PSYCHOLOGICAL AND ENVIRONMENTAL EFFECTS OF LIVING IN TALL BUILDINGS: CASE OF BISMAYAH CITY

A THESIS SUBMITTED TO THE GRADUATE SCHOOL OF APPLIED SCIENCES

OF

NEAR EAST UNIVERSITY

By

MOHAMMED T. F. ZIADA

In Partial Fulfillment of the Requirements for the Degree of Master of Science

in

Architecture

NICOSIA, 2019

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Approval of Director of Graduate School of
Applied Sciences

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We certify this thesis is satisfactory for the award of the degree of Masters of Science in Architecture

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I hereby declare that all information in this document has been obtained and presented in accordance with academic rules and ethical conduct. I also declare that, as required by these rules and conduct, I have fully cited and referenced all material and results that are not original to this work.

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Signature:

Date:

To my parents…

ACKNOWLEDGEMENTS

I would like to thank all who contributed to the completion of my thesis. Special thanks to Assist. Prof. Dr. Çiğdem Çağnan whose guidance, supervision, observations and encouragement had a great influence in mastering and ending this thesis.

To my angels in life. To the meaning of love, devotion and tenderness. To the smile of life and the secret of existence. Dear my mother Alaa and dear father Thamer.

To my friends those who look like the brotherhood. To whom I am pleased with their knowledge and companionship. Thanks to all the colleagues who provided support and advice throughout the study period.

ABSTRACT

The satisfaction of residents (residential satisfaction) living in tall buildings is defined as the emotional behavior of the inhabitants to their residential environment. The aim of this thesis work is to investigate the psychological and environmental effects of tall buildings on residents. To conduct this investigation a residential area in Bismayah city of Baghdad is selected as a case study and the opinions of the residents were taken. A quantitative research method was used, focusing on conducting a survey of 120 apartment users selected from 12 tall residential buildings in Bismayah. The number of the participants included 74 males and 46 females. The age range of the sample group was between 20 and above 61. Survey questions concern general information about residents, the satisfaction of residents about housing units, public services of the neighborhood, social environments and psychological behavior of residents. Statistical package for the social sciences (SPSS) software program was used to extract the results. The results showed a variation of residents' opinion in several factors such as residential units, environmental aspects, public services, social and psychological behavior. According to environmental aspects, most of the population was dissatisfied about location, the entrance of the building and commercial services. In the other hand, they showed satisfaction about the noise level, educational and medical services and waste collection. Psychologically, it has shown that users feel safe and comfortable life in high-rise residential buildings but are dissatisfied from feeling being isolated from the city. The thesis research reveals that Bismayah's design process is closely related to environmental and psychological values which affects residential satisfaction. It can be concluded that; the process of achieving residential satisfaction requires effective coordination among all the disciplines related with architecture field.

***Keywords*:** Residential tall building; satisfaction of residents; psychological behavior; environmental behavior; Bismayah

ÖZET

Yüksek binalarda yaşayan sakinlerin memnuniyeti (kullanıcı memnuniyeti), kullanıcıların konut ortamlarına duygusal davranışları olarak tanımlanmaktadır. Bu tez çalışmasının amacı, yüksek binaların konut sakinleri üzerindeki psikolojik ve çevresel etkilerini araştırmaktır. Araştırmayı yürütmek için Bağdat'taki Bismayah şehrinde bir yerleşim bölgesi örnek inceleme alanı olarak seçilmiş ve bölge sakinlerinin görüşleri alınmıştır. Çalışmada, Bismayah'taki 12 adet yüksek konuttan seçilen 120 apartman sakinine anket yapılmasına odaklanan nicel bir araştırma yöntemi kullanılmıştır. Katılımcılar 74 erkek ve 46 kadını içermektedir. Örneklem grup 20 yaş ile 61 yaş üzeri aralığındadır. Anket soruları, konut sakinleri hakkında genel bilgi, kullanıcıların konut birimleri ile ilgili memnuniyeti, mahallenin kamu hizmetleri, sosyal çevre ve kullanıcıların psikolojik davranışları ile ilgilidir. Sonuçları elde etmede sosyal bilimler için istatistik (SPSS) yazılım programı kullanılmıştır. Sonuçlar konut birimleri, çevre yönleri, kamu hizmetleri, sosyal ve psikolojik davranış gibi çeşitli faktörlerde konut sakinlerinin görüşlerinin farklılaştığını göstermiştir. Çevresel konulara göre kullanıcıların çoğu, binanın konumu, girişi ve ticari hizmetler konusunda memnuniyetsizdi. Öte yandan, gürültü seviyesi, eğitim ve sağlık hizmetleri ile atık toplama gibi birçok konuda memnuniyet gösterdiler. Psikolojik açıdan, kullanıcıların yüksek konut binalarında kendilerini güvende ve rahat hissettiklerini ancak şehirden soyutlanmış olduklarından dolayı memnuniyetsiz olduğunu göstermiştir. Tez araştırması, Bismayah'ın tasarım sürecinin, konut memnuniyetini etkileyen çevresel ve psikolojik değerlerle yakından ilgili olduğunu ortaya koymaktadır. Sonuç olarak denebilir ki; kullanıcı memnuniyetine ulaşma süreci, mimarlık alanı ile ilgili tüm disiplinler arasında etkin bir koordinasyonu gerektirmektedir.

Anahtar Kelimeler: Yüksek konut binası; kullanıcı memnuniyeti; psikolojik davranış; çevresel davranış; Bismayah

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LIST OF ABBREVIATIONS

°C:	Celsius
BA:	Bachelor of Arts
Km:	kilometer
M:	Meter
Mg:	Milligrams
M^2:	Meter Cube
PhD:	Doctor of Philosophy
SPSS:	Statistical Package For Social Sciences

CHAPTER 1
INTRODUCTION

The shelter is the basic human need. It has developed according to the economic and social developments of civilization and technology passed by the societies. The various forms that appear in the two types of housing are vertical housing (tall buildings) and horizontal housing. In this thesis, psychological and environmental effects of living in tall buildings on residents will be studied with a case study in Bismayah city, Baghdad. The attempt to plan the residential environment without an adequate understanding of population needs and their environment is usually failed attempt. Human is connected to the environment and this relationship determines the behavior of his life. Human interacts with the place must be available factors that promote this interaction, such as psychological comfort, safety, the sense of pleasure when moving and transport in order to recognize all elements. The relationship between human, residential environment, social and aesthetic aspects makes the environment more suitable for housing. The weakness of these three requirements leads to a weak relationship between human and the environment.

There are a lot of people prefer to live in residential tall buildings especially the small families or the newly married couples. This type of construction is successful and attractive if it applies the appropriate planning and design standards that make it residential complex with integrated services. The design of the building is to balance a range of aspects affecting the resulting form (functional, social, structural, environmental and aesthetic). The design process of the residential tall building consists of a set of systems that have certain requirements and may not meet the requirements, but the final integration of the design of the building must meet the maximum requirements of these systems. During 1960-1970 vertical housing in Iraq began to find solutions for housing problems. This happened when the government started scientific and practical steps toward including the adequate housing for citizens with focusing on the vertical housing system (Humanitarian Library, 2006).

1.1 Problem Statement

Before residents feel satisfied or not about the residential tall buildings, they see or experience their features or characteristics which may affect the resident's mood. This thesis studies the problems of residents living in tall buildings in terms of;

- Environmental aspects surrounding residential complexes such as location, noise, pollution, the orientation of the building.
- Vertical housing psychological effects on populations such as fear, anxiety, feeling bored and dissatisfaction.

1.2 The Aim of the Thesis

The aim of this thesis work is to investigate the psychological and environmental effects of tall buildings on residents. To conduct this investigation a residential area in Bismayah city of Baghdad is selected as a case study and the opinions of the residents were taken. The thesis objectives are;

- To study the psychological effects of the residents and the environment surrounding residential complexes on different countries.
- To explore and analyze, in the research context, the environmental pollution and psychological issues of the city of Baghdad, Iraq.
- To determine the opinions of residents within residential buildings regarding environmental and psychological effects.

1.3 Scope of the Thesis

This thesis focuses on residential buildings between five to ten floors (5-10) and their impacts on the population within the residential complexes in terms of;

- Environmental pollution such as air pollution, noise, visual pollution, waste collection and how to get rid of them.
- Psychological effects of the population within the residential complexes in terms of fear, anxiety, bored and safety.

1.4 Methodology

This thesis consists of a number of quantitative research employed to the samples selection and data collection used to study the following;

- Vertical housing definition, stages of its development, types, positive and negative effects on residents.
- Geographical distribution of vertical housing in Baghdad.
- Impacts of the population growth on the housing crisis in Baghdad.
- Theoretical study on the subject from primary sources, literature review, books, journals, articles and internet sources.
- Analysis of cases studies in Baghdad in terms of residential complexes.
- Field observation, take photos of residents buildings, surrounding buildings, roads.
- Design a questionnaire to collect the opinions of residents.
- Use the statistical package for social sciences (SPSS) software in order to analyze the database and show the results.

1.5 Importance of the Thesis

The importance of the thesis is to design suitable infrastructure and proper residential building that can cover the needs of the population and provide them a comfortable and safe life. This thesis was divided into five sections. The first chapter; contains information on the tall buildings, problem statement, the aim of the thesis, methodology. The second chapter; contains the definition of residential buildings, the impacts of tall buildings, psychological behavior in tall buildings, residential neighborhood design. The third chapter; contains the definition of satisfaction of residents, indicators of satisfaction of residents, comparative study in residential buildings. The fourth chapter; contains the case of Bismayah city, Baghdad. The fifth chapter; contains conclusion and recommendations. Figure 1.1 shows the thesis structure chart.

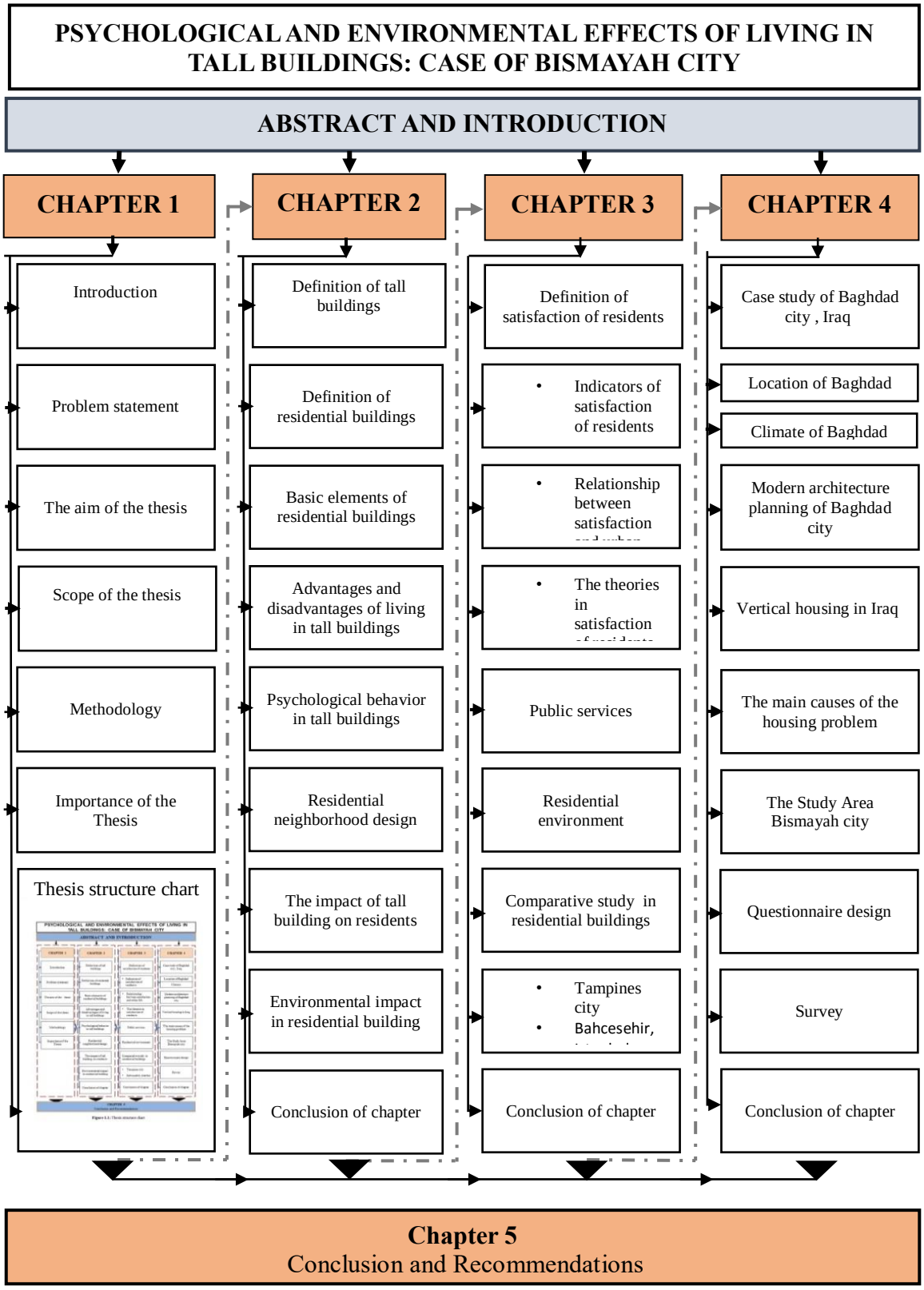

Figure 1.1: Thesis structure chart

CHAPTER 2
RESIDENTIAL TALL BUILDINGS

Since the 20th century, high buildings have become monuments of civilization and urbanization. The beginning of the appearance of high buildings was in the United States of America and then spread throughout the world, especially in Europe and East Asia, which has always forced designers to choose the shape and the best design of buildings. The vertical housing has seen interest from different countries in the world during the 21st century which was the most active in the history of high buildings (Philip, 2012). Figure 2.1 shows the vertical housing in New York.

