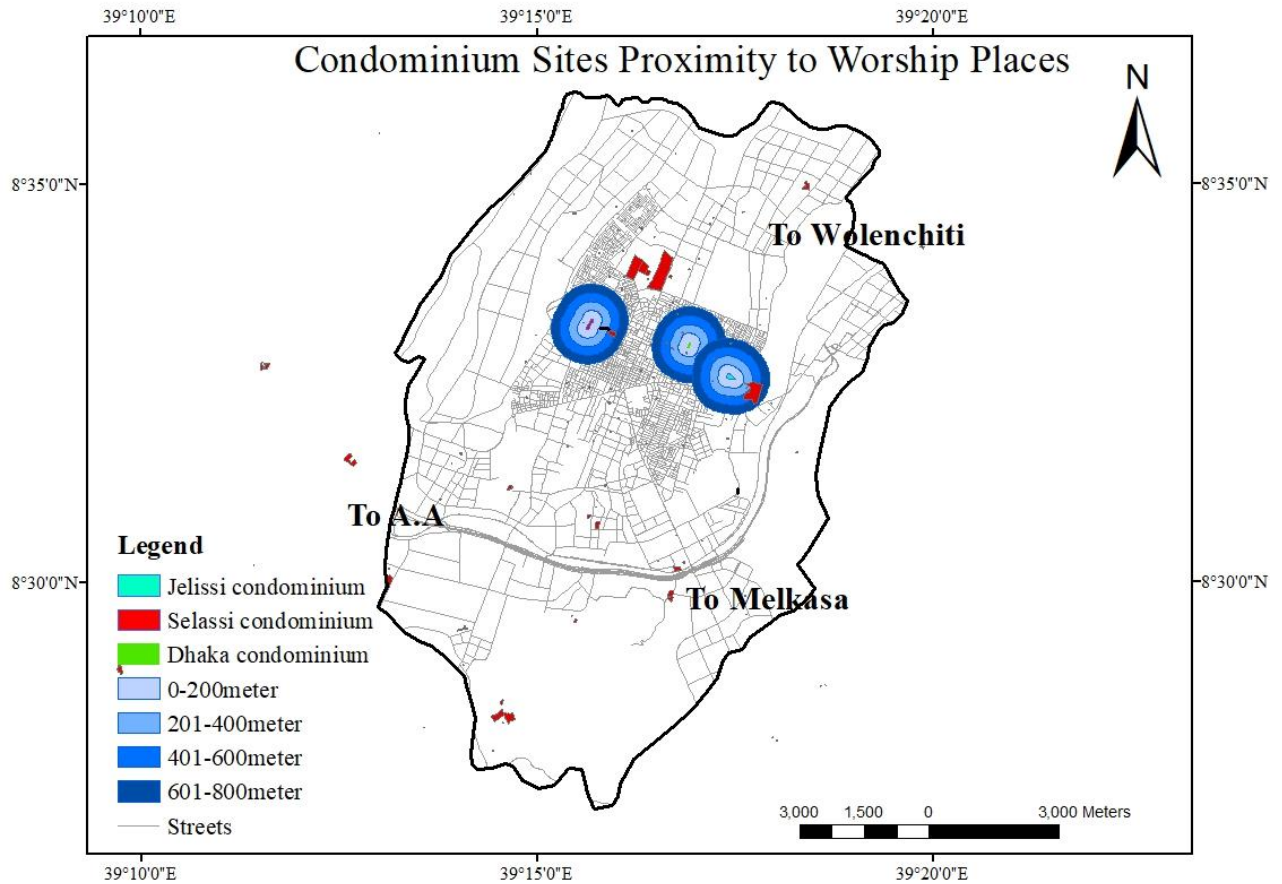


Figure4. 12 Condominium proximity to worship places

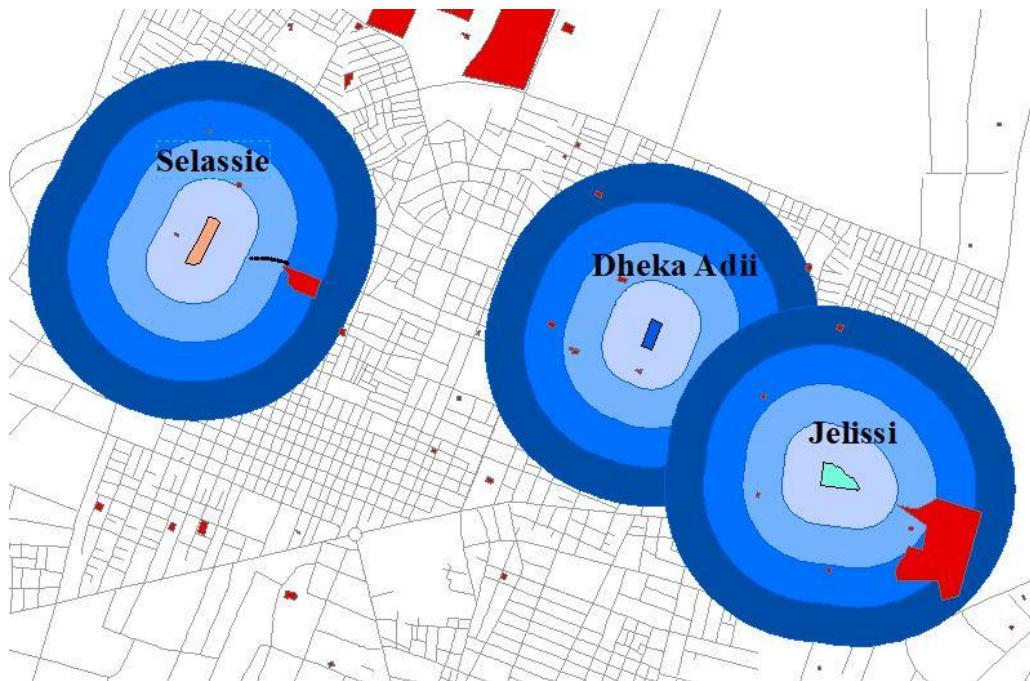


Figure4. 13 Neighborhood worship places

As shown in figure 4.12 Selassie condominium is located on the outskirts of the city, it has fewer community services than the two condominiums. There is 1 mosque up to 200 m from the compound, 2 churches from 200m-400m. In Dhaka adii condominium most worship places are easily reachable, well connected to the street network and in good proximity of the sites to residents. These include Saint Mary church, kale hiwot church and Al Selma mosques. Religious sites occupy the largest number of community facilities in this condominium, egziabhar ab orthodox church, the full gospel church, Adama mosques and Al Nur mosques. Selassie district condominium neighborhood adjacent worship places are holy Selassie church, Ayyub Al Alsar mosques and Khalid mosques.

4.3 Compatibility of Land Use to Condominium

4.3.1 Land Use Analysis

Dhaka adii condominium is located along the road and it offers a variety of activities including shops, bars and restaurants, butchers, government service offices, and hotels. Adama branch of natural glue product marketing enterprise is located 20m east from the condominium, which is noise free governmental office. Mafi restaurant and Dalol hotel are located in left side, 10m separated distance. Behind the condominium there is the Adama Textile Factory in 20m distance.

On the contrary Jelissi site is located a long way from the street and it is enclosed by utilization residential area in 46.7 hectare coverage, bare lands in 290m distance from the condominium and flour factory in 80m distance in south direction. Selassie condominium site also comes across in outskirts of the city and is surrounded by residential area, manufacturing in 230m far in North West direction, Goro primary school in 300m in north and Selassie church, 350m far. What makes Dhaka adii condominium incomplete is the lack of parks, urban plazas, play spaces and meeting places for the condominium dweller or any other resident.

The vacant lot in the condominium yard and the tree-covered ground, the tree-covered in the textile factory yard, planted on the sidewalks and greenery in the residents' yard made the neighborhood windy. Despite the extensive high commercial activity, hotels on various levels, pool house, pubs, bars, restaurants, are all available in the area. From the social services category there are Muslim and Protestant places of worship and an elementary school at 300m distances.

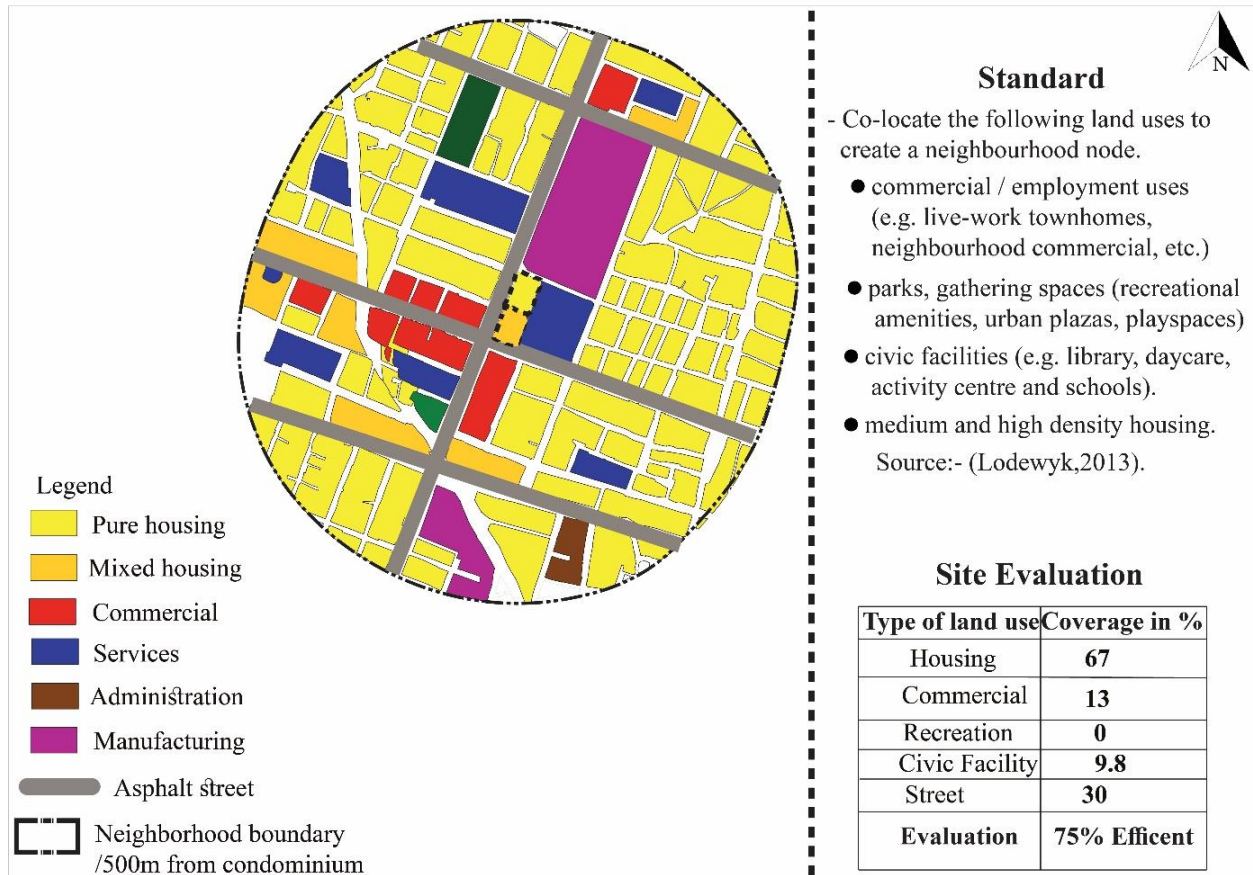


Figure4. 14 Dhaka condominium neighborhood land use description

As shown in the above figure 4.15, regarding to the city of Red Deer Neighborhood Planning and Design Standard, land use site analysis of Dhaka adii condominium meets the qualifications that neighborhood must meet in 75% efficiency, the rest 25% is reduced because of no recreational amenities and gathering places in the neighborhood regarding neighborhoods have attractions or administrations that are the portion of the texture.

The residents in their day-to-day life utilize these properties. For illustration, schools, parks, neighborhood commerce, clinics, devout offices and shopping regions may all be included, but not fundamentally all (DearMonty, 2016). There is also a wide range of housing in the area, from expensive and high-quality homes to low-quality homes.