Figure 2.1: Lever house building in New York (Emporios, 2013)

2.1 Definition of Tall Building

Tall buildings are a phenomenon that has many definitions as there are researchers devoting attention to it. Taranath (1988) had implied that tallness was a relative matter. In some countries of the world, a five floors building will appear tall, while in other a 25-floors building will be the tallest. In Chicago and New York, this number will jump to somewhere between 70 and 100 floors. The tall building first appeared in the United States in 1884 and was used as a noun around the year 1889. In architecture, there are presently numerous definitions of tall buildings. The definitions can be divided into three groups. The first group of definitions is made by floors. The second one according to the plan, ground area, design and the use of the buildings. The third one is made by comparing the words with each other as defined below.

- *First group:* Tall buildings are the type of building that generally affects on their near and distant environment from the aspects of the physical environment, urban layout, and every kind of urban infrastructure. If the ceiling of the final floor is above 30.80 m or if the total number of the floors are more than 13, including the basement and excluding the thirteenth floor.

- *Second group*: According to plan, forces, ground area, design and use may be enumerated as a building in which strongly influences planning, design and use, or a building whose height creates different conditions in the design and construction. Generally buildings like towers having a small ground area with a height more than the dimensions of the ground below to the second group (Moore et. al, 1980).

- *Third group*: Made by comparing either the height or the name of the building. For example, the tall building can be divided into two groups; tall buildings up to 25 floors and Skyscrapers more than 25 floors.

2.2 Definition of Residential Buildings

The housing is simply defined as enough space that protects the person from outside factors and provides with the necessary physiological and psychological needs according to efficiency design (Ali, 2009). From this general orientation begins the theory of human motivation of Abraham Maslow which believes that the human needs based on development composition and imagine that the full growth is based on these needs. Maslow's theory of the hierarchy of needs is one of the key concepts in organization theory that has been used to understand human requirements and personal connections. Motivation is the psychological process that initiates and drives oneself toward goals. Maslow visualizes a pyramid that is divided into five different levels starting from self-realization, then esteem needs, belonging needs, safety needs to physiological and psychological needs, in describing his hypothesis as seen in Figure 2.2 below.

Figure 2.2: Maslow's theory and population needs (Noltemeyer et al., 2012)

- *Self-realization*: The highest stage actualization of needs is of personal potential, seeking personal growth and peak experiences.

- *Esteem needs*: which are self-esteem, mastery, achievement, independence and dominance.

- *Belonging needs*: These needs are work group, family, affection and relationships. Employees desire to seek social belongingness in the workplace.

- *Safety needs*: The needs are the protection from enemies, a sense of security and stability.

- *Physiological and psychological needs*: These basic needs are air, food, water, shelter and warmth.

2.3 Basic Elements of Residential building

Building or housing is the most fundamental needs for humankind. The building is a kind of structure which is built with materials and including with foundation, walls, floors, roofs, plumbing and building services. The aim of a residential building to provide security, serve needs of society primarily as the weather, security, living space, privacy, comfortably live and work. Residential complexes consisting of special elements that cannot be dispensed on. These basic elements are shown below in Figure 2.3.

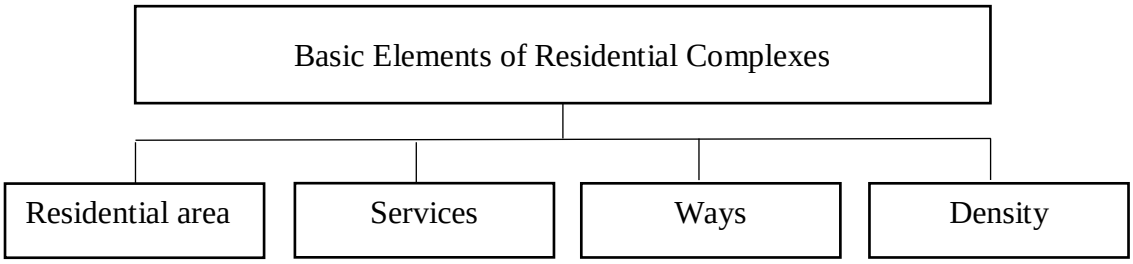

Figure 2.3: Basic elements of residential complexes

- **Residential areas**: They consist of the residential building and the land surrounding it directly which is specialization for hold house service. In the case of buildings for one or two families. Front and backspace, side corridors, car parks and garden are residential elements.

In the case of residential tall buildings parking, recreation areas, public services, children's playgrounds and green spaces are residential elements. As the planning of residential groups is more appropriate in terms of economic usage, movement of pedestrians, provide

places for the population to enhance social relations among the population, provide high flexibility in planning and beautiful views of the population (Kurraz, 2006).

- **Services**: The residential neighborhood is mainly depending on services located in the neighborhood center and the access to these services are important. Kurraz, (2006) noted that the lowest proportion of services should be available in the residential neighborhood between 8-10%. The most important services are educational services, commercial services, health center, religious services and gardens.

- **Ways**: Roads are one of the most important components within the neighborhood. The proper planning of the street network aims to reduce traffic accidents, reduce noise, air pollution, reach all areas of the neighborhood easily and access to the general service center by feet.

- **Density**: Population density is the number of housing units divided by the land area, which is an important index helps in estimating the amount of land needed for housing (Asfour, 2012). The land area varies according to the type of density as explained below (Figure 2.4).

A) Total residential density: Is the rate between the number of housing units divided by the land area in addition to public streets, open areas, commercial areas and educational areas.

B) The net residential density: Is the rate between the number of housing units divided by the land area allocated for housing, including streets and corridors.

C) Site density: Is the rate between the number of residential units divided by the area of the site (Landcom, 2011).

A)

Total residential density

B)

Net residential density

C)

Site density

Figure 2.4: Comparison of different types of densities (Landcom, 2011)

2.4 Advantages and Disadvantages of Living in Tall Buildings

In the twenty-first century, more people are moving from the countryside to the city, and in the city, they tend to live in large apartment blocks. Although it may appear that apartment blocks provide a convenient way to accommodate a huge population, another way to look at this is its impact upon living standards. High-rise buildings may be the most efficient way of cramming a large number of people into a small space, but causing overcrowding and increased competition for space.

- **The advantages of living in tall buildings are**;

- More economical in the implementation of infrastructure services compared to horizontal construction.
- Vertical housing is healthy because it provides proper ventilation as well as noise from transportation.
- It has beautiful architectural interfaces within the residential complex as well as the architectural configuration of the main streets and area.
- The upper floors are more ventilated and interspersed with more sunlight.

- **The disadvantages of tall buildings are**;

- Residents who live on the upper floor have a long distance to reach the ground level, which has psychological consequences for some residents, in addition feeling of isolation (Gifford, 2007).
- Psychological effects of the population especially for families with children.
- Weak privacy among residents of buildings because they are exposed to see each other.

2.5 Psychological Behavior In Tall Buildings

Psychology is the study between people, their physical connections and behavior when residents change their residential environments. The psychological environment has an important role in determining an individual's behavior in residential buildings and cannot be accomplished easily and simply (Kolvir, 2015). The most important of these behavioral problems are;

- **Tension and fear**: There are many social and physical determinants that may play a role in people. For example, adolescents living in tall buildings are suffering from high degrees of exposure to violence and fears their personal safety. But clearly, this is related to social and economic conditions in more or less the form of housing (Sweatt, 2002).

- **Overpopulation**: Residential tall buildings are characterized by technology and economy advantages in areas with high-density population areas and its location in the central part of the city allows increasing the number of living space to bring the population to the place of employment and reduce random movement. But an increase in population density leads to psychological problems such as infectious diseases move quickly, stress and anxiety. Also, such planning leads to the problem of transportation and population growth in the city center (Romanova, 2017). In Parisian high-rises, residents reported being more crowded, so that relationships within the buildings were worse. The residents of buildings felt too densely populated, acoustic isolation was bad and they believed there were too many houses on each floor (Bordas-Astudillo, 2003).

- **Mental health**: Residential tall buildings and challenging environmental and social impacts of urbanization are associated with the child and led to a rapid decline in physical activity of the children and other health services. Mental health problems have related to building height. Study Wridt**,** et al., (2015) confirmed that mothers who lived in tall buildings reported more depressive symptoms than those who lived in houses. Psychological symptoms were more often present in residential tall buildings. In India, a study showed suggested that the residents failed to cope with the stress produced by living in tall buildings. Among the negative influences noted by Modi (2018), that noise, gloomy, depressing conditions, inadequate size and lack of security.

2.6 Residential Neighborhood Design

There are many planning theories aim to organize an integration social life and provide all the needs of urban areas. The most important residential neighboring theory is defined by Perry (1929). This theory provides for the population to be concentrated in residential areas around a range of services and the school is located within an acceptable walking distance.

It aims to encourage social activities between population and in addition to reducing the distance between work and residence place. Figure 2.5 shows residential neighborhood proposed by Perry (1929) surrounded by the main streets, inside sub-streets, the school in the center, provide calm and dedicated about 10% of the area for recreational areas, social center, church and library (Meenakshi, 2011).

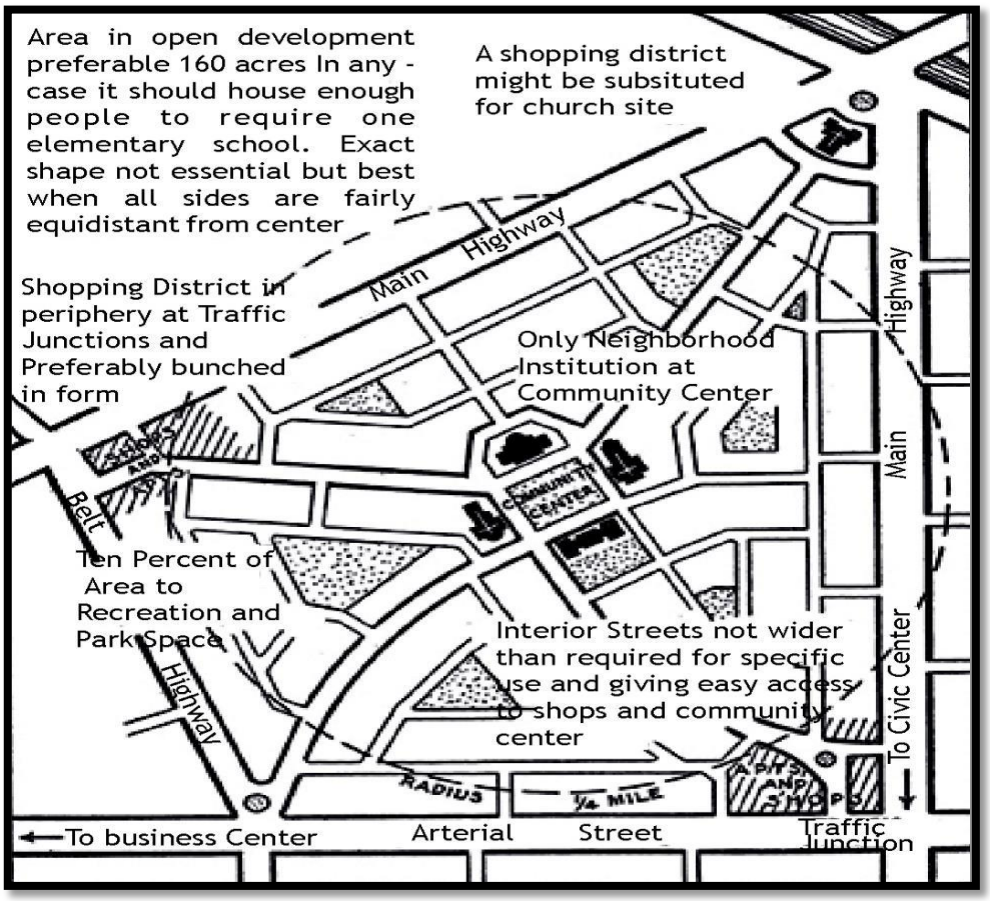

Figure 2.5: Residential neighborhood of perry (Meenakshi, 2011**)**

The six rules that Perry (1929) proposed for residential neighborhood planning are;

1. Should not penetrate the main streets of the neighborhood but should surround it.

2. Internal streets must end with closed streets or squares to achieve a little and safe movement that preserves the residential environment.

3. The number of population within the neighborhood should match the size of the school.

4. The neighborhood center should contain a school located within green areas in addition to other services.
5. The neighboring residential radius must be no more than half a mile so that the student's walking distance to the school does not exceed this distance.
6. Commercial services are placed on neighboring borders or on main intersections of streets.

Ideal design of the residential building is to balance the range of aspects affecting the resulting from functional, social, construction, environmental and aesthetic aspects. The design of residential complex buildings consists of a set of systems that have certain requirements and also the final integration of the design must achieve the greatest requirements of those sub-systems.

The design process of a residential complex is a complicated process in which several aspects can be summarized in three values which are; *environmental*, *social* and *aesthetic values*. The design process must have a certain degree of integration, especially in the design stage of the building which must have the best degree of integration to reach the most important objectives of design which is to meet the population needs. Figure 2.6 shows the negative effects of the non-ideal design of the residential tall building.

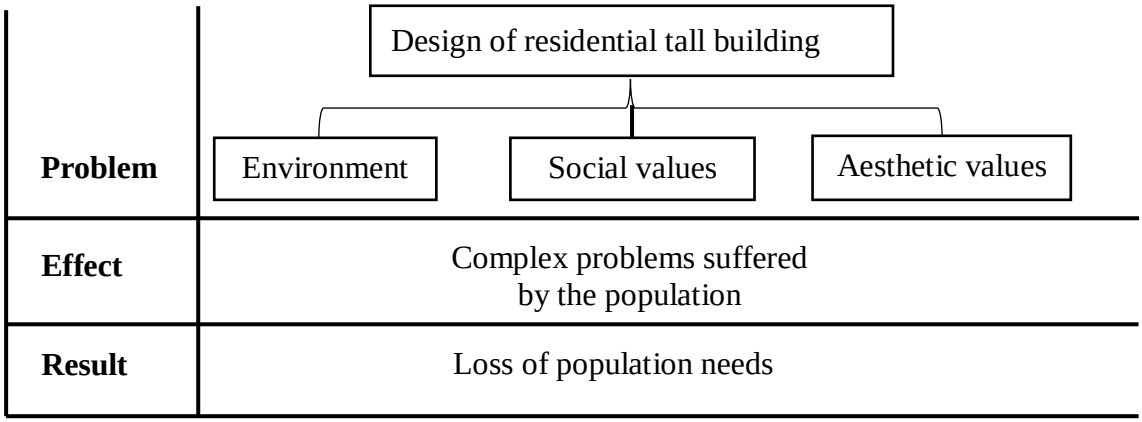

Figure 2.6: The effect of the non-ideal design of the residential tall building

2.7 The Impacts of Tall Buildings on Residents

Tall buildings can be related to negative effects. There are several factors of tall buildings design which can be classified into these characteristics of the population listed below.

- Social relations
- Nature
- Economic status
- The amount of choice among residences
- Location within the urban fabric
- Population density
- Neighborhood (Gifford 2007).

There is a relationship between the physical condition of housing and behavioral problems among people. If people able to access green spaces these problems will be reduced. Nature has an important role in calming the relationship between living and behavior problems. Gifford & Lacombe (2006) showed strong connections between the physical conditions of housing and behavior problems among children. The variation in results may be explained by the different physical quality of the residents, regardless of housing form.

2.8 Environmental Impacts in Residential Buildings

The design, construction and maintenance of buildings have a great impact on the environment and on natural resources. The challenge is to have buildings that minimize the use of depleting energy, production of pollution while increasing the luxury, health and safety of the residents. On average buildings consume more natural resources than necessary, have negative environmental effects and generate a large amount of waste. The negative consequences of the failure to achieve the population needs and provide adequate housing will lead to problems as a result of the non-ideal design (Figure 2.7).

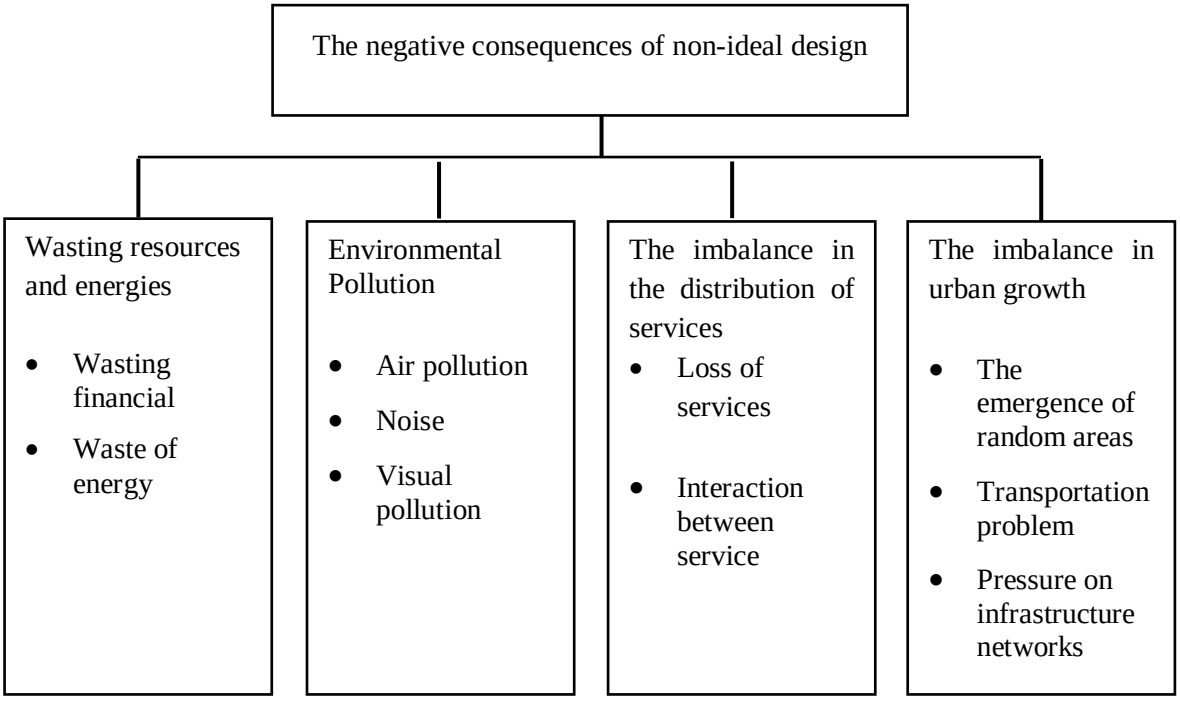

Figure 2.7: The negative consequences of non-ideal design in residential complexes (Aina et al., 2013)

2.8.1 Environmental pollution in residential buildings

Environmental pollution is one of the most important problems facing humans in recent times. Air pollution comes at the first of these environmental problems because it is not possible to control the air and monitor its spread from one place to another (Hayati & Sayadi, 2012). The most important of these pollutants are explained below.

- **Air pollution**: Air pollution is caused by human intervention in changing the proportions of air components by the waste or exhaust produced by industries. Air pollution defines as any change in the characteristics and specifications of normal air which poses a risk to human health and the environment, whether this pollution is caused by natural factors or human activity and. Scientists divide air pollution into three types, which are biological pollution, radioactive pollution and fuel combustion.

- **Air pollution around the tall building**: To identify and know the pollution around the building will help the designers to choose the best location for windows with minimum

contact with dirtied air. it also, the normal focus from the lowest point in the building up to about 6-9 floors. This may be because of high wind speed in the upper edges of the building (Abbaspour & Behjo, 2000).

- **Plants role in reducing air pollution**: Plants can balance temperature and humidity and also able to absorb toxic gases, whereas in each hour remove 20 mg of ammonia in the air. Therefore, environmental experts believe that the role of green spaces improve the urban landscape as well as reducing air and noise pollution. Roof gardens also help to absorb heat and cause lower the temperature in summer, increase oxygen in the air, shadows and air filtration (Sharghi & Mohtashami, 2007).

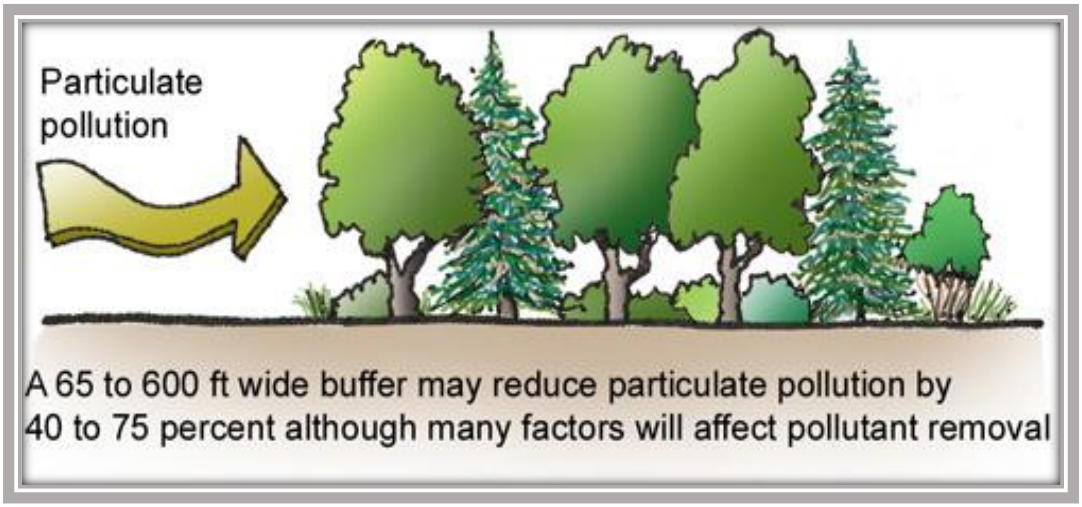

Figure 2.8 Plants role in reducing air pollution (National agroforestry center, 2013)

- **Procedures for the preservation of air**: The risks of air pollution should be avoided at an early stage by scientific planning so that the introduction of industrial development and modern technology does not cause environmental health problems. The most important measures to reduce pollution and its risks include the following;

- It is necessary to follow the scientific planning in the establishment of any industry and not to allow the construction of industrial facilities, mining or chemical and other near the residential complex, especially the highly polluting industries, such as the cement industry and power plants.

- Permanent care and control of combustion machines in laboratories and power stations should be taken to reduce the number of pollutants discharged from them, as well as monitoring cars, means of transportation and detecting their engines periodically.
- Old heating must be replaced with other good quality either electric or high-tech in which combustion is complete.
- Develop regulations and standards concerning the maximum pollutants allowed to be present in the air, especially nearby residential areas and establish a network of monitoring pollution.
- Interest in the agriculture of trees and green spaces because they play a major role in the filtration of the air by reducing the impact of pollutants and improve the conditions surrounding the human (Victoria, 2002).

- **Noise**: There are many activities like sport, entertainment and commercial activities that can generate levels of noise ranging from being a nuisance to actually damaging people's health. Neighborhoods noise generated by air-conditioning units, stereo device and maintenance work is a common cause of complaints related to noise.