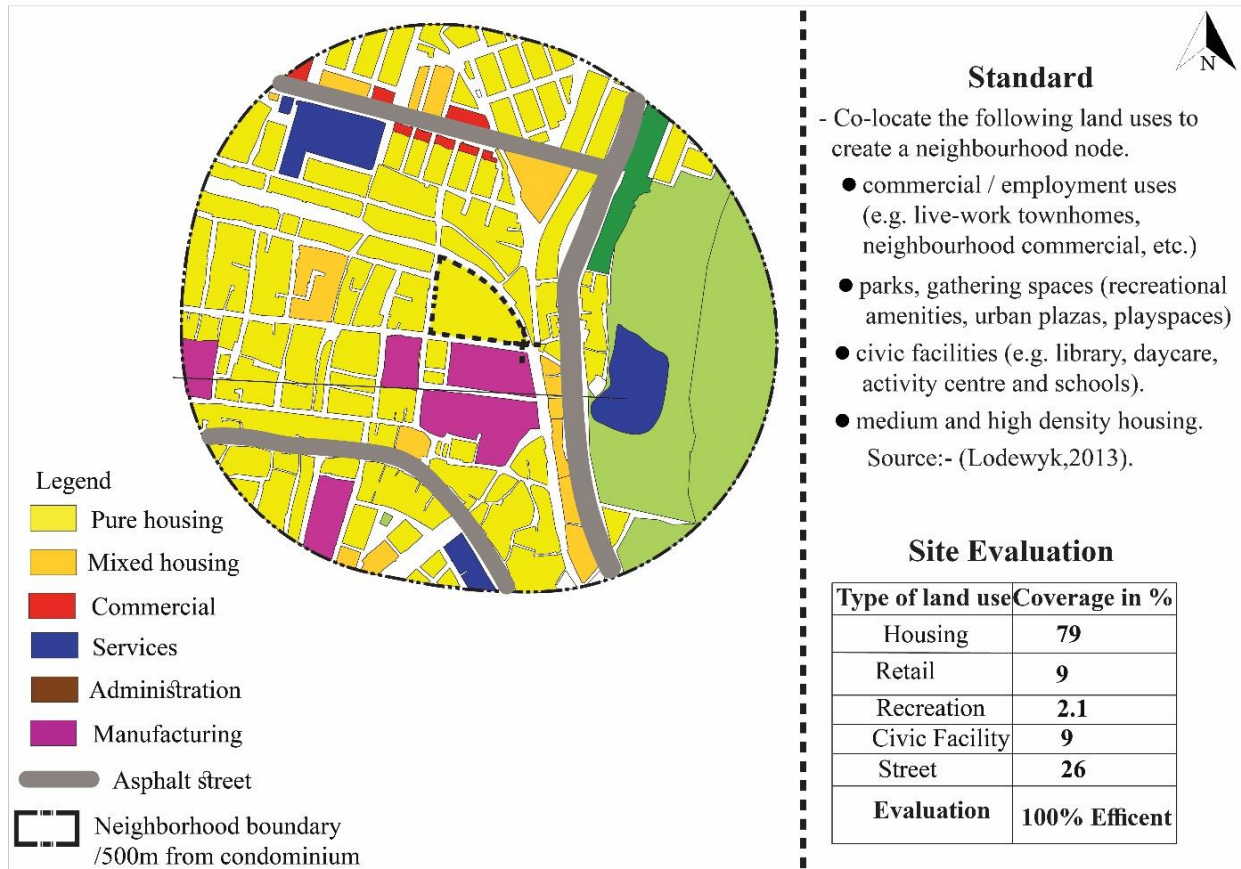


Figure4. 15 Jelissi condominium neighborhood land use description

Also it gives a response for development's response to neighborhood character is important in the consideration of all urban development. Rather than houses of various sizes and levels, there is a grain flour factory which is the reason for the name of the village. In the combination of service facilities, primary school away from 300m to condominium, two Muslim and one Orthodox places of worship are mentioned. A look at the vacant lot and the green space inside the condominium compound shows that the compound is a dense jungle that has been neglected and poses a threat to residents.

There is a small shop on the condominium grounds, as well as a place for outside businesses to do business in their homes and a place for extensive retail activities in front of the main street. The neighborhood has 3 main roads. The street from Adama University to the gende gara neighborhood, the only driveway for trucks to pass and the street from the city CBD to the Ameda neighborhood.



Figure 4. 16 Selassie condominium neighborhood land use description

As shown in figure 4.17 above, Selassie neighborhood is a neighborhood within a city that meets the requirements of more than half of the infrastructure and land use mix required. These include high-rise villas to middle-class homes, vegetable and fruit stalls, businesses, schools and places of worship. According to an interview with the residents, the 2 primary and secondary schools near the condominium namely, Goro primary & 2nd school and Makko Billi School are a great achievement for both the condominium resident and the outsider. A Muslim shrine is located in front of the condominium & about 200 m away. And there is the Holy Trinity Orthodox Church, which is the reason for the name of the condominium and the neighborhood. In addition, there are about 7 production facilities, such as food processors and car stalls, which have created jobs for the residents and the rest of the community. From the road service perspective, there are 3 asphalt streets as can be seen on the map.

4.4 Compatibility Evaluation

According to the various analysis above, Dheka condominium neighborhood is a community with 3 types of compatibility categories. According to land use analysis, the condominium is not compatible with the nearest commercial facilities due to the lack of buffer space for noise and commotion on the ground floor of the condominium retail activities and nearby commercial centers. Then became conditional compatible because some of the some of the loud cars coming out of the asphalt and some commercial centers did not match the other building heights in the neighborhood.