- **Visual pollution**: Visual pollution is an undesirable change in the elements of the urban environment of additions, deformations, illegal building blocks and spaces are not designed or any additional incompatible with nature or environmental climate. Some aspects of visual pollution are;

- Design buildings interfaces in different architectural styles.
- Buildings with illegal heights.
- Public pollution in roads, above sidewalks and streets.
- Sale shops are randomly spread on the sidewalk, middle of the street without consideration general taste, consistency, colors and health.
- Broken pavements, sand and waste of drilling (Jana & De, 2015).

2.8.2 Role of buildings in climate

Tall buildings have special effects and an important role in weather and environment which changing climate factors are mostly related to sunshine and wind (Hayati & Sayadi, 2012).

- **Sunshine:** Humans like to live and work near daylight. This observation implies that dwellings that are situated with good exposure to sunlight should be preferred, ceteris paribus, to dwellings with poor sunlight. Intensification of cities, however, may lead to urban canyons or other forms of overshadowing by neighboring buildings, reducing sunlight for existing dwellings. Negative externalities are therefore likely to be incurred through intensification where this process reduces sunlight exposure for neighboring sites. High buildings can help to reduce the sunshine and create misleading spaces, especially on the lower floors of buildings (Aries et al., 2015).

- **Wind flow:** The wind is often much more intense around the base of the tower. Accelerated winds near skyscrapers are caused by the downdraught effect. This happens where the air hits a building and, with nowhere else to go, is pushed up, down and around the sides. The air forced downwards increases wind speed at street level. High buildings can cause undesirable flow of polluted air in open areas, that depending on the location of the buildings and the surrounding environment (Parkinson, 2015).

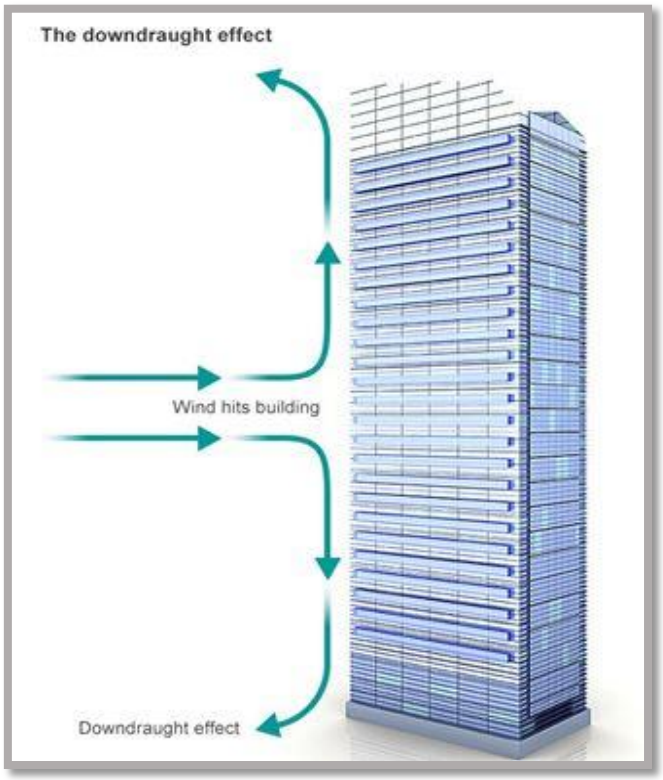

Figure 2.9: Impact of rapid wind near tall buildings (Parkinson, 2015)

2.9 Conclusion of the Chapter

This chapter explores the definition of residential tall buildings, the impact of tall buildings on residents, problems in tall buildings and it is behavior, psychological effects in tall buildings, residential neighborhood design, ideal design of residential complexes, basic elements of residential complexes, environmental impact in residential buildings. It can be concluded the consequences of living in complex residential buildings are many. The most important of these factors are social, economic status and building location, as well as increased air pollution in cities. Therefore, the appropriate principles and standards in height, landscaping and creating green space around residential buildings, appropriate distance to the other buildings, how to design them in terms of urban landscape to reduce the negative effects in buildings, create green spaces in floors and roofs of buildings are helpful to reduce environmental problems which called environmental friendly buildings. In the next chapter, the satisfaction concept of residents in tall buildings will be studied.

CHAPTER 3
SATISFACTION OF RESIDENTS IN THE TALL BUILDINGS

In order to understand the concept of '*residential satisfaction*', firstly the terms should be defined separately and afterward the concept of *housing* or *residential satisfaction* should be defined. Housing is a system composed of sub-systems like social and physical components (Francescato et al., 1989). In the previous chapter, information about residential buildings were given. In this chapter, the idea of *satisfaction of residents* or housing satisfaction will be explained with examples.

3.1 Definition of Satisfaction of Residents

Satisfaction is a process that evaluates between what is expected and what is received (Parkes et al., 2002). Satisfaction is defined as the psychological state that results from comparing the different responses to the current situation with the desired state, ambition in turn, is defined as the idealized response that praises the use of many individual personal reference frameworks to reach idealism. Satisfaction is the investigation of the personal requirements of the population to reach the goal (Potter and Cantarero, 2006).

Bechtel (1997) noted that complacency is determined by a combination of factors that include not only physical and housing characteristics but also the area and social quality surrounding it. The evaluation of residential satisfaction is an emotional state of a positive nature to the residential environment, which will lead to developing specific behavior designed to maintain it. From this side, a systematic model is proposed which considers the behavioral components that involved in residential satisfaction, using the various models found in Previous studies. Figure 3.1 shows a conceptual model of population satisfaction. Residential satisfaction, defined as the feeling of contentment when one has or achieves what one needs or desires in a house, is an important indicator and planners, architects, developers and decision-makers use it in a number of ways. Also, a host of variables belonging to housing and its environment including the socio-demographic attributes of residents exert significant influences on the level of residential satisfaction/ dissatisfaction (Mohit, 2014).

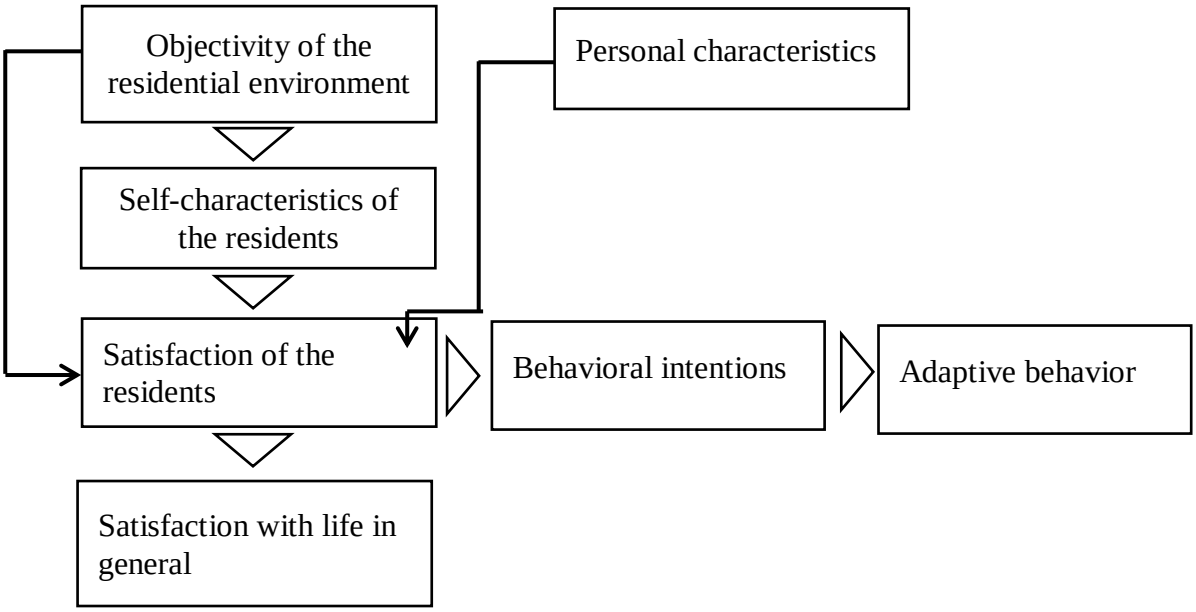

Figure 3.1: Conceptual model of residents satisfaction (Amérigo & Aragonés, 1990)

3.1.1 Indicators of satisfaction of residents

Sixsmith (1991) indicated 18 default variables related to population satisfaction as listed below.

1. Population density
2. Safety (security)
3. Facilities of the site
4. Aesthetic view (appearance)
5. Location of the site (community access)
6. Access to friends
7. Economic maintenance cost
8. The psychological comfort of the population
9. The policy of the management
10. Sense of belonging to the community
11. Perception of the population about the surrounding community
12. Sense of personal freedom (privacy)
13. Perception of neighbors
14. Residents personality (characteristics of the residents)

15. Demographic characteristics of the population
16. Behavior in public places
17. Hopes of the population for the future and investigation of suitable satisfaction with other residents.
18. Comparison of the current to the previous residence

3.1.2 The relationship between satisfaction and urban life

Urban planning has a major role in determining the quality of life in the residential complex. optimize the life quality in cities is an important factor in the satisfaction of residents with different urban characteristics, various urban characteristics such as transport, quality of public spaces, recreational opportunities, land usage patterns, population densities, construction and accessibility to reach services. As well as social features, which are considered to be an important factor affecting the quality of life. Social features include social integration, protection of public health, preservation of historical and religious buildings. Improving the quality of urban life by improving construction, social and environmental characteristics leads to more human satisfaction, more healthy communities and happiness (El Din et al., 2015).

A quality living area is the result of a balanced spatial relationship between structures, transportation facilities and open areas. The effects of open and green areas with different features, sizes, equipment's, functions and services on the quality of urban life changes depending on their characteristics (Emür and Onsekiz 2007).

3.1.3 The theories in satisfaction of residents

There are three theories in most empirical studies (Mohit et al., 2014) are based on;
1. Population needs theory
2. Residential disability theory
3. Psychological rehabilitation theory

Table 3.1: The theories adopted in the study of housing satisfaction (Mohit et al., 2014)

Researcher name	Theory	Basic elements
(Rossi, 1995)	Population needs theory	Residential needs change according to life cycle stages. The contradiction between current and desirable housing creates residential tension and dissatisfaction.
(Morris, 1978)	Residential disability theory	The contradiction between actual and personal housing standards leads to a housing deficit.
(Galster, 1985)	Psychological rehabilitation theory	The Psychological rehabilitation of residents is the reference cases of their housing situation.

Most studies have used satisfaction and dissatisfaction with one or a group of previous theories. Diaz-Serrano (2006) points out that there are three factors that determine accepted satisfaction;

1. Characteristics of the dwelling. For example, social, economic and personal factors.
2. Neighborhood properties.
3. Self-welfare factors.

As described above, the satisfaction of the residents can be described as the total value of a number of factors affecting the measurement of satisfaction. Therefore, these factors must be measured to reach the satisfaction of the residents in the residential environment.

3.2 Public Services

Services are shown in different stages according to the extent of their impact, the size and type of services they perform for the center's visitors the population. There are service centers requirements in residential centers, neighborhood centers, major city centers and regional service centers on main roads. Service facilities should be located in suitable locations and at short distances from dwellings if their residents are to be protected by providing services, through the existence of functional coordination between the supplier of services and their management and those responsible for the provision of housing (Olanrele & Thontteh, 2014).

3.3 Residential Environment

The residential environment is certain environmental characteristics whose residents can choose within cultural factors related to their way of life. This choice reflects the desire to achieve cultural ideals, values and perceptions. Housing environments are also defined as formative expressions of social and environment (Hanák et al., 2015). The residential environment consists of two elements: the surrounding environment and the social environment. Figure 3.2 shows the components of the residential environment.

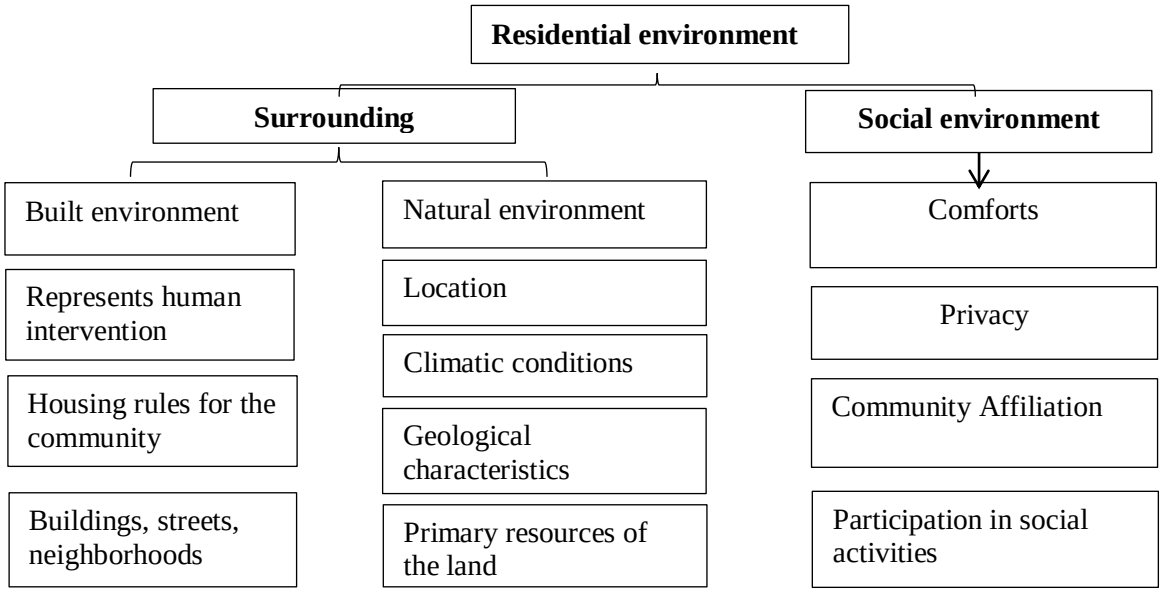

Figure 3.2: Components of the residential environment (Hanák et al., 2015)

3.4 Comparative Study in Residential Buildings

Each country has its own experience in residential tall buildings through which it has been able to adapt to the environment and living conditions in order to build a better society that meets the needs of its population. This is not a time matter, but growth and development through a long chain based on the study of sustainable and renewable reality according to developments.

3.4.1 Tampines city, Singapore

Tampin is a city in Singapore and has won the United Nations' award for new cities and was built on several stages in 1980. Tampin is located in eastern Singapore and covers an area of about 1078 hectares and is surrounded by extended streets. Tampin was formerly a land of waste used as sand quarries and places to collect waste and spread agricultural houses and houses in a random way (Seik, 2001).

Tampin has planned a pyramid system with nine neighborhoods comprising 5000-6000 housing units covering an area of 80-100 hectares. Within the neighborhood is a center of shops and markets that cater to the daily needs of the population. This center is located at the intersection of two main streets and 10 minutes away from all the apartments. Access to all other services is easy and easy to walk such as schools, parks, playgrounds and bus stations. Each neighborhood consists of 8-12 residential groups, each with 4-8 residential blocks. It is located around the center of the group, which is an open space that includes small playgrounds, enhances the people's acquaintance and facilitates communication and understanding. The center includes some basic activities such as small shops and childcare centers, these residential groups are connected to each other through pedestrian corridors up to the neighborhood center. Figure 3.3 shows the residential neighborhood in Tampin. The residential neighborhood contains children's play areas, a fitness corner and sidewalk, while seats and chairs are designed to be proper with garden design. Figure 3.4 shows the recreation areas in Tampin.

Figure 3.3: Residential Neighborhood in Tampin (Urban Redevelopment Authority, 2014)

Figure 3.4: Recreation areas of residential buildings in Tampin (Urban Redevelopment Authority, 2014)

The study concluded that the principle of comprehensive planning to create sustainable communities and cities based on self-sufficiency in terms of providing workplaces, recreational, learning, living and all necessary services are compatible with the needs of many people.

3.4.2 Bahcesehir collective house, Istanbul

Bahcesehir collective house project located on the European side of Istanbul (Figure 3.5).

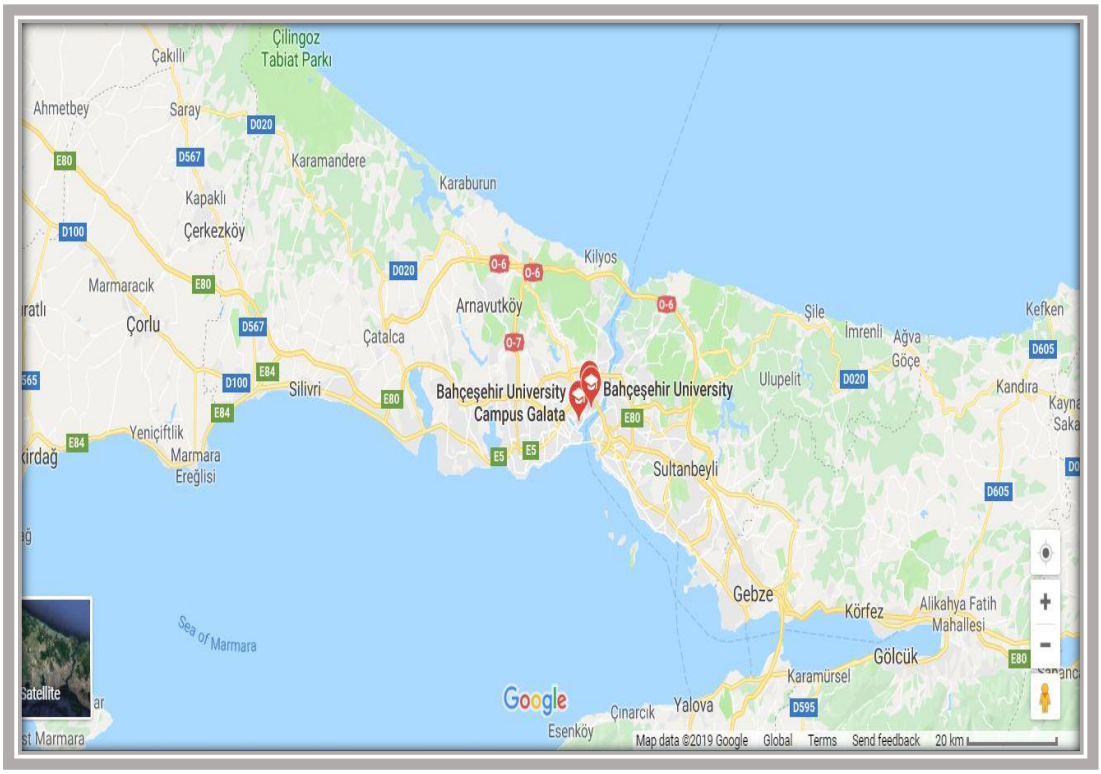

Figure 3.5: Istanbul map (Google Earth, 2019)

In 1997, 400 questionnaires were given to families in Bahcesehir collective house area, 73 (18%) were done in single-family separate residences (Figure 3.6) and 327 (82%) of these were done in multi-family residences (Figure 3.7 and Figure 3.8).

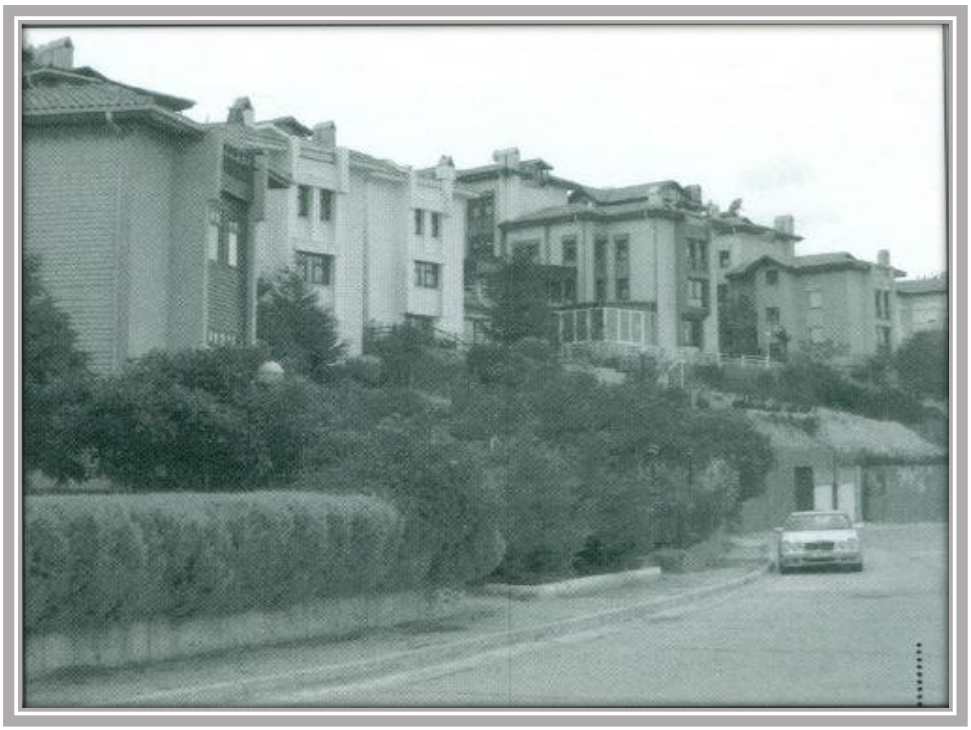

Figure 3.6: Low-density hosing (Berköz & Kellekçi, 2007)

Figure 3.7: Multi-family residence (Berköz & Kellekçi, 2007)

Figure 3.8: High-rise residence (Berköz & Kellekçi, 2007)

The study discusses the importance of evaluating the satisfaction of residents with housing and the residential environment to achieve expectations, goals and needs. The quality of residence and the environment affects the public life of people. If the residents are satisfied with their housing and residence in their environment this affects their mental and physical health. That the knowledge of these variables helps in the development of standards for the design of residential environments (Berköz & Kellekçi, 2007).

3.5 Conclusion of The Chapter

This chapter discusses determining the resident's expectations about their shelter, environment and evaluating their satisfaction. The study showed that not only the quality of housing is important but also the environment as the residential environment also constitutes social and economic factors. The previous studies focused on multiple works that determine the satisfaction of the residents including the characteristics of the residential unit, characteristics of the site, neighborhood and the services. These factors may have obligated the residents to move from place to another place.

CHAPTER 4
CASE STUDY OF BAGHDAD CITY, IRAQ

The Abbasid Caliph Al-Mansur decided to establish a new capital for the Abbasid Empire. That capital was the city of peace (Baghdad) which planned to be a circular city, to function as an impenetrable fortress and duration of construction took four years. The city represented the classical Islamic image. Baghdad consisted of a central mosque and caliph's palace, market, and residential neighborhood (Figure 4.1). Al-Mansur choose suitable land for agriculture to the left of the Tigris River and close to the Euphrates. The city has four equal doors in the distance from each other, with roads leading to the city center. The Kufa Gate in the southwest, the Basra Gate in the south-east and the Sarat Canal, which formed an essential part of the water network, withdraw water from the Euphrates to the Tigris. The Sham Gate in the north-west leads to Anbar and the desert towards Syria. In the north-east is the Khorasan Gate, which leads to boats in the Tigris River.