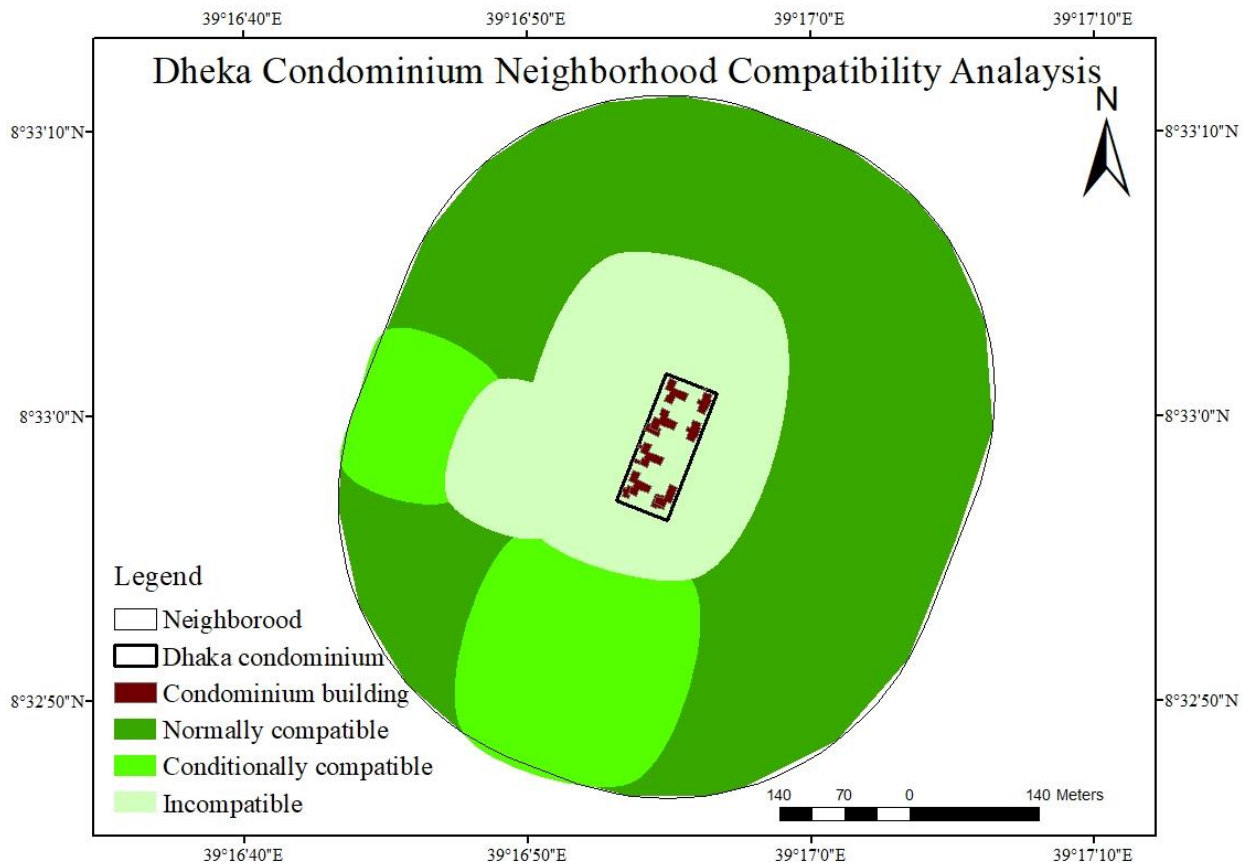


Figure 4. 17 Compatibility evaluation of Dheka neighborhood

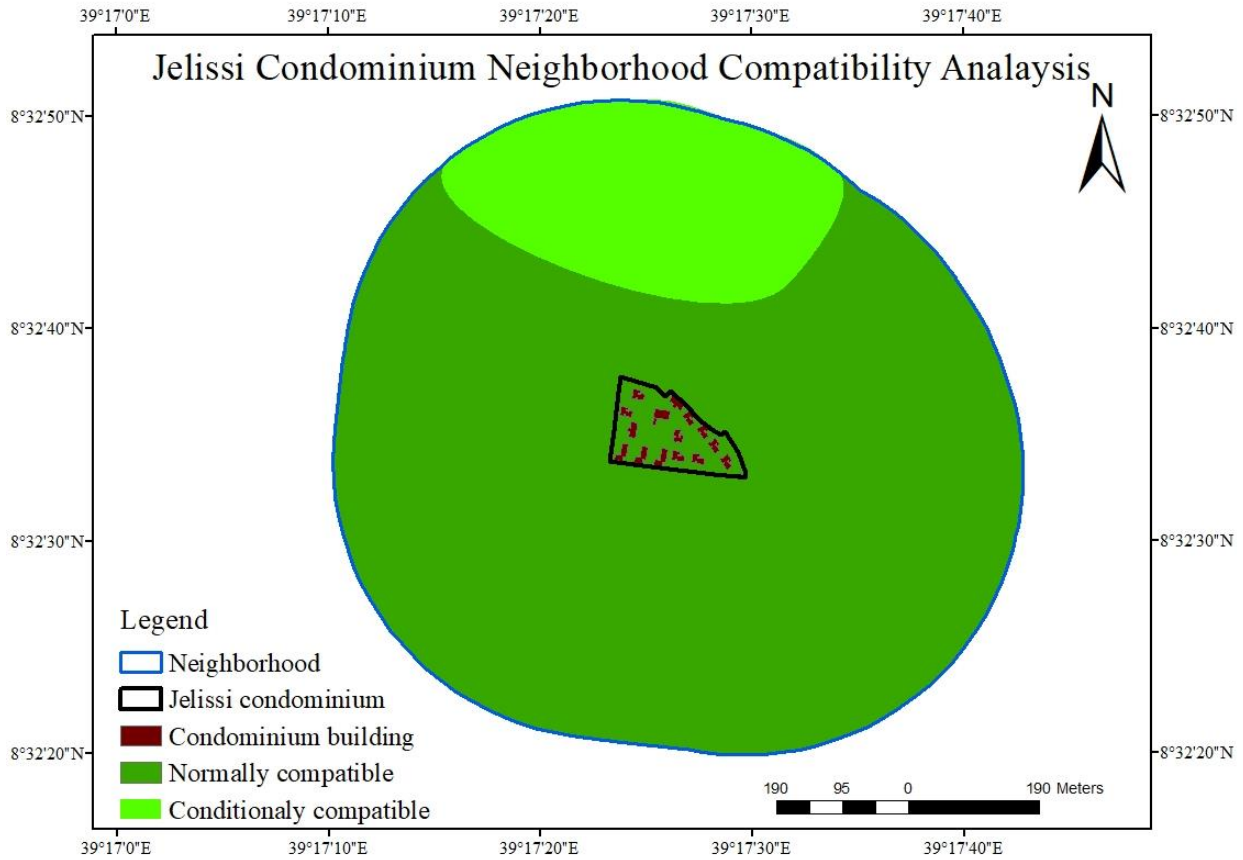


Figure 4. 18 Compatibility evaluation of Jelissi neighborhood

In Jelissi neighborhood most community service facilities are in line with the condominium based on land use compatibility analysis, and various architectural standards. Unlike Dheka condominium neighborhood, Jelissi neighborhood has a lot of residential lands. Businesses along the main roads, however, sometimes make loud noises. In these areas the compatibility analyses show conditionally compatibility.

Selassie condominium is a suburb of a city so many activities are emerging in the neighborhood. The out of town area is a prerequisite for the construction of factories so the steel and block factories built in the neighborhood are within walking distance of the condominium. According to land use analysis and building height evaluation, the schools, orthodox christen worship places and residential communities in the neighborhood are compatible with the condominium. However, the loud noise of the local mosque and the factories near the condominium do not have enough buffer space from the condominium, so these areas have conditional compatibility with the condominium.

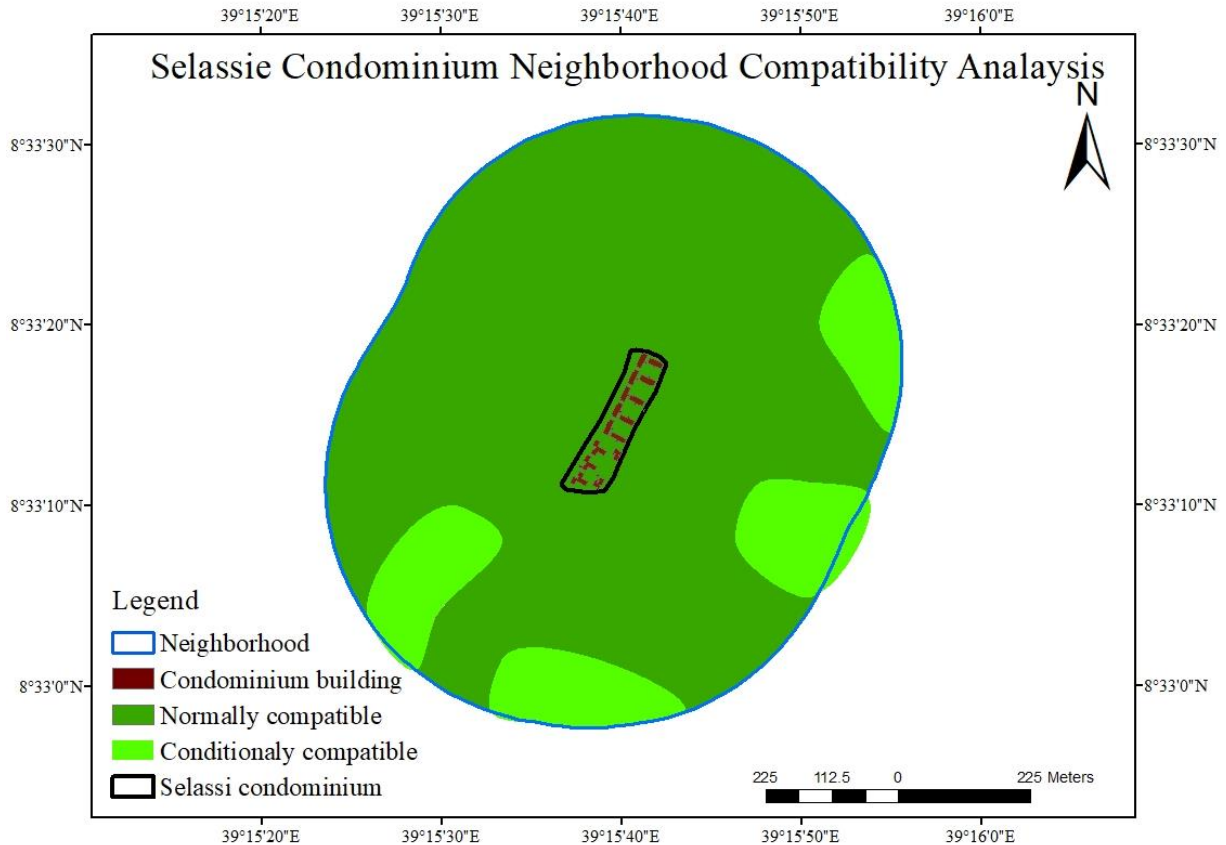


Figure 4. 19 Compatibility evaluation of Selassie neighborhood

4.5 Discussion

It can be understood by looking at secondary data of water supply for condominiums in the city of Adama that if supply fails from the Awash River, the water supply situation is becoming worst in the town due to a lack of emergency water supply source.

Residents of Dheka and Jelisii condominiums are delighted with the water supply in the compound, while residents of Selassie condominium often complain about the scarcity of water supply and interruptions. Residents say adequate in spite of water supply is supposed to a key utility of the condominium, it has to pay extra to meet the water demand in the home. Also they go to a place far away from the condominium and fetch water.

Residents of Dheka condominium testify that it is better in terms of liquid waste disposal performance on their premises. They also say that the ditch, which is designed for rainwater runoff, will not pass any sewage sludge other than rainwater, and that the home-made drainage system is properly designed and the occupants will be safe.