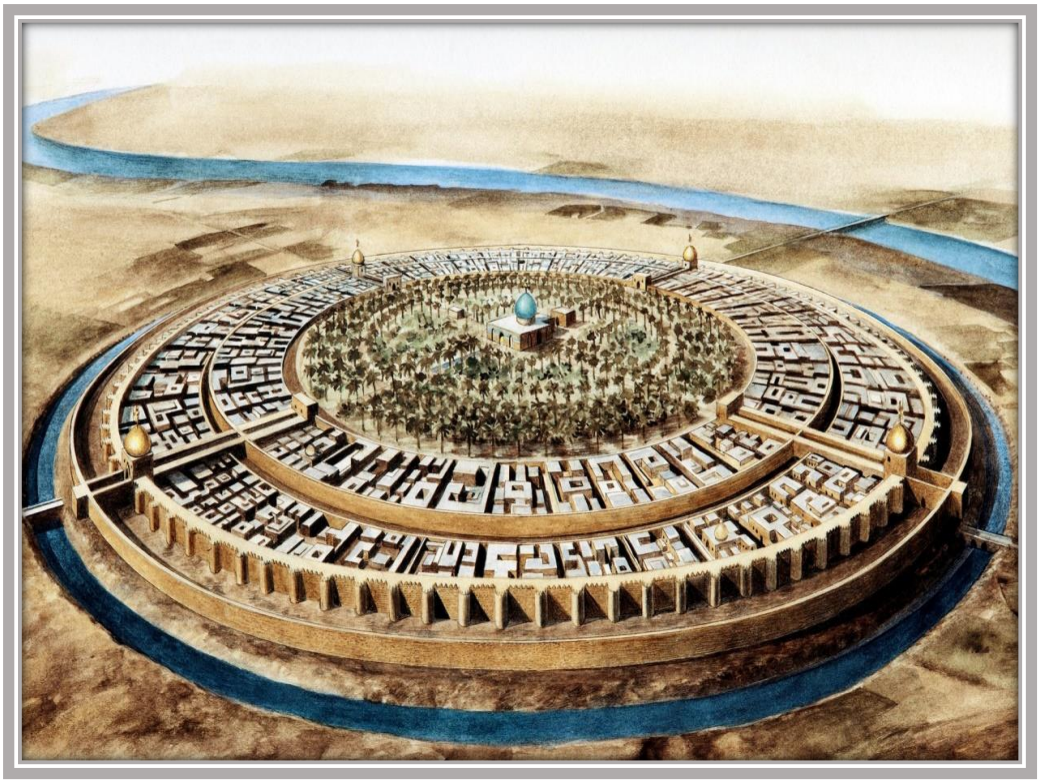

Figure 4.1: Round city of Baghdad (Al-Gburi, 2016)

4.1 Location of Baghdad

Baghdad is located in the northern regions of Iraq on latitude 33.34, longitude 44.40 and 41 meters above sea level. Baghdad is surrounded by the Tigris and Euphrates rivers. It is the largest city in Iraq and one of the most populated urban complexes in the Middle East. (Baghdad Archived, 2016).

Figure 4.2: Location of Baghdad on the map (World Atlas, 2019)

4.2 Water Resources

Baghdad is located on both sides of Tigris River in addition to many canals and ponds within the city. Tigris River has great importance for Baghdad especially that the city is within the hot zone, these features could help improvement to the climate of the surrounding areas. The Tigris River which passes through all the city provides beautiful views that could be invested for many activities (Akram & Al-Akkam, 2012). The current situation is different and there is a lack of recreational areas and paths along the river (Figure 4.3).

Figure 4.3: Riverfront, Baghdad (Ziada, 4.7.2018)

4.3 Climate of Baghdad

Baghdad is located in the hot zone. Summer is hot and dry with the average daily temperature between (32-48)°C. While humidity is low (10-50%) and the temperature declines at night by (26)°C or more. Winter is cool and wet with an average temperature of (9-20)°C. Spring and fall are acceptable but too short. Figure 4.4 shows the average monthly temperature and precipitation.

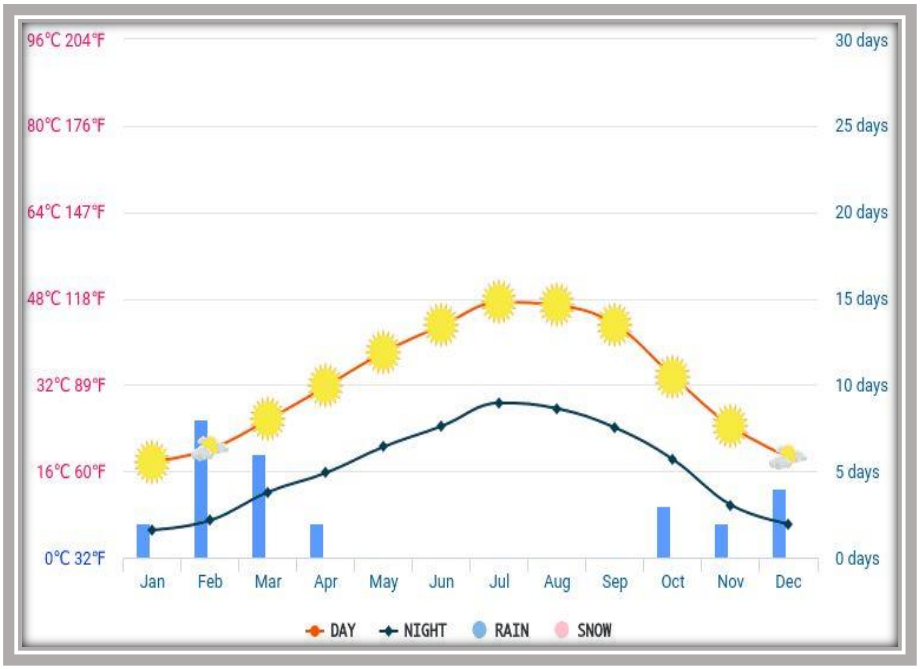

Figure 4.4: The average monthly temperature and precipitation in Baghdad (Baghdad Iraq weather, 2019)

4.4 Modern Architecture Planning of Baghdad City

Baghdad city has begun major revolutionary achievements and innovations that changed the impacts of tall buildings and the presence of modern architecture in Baghdad, all stages of the development and architectural styles throughout history. As Iraqi academics and architects have been influenced by modernity in the west during their studies and write what they saw and publish as well as economic developments and social changes contributed to the creation of a new environment reflected on the urban society. Baghdad city has seen multiple stages in the growth and development has a response to urban and planning changes due to economic, social and political factors, which have been reflected its society and land use. These phases include;

- The land uses were connected with the presence of commercial areas often concentrated in the city center. Residential use represents the largest proportion of urban uses, there was no modern architecture at this stage.

- This stage saw the transformation of the city of Baghdad from the semi-circular growth to the longitudinal axis of the extension work of the Tigris River and the networked

system of streets began to show the developments that led to architectural and planning optimization. Figure 4.5 showing residential complexes and the Tigris river.

Figure 4.5: Residential complexes and Tigris river (The media express, 2018)

- This critical period expressed ideas for Iraqi architects who studied outside Iraq and came with high quality of western and American architecture and they designed the modern infrastructure of the city including commercial, governmental facilities. (Salman, 2014).

- Western architects came up with new different ideas of modern urban planning when they came to Baghdad. In that period their designation was characterized by multi-floors buildings, long lines and harmonic exterior interface. In results, this duration showed the rapid development of residential tall buildings. Table 4.1 shows the local and foreign influence in Baghdad planning.

Table 4.1: Local and foreign influence in terms of architecture, economy and planning (Khudair & Nasser 2010)

Iraqi influence in Baghdad	Foreign influence in Baghdad	The Effect
Use mix heritage materials in building interfaces	Reproduction of modern architecture in the west and implement it in Baghdad	Architecturally
Achieve economic progress	The dominance of foreign capitalism over the capabilities of economic development	Economically
Interest in residential complexes planning	Characterized by design multi-floors buildings and harmonic exterior interfaces	Planning

4.5 Vertical Housing in Iraq

The vertical housing idea has applied when the government started to find a solution for the housing shortage problem and provide suitable housing for all Iraqi citizens. The municipal authorities provided a new procedure to solve that problem and give the priority for foreign and local investments focusing on the vertical housing system.

- **Types of vertical housing in Baghdad**

Vertical housing is a modern pattern that has begun to spread in most countries of the world because of its advantages, which are different from horizontal housing as the following;

1. Low-floor housing (0-5 floors): It is the most typically used in the country, consisting of three or four floors and often does not require elevators as Al-Salam residential neighborhood (Al-Tikriti, 1982).

Figure 4.6: Al-Salam residential neighborhood in Baghdad (Al Salam Residential Group, 2017)

2. Multi-floors buildings (above 5 floors): This form began to spread not only in Iraq but in many countries of the world and consists of eight floors and above. These tall buildings require some necessary requirements such as elevators, privacy, safety and services. For example, Haifa Street complex in Baghdad that shown in Figure 4.7.

Figure 4.7: Haifa Street complex in Baghdad (Alobaidy, 2017)

- **Population statistics in Iraq**

The population of Iraq exceeded 38 million people in 2018, an increase of about one million people from 2017. The highest concentration of population in Baghdad province about 8 million by 21% of the total population of the provinces. Iraq in general and Baghdad in particular suffer from the housing crisis as the crisis was growth by the shortage of housing units and the large population growth as well as the large numbers of units that need to change due to poor condition. The Statistics Office expects the country's population to reach 64 million by 2030. Where the need is estimated (428862) housing units in the country (The Ministry of Construction and Housing, 2018).

- **Geographical distribution of vertical housing in Baghdad**

Through the distribution of residential tall buildings in the districts of Baghdad, it notes from the table 4.2 that the number of residential tall buildings and their proportion in comparison with the districts of Baghdad Governorate in 2016, the proportion of residential vertical type in Baghdad is (15.38%).

Table 4.2: The number of residential buildings in districts of Baghdad (Ministry of planning, Iraq, 2016).

The districts	Number of residential buildings	Percentage
Rusafa	8564	3.45
Al Aedmah	3419	1.97
Al Sadr 1	1312	1.95
Al Sadr 2	1079	2.00
Karkh	6071	2.54
Al kadmah	2108	1.63
Mahmoudiyah	508	0.58
Abu Ghraib	378	0.67
Tarmiyah	108	0.35
Al mdaen	186	0.24
Total in Baghdad	**23733**	**15.38 %**

4.6 The Main Causes of the Housing Problem

- Economic: Low salaries, high prices of residential land, ignore the role of urban planning, lack of resources, poor administrative and organizational supervision in the private housing sector and high dependence on the public sector in providing housing.

- Housing plans: The increase in population leads to the need for more housing units, failure to implement the requirements of any plan or project leads to increased housing demand.

- Population growth: Iraq is one of the fastest growing countries with an annual growth rate of 3%. This means that the population is increasing. It will double by 64 million by 2030 if this rate continues to rise (Ministry of Planning 2016).

The population of Iraq in 2018 about (38) million people, (8) million of them were in Baghdad. Figure 4.8 shows the increase in the population of Baghdad since the middle of the last century, the first census of Baghdad in 1947 was 817205 people, until 2018 was (8) million people.

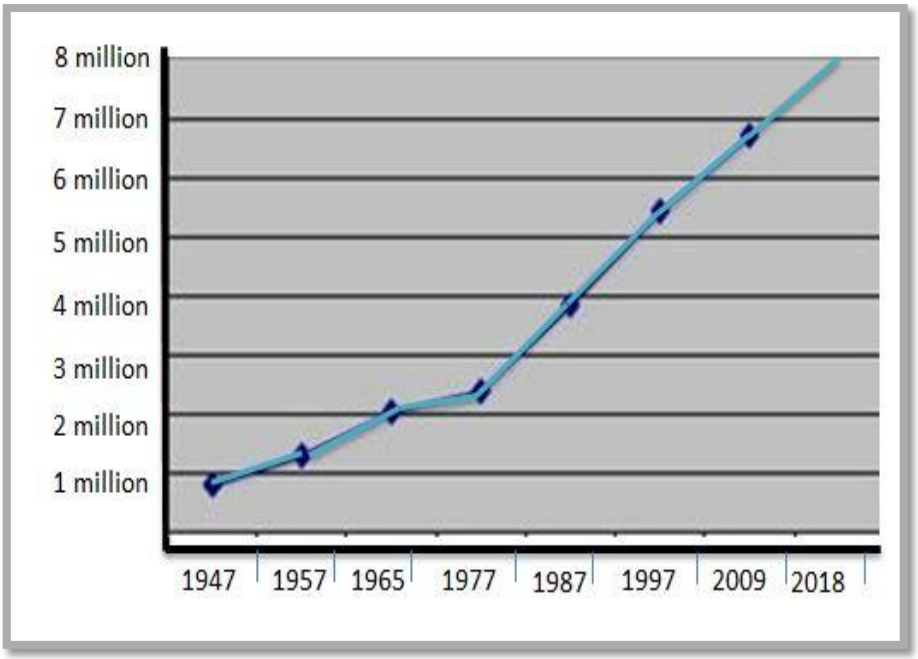

Figure 4.8: Population increase in Baghdad

4.7 The Study Area (Bismayah city)

Bismayah city the first and the largest development project in the history of Iraq, where Bismayah city located to the south-east of Baghdad city and lies about 10 km from the city on the international road connects between Baghdad, Cote. Its area is (1.830) hectares, it accommodates about 600,000 people and the total number of housing are 100,000 units, it has about 835 residential buildings (Figure 4.9).