Conversely Jelissii and Selassie condominiums, in addition to the lack of adequate drainage, it is also made of poor quality materials, frequent damage causing poor sanitation and costing residents additional maintenance.

Due to the proximity analysis of the community facilities in all 3 condominiums, schools are closer to condominium than public health facilities and commercial centers. Most of the condominium residents are disconsolate by that. In a way that reinforces this, medical facilities had to be located within walking distance of each condominium.

Most condominium residents get medical treatment from a well-known hospital in the city, which is located far from all three condominiums, and they use public transportation to get there, while children, mothers and emergency patients, can be treated at their nearest outpatient clinic. Private medical facilities near each condominium offer only ophthalmology, dental care, etc. that do not provide full-body medical care. The condominium residents are going to buy the items they need by going to the small shops outside the compound and to the big malls in the city. Residents are pleased that there is enough transportation to get to these economic facilities near all 3 condominiums and that the condominiums are close to the main street.

From the land use analysis of the area, there are no commercial premises nearby to Jelissi and Selassie district condominiums, it is just away in 300m. Thus, the noise coming from businesses does not have a negative impact on the residents of the two condominiums. On the contrary in Dheka adii condominium there is no buffer space between the leased commercial premises and the residential area.

According to a poll conducted by Dheka adii condominium residents, most of residents are disturbed by the music, and the noise of people coming out of commercial businesses. Also in Selassie site 1/3 of the residents are disturbed by the noise coming from the Ayyub al ansar mosque located in front of the condominium and from steel and block factory nearby. In Jelissi condominium the sidewalk between the nearby flour mill and the condominium serves as a buffer area. Therefore in the land use analysis, Dheka condominium neighborhood is not compatible with the neighborhood relatively from the rest condominiums due to the clamor coming to the commercial areas and car horns on the asphalt.

In Jelissi condominium, as observed there are sidewalks that connect to the condominium and serve as a buffer from the factory nearby, even if there is noise. Similarly in Selassie condominium there are several production areas in the area without adequate sidewalks or any other area as a buffer, so residents were disturbed. From architectural analysis various neighborhood compatibility standards states that the condominium differs from the local community service facilities in terms of building height, in this term the Dheka condominium differs in height from the community service facilities in the area so there is conditionally compatibility.

5. CONCLUSION AND RECOMMENDATION

5.1 Conclusion

This portion of the thesis is based on the discoveries that come about from the study, of which views sampled and data accumulated from different parties in condominium housing residents water, electricity, sewage system and other soft and hard infrastructure issue have been categorized and examined. These key findings will among others revolve mainly around the stated objectives and research questions of the study.

Most of the condominiums in Adama have access to the safe water supply. On the other hand, one in 3 condominiums does not have an adequate water supply. These residents used alternative sources like purchasing from other neighboring kebele, wells and bono water when water interruption occurred. Despite the city's water supply problems, residents say they can get drinking water from a variety of sources as they think the incoming water is contaminated and could be harmful to health.

Most of the respondent's residence households used their water for cooking, bathing and washing whereas some respondents were using it for the toilet and in some cases for gardening purposes. In addition, for most respondents the amount of their previous average daily water consumption was between 120 and above litres of water per day. Within the Adama condominium housing units, all housing are associated with the water supply framework. No housing unit is without channels associated with their homes. But the recurrence of stream of water has been a major concern for the families of condominiums. With respect to the recurrence of tap streams, for most of the families, water streams basically on 1 -2 days in a week or most extreme 2 days in a week.

The supply of electricity in condominiums is encouraging, with the exception of some disruptions. To make sure this finding, the daily capacity of the power, duration of the electricity day and night time, its reliability, quality, affordability, legality and health & safety of the electricity supply was determined. One of the 3 condominiums in Adama is not compatible with the nearest neighborhood facilities. This is due to the loud noise of nearby commercial malls and factories, including the condominium floor.

5.2 Recommendation

In Ethiopia, the construction condominium house program is the biggest project and the county currently undertaking in terms of a huge amount of public money. This indicates that stronger attentions is required. It is important to make sure that the various hard and soft infrastructures that need to be built together with the condominium establishment. Hence, the following measures need to be taken:

1. **Governmental Sectors:** to full fill the gap between the current water supply & water demand and sewerage system problems the Adama city water and sewerage authority and Adama city housing construction project office must cooperate to ensure the success of any future water demand management program.
2. **NGOs, Civil Society and Condominium Residents' Association:** They should be involved in the water issues in condominium houses. The groups should be able to provide recommendations as to venture needs and plans of the condominium water supply frameworks.
3. **Adama Housing Construction Agency:** Should consider the installation of separate sewer systems for domestic wastewater and storm water runoff overall. In addition Use appropriate locally available materials for sewer construction and design manhole covers to withstand anticipated loads and ensure that the covers can be readily replace if broken to minimize entry of garbage and silt into the system planning and design of new sewerage systems of condominium houses.
4. **Technological Capacity:** innovative technologies are basic to overcome barriers to water and sanitation service provision. Appropriate innovation that can meet appropriate standards and can have adequate spare parts and fittings ought to be applied. Indeed the long term the use of solar energy instead of diesel generators would be appreciated. This could minimize the rate of interference.
5. **Private Investor:** when various domestic and foreign investors are planning to build a school, health centers, business centers and various community service facilities, they should be consider the condominium neighborhoods where most people live, it is ought to be built within walking distance of the resident.