Figure 4.9: Bismayah city Location (Hanwha Engineering & Construction, 2014)

4.7.1 Site plan of Bismayah city

Bismayah city consists of eight residential neighborhoods each district divided into sectors and contains each sector contains 1400 housing units, including schools, police station and medical clinic (Figure 4.10). Each of these buildings consists of ten floors comprising 120 apartments.

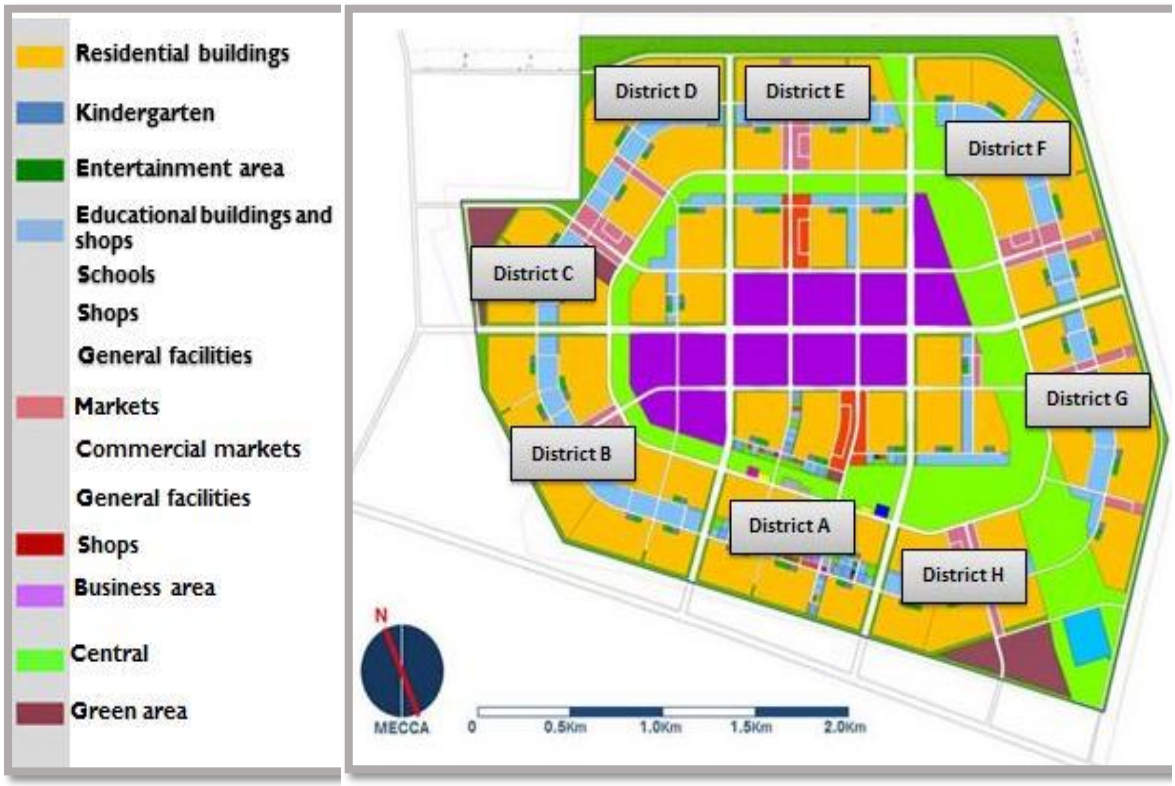

Figure 4.10: Distribution of district in Bismayah city (National housing program, 2015)

4.7.2 Design of Residential Buildings

Residential buildings are designed as (U) shaped (Figure 4.11). It has two entrances, one from the front face of the building and the other from the back side of the building (Figure 4.12). It has ten floors each floor containing 12 apartments distributed (1-6) on the right side (7-12) on the left side. As well it has four elevators, in addition to the emergency stairs placed in the corners of the building.

Figure 4.11: Residential buildings design (National housing program, 2015)

Figure 4.12: The entrances of residential buildings (Ziada, 7.8.2018)

4.7.3 Design of the housing units

Each building has 12 floors and each floor contains 12 apartments, (8) apartments of (100 m^2), (2) apartments corner building area (120 m^2), (2) apartments corner building area (140 m^2). The apartments are designed according to two models which are traditional style and modern style.

1. Traditional style

The traditional style is focused on the design of public areas separate from the private areas, to be the living room independent of the bedrooms Figure 4.13 show the plan and perspective of this style housing.

Figure 4.13: Design the housing units, traditional style (National housing program, 2015)

2. The modern style

The modern style is designed for families who prefer a modern style of accommodation, where the living room interacts with the kitchen in order to exploit the area in a wider manner, thus enhancing its functions as a central area that interacts easily with the rest of the rooms Figure 4.14 shows the plan and perspective of this style of housing.

Figure 4.14: Design of the housing units, modern style (National housing program, 2015)

4.8 Questionnaire design

The questionnaire is designed as described in Appendix 2 which includes the following;

- General information about the residents.
- Questions related to the Satisfaction of the residents about the residential unit and its spaces.
- Questions related to the Satisfaction of the residents about the public services of the neighborhood.
- Questions related to the Satisfaction of the residents about the Social environment and psychological behavior.

Data collection took three tours, it began with field observation of study area then questionnaire was distributed to 120 apartments from one sector from the district (A). After two weeks the opinion was collected from residents. Finally, the statistical package for the social sciences (SPSS) program was used to extract the results and draw the required charts.

4.9 Survey

The number of housing units in the district **(A)** are 14.280 units. One sector was chosen from the district **(A)** where the number of housing units in the sector is 1200 apartments (Figure 4.15).

Figure 4.15: District (A) in Bismayah city (National housing program, 2015)

4.9.1 Family characteristics

The results of the frequency of the sample research were shown with regard to;

- **Gender**

The highest proportion of them was male 61.7% while 38.3% of them were females. Table 4.3 shows the population of the research sample with regard to gender-specific. Figure 4.16 shows the percentage of the population of the research sample with regard to gender.

Table 4.3: Population of the research sample that is related to gender

		Frequency	Percent
Valid	Male	74	61.7
	Female	46	38.3
	Total	120	100.0

After studying Table 4.3 it was found that the highest percentage was male which is 61.7% and then female 38.3%.

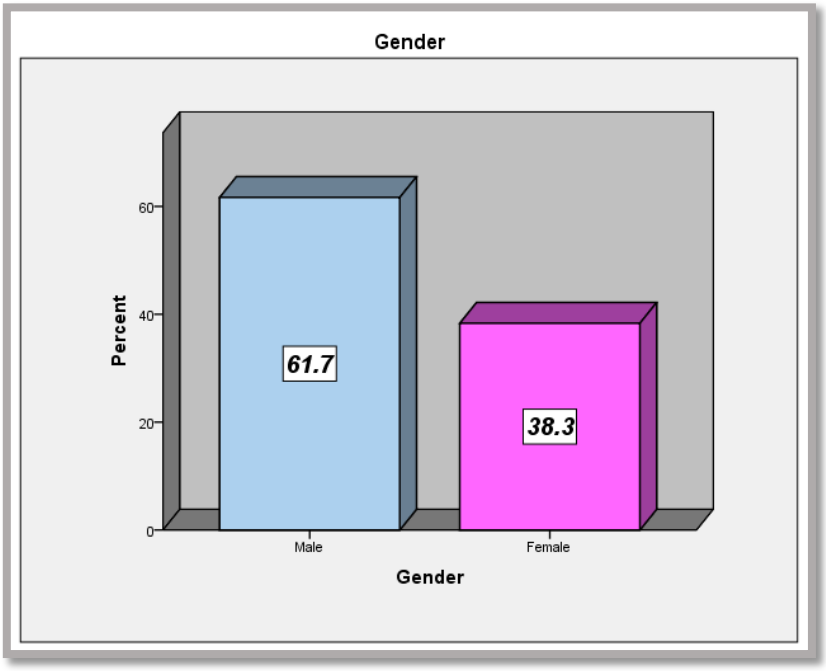

Figure 4.16: Family characteristics with respect to gender

- **Age**

The highest proportion of them were 31.7% ranging in age 31-40, 29.2% of the age between 20-30, 22.5% of them aged between 41-50, 13.3% of them aged between 51-60, 3.3% of them aged above 61. Table 4.4 shows the population of the research sample with regard to age. Figure 4.17 shows the percentage of the population of the research sample with regard to age.

Table 4.4: Population of the research sample that is related to age

		Frequency	Percent
Valid	20-30	35	29.2
	31-40	38	31.7
	41-50	27	22.5
	51-60	16	13.3
	above 61	4	3.3
	Total	120	100.0

After studying Table 4.4 it was found that the highest percentage was 31.7% their ages were between 31-40, where the lowest proportion is 3.3% and their ages were above 61.

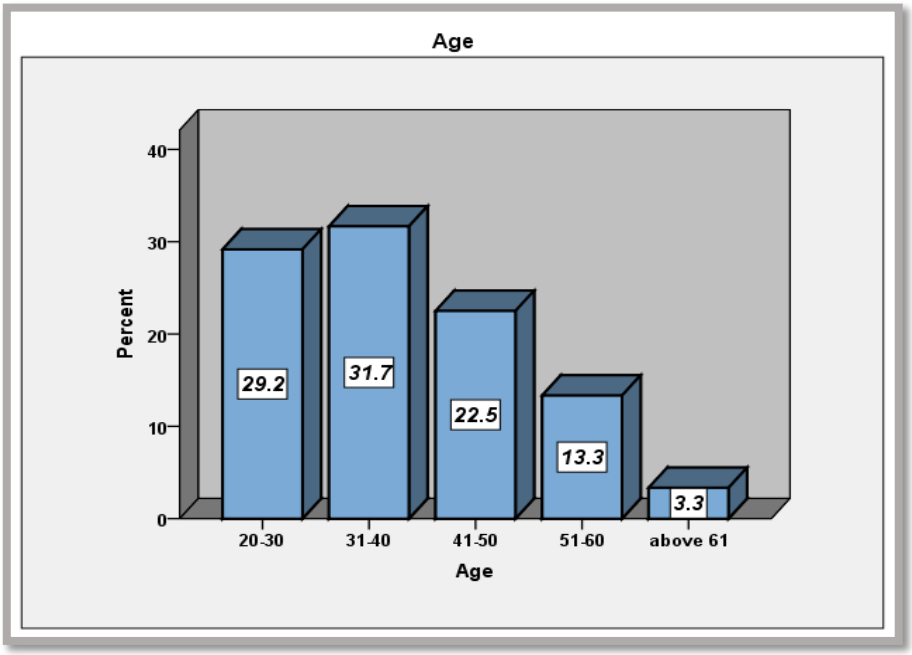

Figure 4.17: Family characteristics with regard to age

- **Certificate obtained**

The highest proportion of them were 48.3% who are B.A Graduates, 17.5% of them institutes graduates, 26.7% of the high school graduates, 5.8% of them master graduates, 1.7% of the Ph.D. graduates. Table 4.5 shows the population of the research sample with regard to a certificate obtained. Figure 4.18 shows the percentage of the population of the research sample with regard to a certificate obtained.