Special Acknowledgments

This research thesis is funded by Adama Science and Technology University under the grant number, ASTU/SM-R/445/22. Adama, Ethiopia.

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6. APPENDIX

Appendix A- Field Observation Checklist

Attributes	Description
Building height	
Open spaces & greenery	
Street pavement	
Building facades	
Drainage system	
Parking spaces	
Housing quality	
Solid waste management	

Appendix B- Field Counting

Attributes	Total in number
G+2 condominium buildings	
G+3 condominium buildings	
G+4 condominium buildings	
Houses in 1 floor	

Appendix C- Questionnaires' One

ADAMA SCIENCE AND TECHNOLOGY UNIVERSITY
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DEPARTMENT OF URBAN PLANNING AND DESIGN

MSC PROGRAM

Dear Respondent, I thank you in advanced for your cooperation, and honesty in answering the following questions. The aim of collecting information through this questionnaire is to conduct academic research on Characteristics of Condominium Neighborhood. I am among graduating class students, as such I would like to assure you that, the information that you provide me will be kept confidential. No need of writing your name.

I thank you in advance!!!!!!

1. Is there a shopping mall on the premises of the condominium?
A. Yes B. no
2. If there is no answer to the 5th question, how far do you travel from your home to buy?
A. 100-500m B. 500-1k.m C. above 1k.m
3. Is there any children in your home studying?
A. Yes B. no
4. If there is yes answer to the 3th question, How far is the children's school from home?
A. 100-500m B. 500-1k.m C. above 1k.m
5. Do you get good access to water and sewerage system?
A. Yes B. no
6. If the answer to question 5 is not, what is it that are not doing well?
A. water B. sewerage system C. other services

7. Fill the water consumption table per day depend on the appliance.

Appliance	Water consumption per day			
	Frequency	Condominium sites		
		Dheka site Household	Jelissi site Household	Selassie site Household
Cooking				
Bath				
Dish Washing				
Toilet				
Cloth washing				
Other				

8. From where do you get water when there is shortage?

A. Bono B. Other place C. Neighbor

9. Which school do you send your children's?

A. Private school in the Neighborhood

B. Private school outside the Neighborhood

C. Public school in the Neighborhood

D. Public school outside the Neighborhood

E. Other

10. The reason for question selected school.....

A. Private school is affordable

B. Private school is not affordable

C. Public school is affordable

D. Public school is not affordable

E. Far from the neighborhood

F. Near to the neighborhood

11. Which clinic do you go when you have health problem?

A. Private clinic in the Neighborhood

- B. Private clinic outside the Neighborhood
- C. Public clinic in the Neighborhood
- D. Public clinic outside the Neighborhood, Other

12. The reason for question selected healthy center.....

- E. Private clinic affordable
- F. Private clinic is not affordable
- G. Public clinic is affordable
- H. Public clinic is not affordable
- I. Far from the neighborhood
- J. Near to the neighborhood

13. From where do you shop most of the time?

- A. Neighborhood market
- B. Around the neighborhood
- C. Other place

Appendix D- Interview for Key Informants

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Dear interview respondent, I thank you in advanced for your cooperation, and honesty in answering the following questions. The aim of collecting information through this interview is to conduct academic research on Characteristics of Condominium Neighborhood. I am among graduating class students, as such I would like to assure you that, the information that you provide me will be kept confidential.

I thank you in advance!!!!!!

1. When the condominium is constructed/ by whom? Can you tell me about the history of the community?
2. Why was the site used before it was used for condominiums?
3. How many household/peoples live in the condominium? Household size, average number of members per household?
4. What do water leaks and water main breaks cost our water system each year?
5. What method you have used to communicate information to prospective tenant for communicate about water and sewerage system of the house?
6. Who pays for all the damages when a water main breaks?
7. What is water supply and demand system of the condominiums
8. What is the waste disposal process and drainage in the condominium?

Appendix E- Questions for Focus Group Discussion

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Dear Moderators, I thank you in advanced for your cooperation, and honesty in answering the following questions. The aim of collecting information through this discussion is to conduct academic research on Characteristics of Condominium Neighborhood. I am among graduating class students, as such I would like to assure you that, the information that you provide me will be kept confidential.

I thank you in advance!!!!!!

1. What do you think is the water supply and demand services provision in your condominium?
2. What do you think about the problem & solution about installation of water supply and liquid waste disposal in the condominium premises?
3. How do you see the negative and positive effects of the proximity of the community service facilities in the condominium neighborhood area and land use incompatibility factors?

Appendix F- Documents Reviewed and Analyzed in this Research

No	Documents	Year
1.	A History of Adama City From Its Foundation To The Present(1916-2015)	2016
2.	Adama Structure Plan Revision Project City Wide Study Report	2017