Table 4.5: Population of the research sample that is related to educational qualifications

		Frequency	Percent
Valid	Institutes	21	17.5
	High school	32	26.7
	B.A	58	48.3
	M.A	7	5.8
	Ph.D.	2	1.7
	Total	120	100.0

After studying Table 4.5 it was found that the highest percentage was 48.3% who are bachelor's graduates, where the lowest proportion of them is 1.7% who are Ph.D. graduates

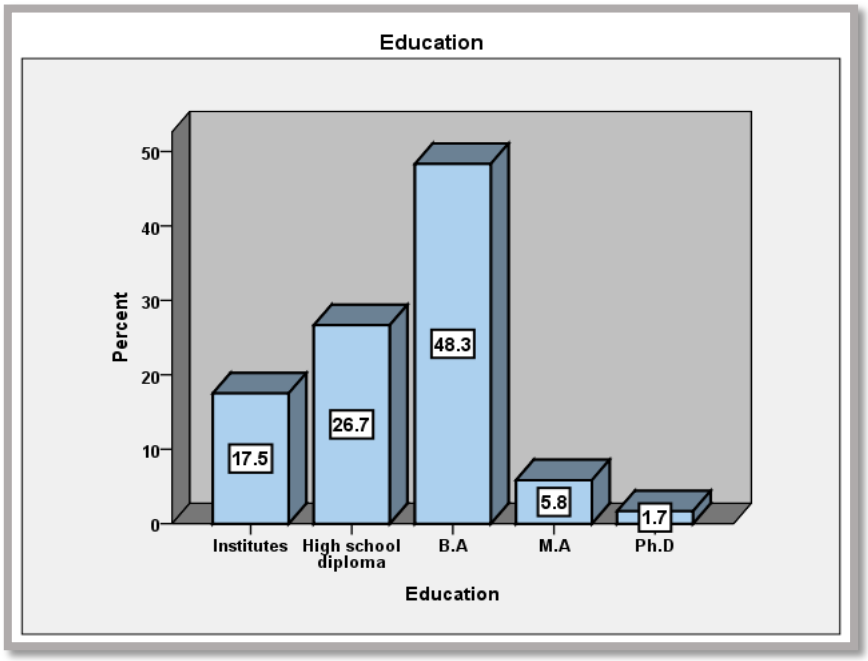

Figure 4.18: Family characteristics with respect to educational qualifications

4.9.2 Satisfaction of the residents about the residential environment

- **Location for Baghdad city center**

The results showed that the highest proportion of the population is 61.7% were not satisfied with the location of the residential complex for the city of Baghdad. 22.5% of the residents were satisfied, 15.8% were neutral. Table 4.6 shows the statistics of the population research sample in terms of location. Figure 4.19 shows the graph for resident satisfaction about location.

Table 4.6: Statistical table of the population for resident satisfaction about location

		Frequency	Percent
Valid	Satisfied	27	22.5
	Neutral	19	15.8
	Not satisfied	74	61.7
	Total	120	100.0

After studying Table 4.6 it was found that the highest percentage of population 61.7% they were not satisfied with the location, where the lowest proportion of the population 15.8% were neutral with the location. It can be said the residential complex far from the center of Baghdad which led to the difficulty of access to the city center, especially in times of work.

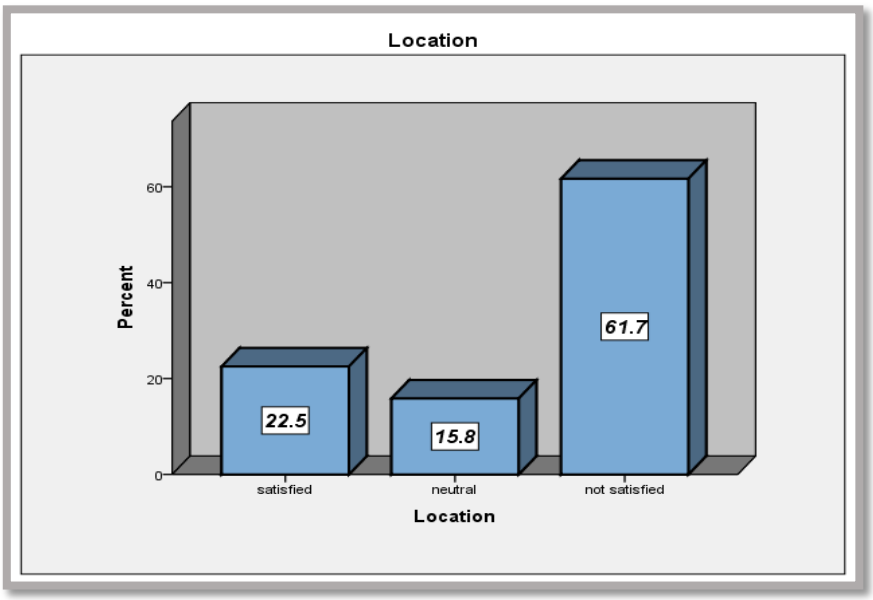

Figure 4.19: Graph for resident satisfaction about location

- **Entrance to the building**

The results showed that the highest proportion of the population 55.8% were not satisfied, 39.2% of the population were satisfied 5% of them were neutral, with the entrance to the building. Table 4.7 shows the statistics of the population research sample in terms of the entrance. Figure 4.20 shows the graph for resident satisfaction about the entrance.

Table 4.7: Statistical table of the population for resident satisfaction about the entrance

		Frequency	Percent
Valid	Satisfied	47	39.2
	Neutral	6	5.0
	Not satisfied	67	55.8
	Total	120	100.0

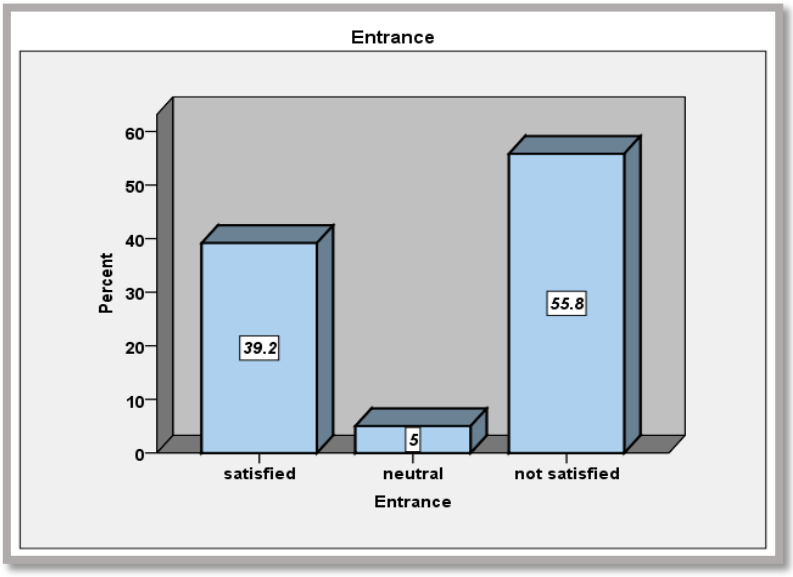

Figure 4.20: Graph for resident satisfaction about the entrance

After studying Table 4.7 it was found that the highest percentage of the population (55.8%) were not satisfied, where the lowest proportion of the population (5%) were neutral with the entrance to the building. It can be said the distance between the entrance to the building and the corridor leading to the apartments located in the corner of the building, which needs to walk a long distance to get to the apartment (Figure 4.21).

Figure 4.21: Entrance to the building (Ziada, 7.8.2018)

- **The corridor between the apartments**

The results showed that the highest proportion 47.5% of the residents were not satisfied, 40.8% of the residents were satisfied, 11.7% were neutral, with the corridor between the apartments. Table 4.8 shows statistics of the population research sample in terms of the corridor between the apartments. Figure 4.22 shows the graph for resident satisfaction about the corridor between the apartments.

Table 4.8: Statistical table of the population for resident satisfaction about the corridor

		Frequency	Percent
Valid	Satisfied	49	40.8
	Neutral	14	11.7
	Not satisfied	57	47.5
	Total	120	100.0

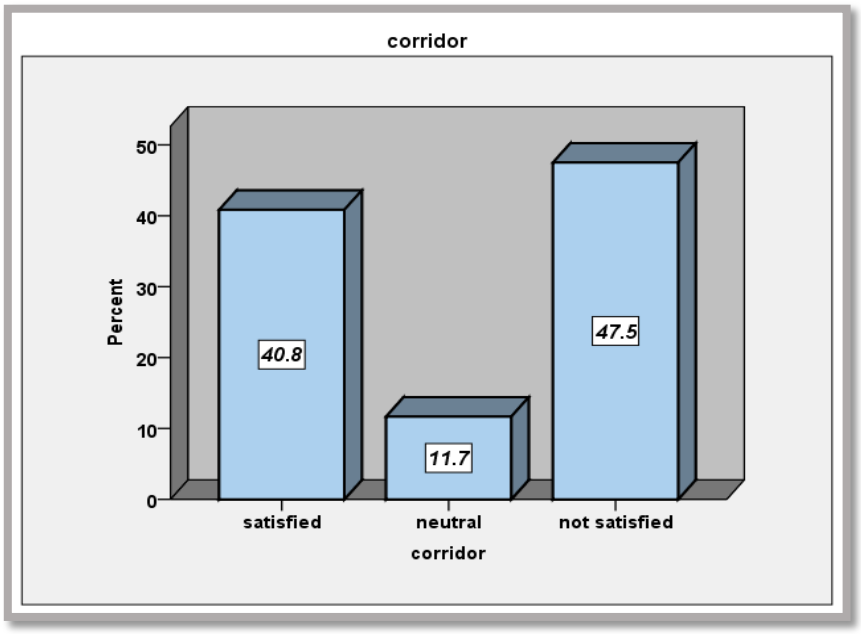

Figure 4.22: Graph for resident satisfaction about the corridor

After studying the table above it was found that the highest percentage of the population was 47.5% were not satisfied, where the lowest proportion of the population 11.7% were neutral with the corridor between the apartments. It can be said the corridors between the apartments are very small and unsafe because of the low wall around them where two families cannot walk through it (Figure 4.23).

Figure 4.23: The corridor between the apartments (Ziada, 7.8.2018)

- **The Noise**

The results showed that the highest proportion 54.2% of the residents were satisfied, 18.3% were neutral, 27.5% were not satisfied with the noise. Table 4.9 shows statistics of the population research sample in terms of noise Figure 4.24 shows the graph for resident satisfaction about the noise.

Table 4.9: Statistical table of the population for resident satisfaction about the noise

		Frequency	Percent
Valid	Satisfied	65	54.2
	Neutral	22	18.3
	Not satisfied	33	27.5
	Total	120	100.0

After studying Table 4.9 it was found that the highest percentage of population 54.2% were satisfied, where the lowest proportion of the population 18.3% were neutral with the noise.

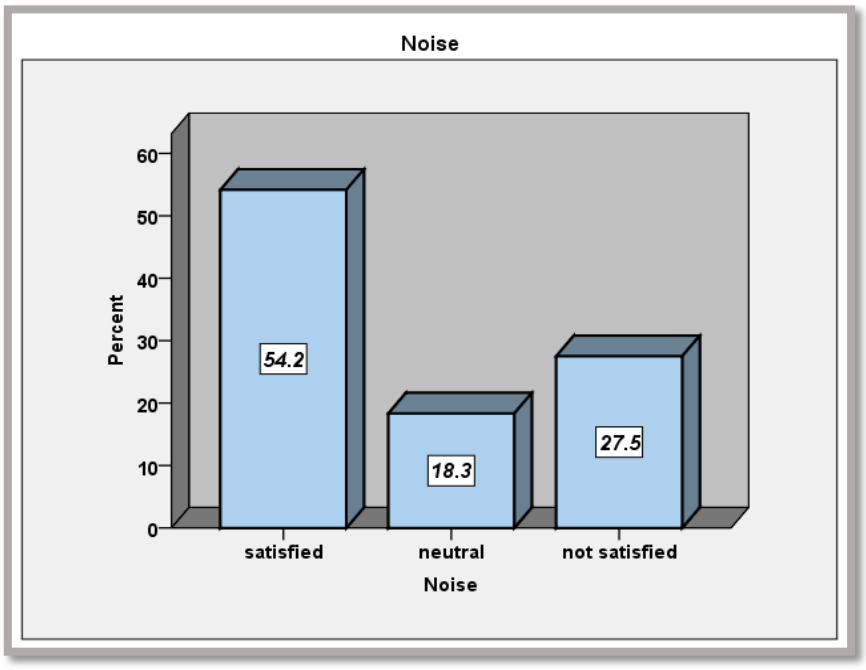

Figure 4.24: Graph for resident satisfaction about the noise

It can be said the noise depends on the culture of people and the community surrounding the residential unit.

- **Visual pollution surrounding the residential area**

The results showed that the highest proportion 63.3% of the residents were not satisfied, 24.2% were satisfied, 12.5% were neutral with the visual pollution surrounding the residential area. Table 4.10 shows the statistics of the population research sample in terms of visual pollution. Figure 4.25 shows the graph for resident satisfaction with visual pollution.

Table 4.10: Statistical table of the population for resident satisfaction about the visual pollution surrounding the residential area

		Frequency	Percent
Valid	Satisfied	29	24.2
	Neutral	15	12.5
	Not satisfied	76	63.3
	Total	120	100.0

After studying Table 4.10 it was found that the highest percentage of the population was not satisfied 63.3%, where the lowest proportion of the population was neutral 12.5%.

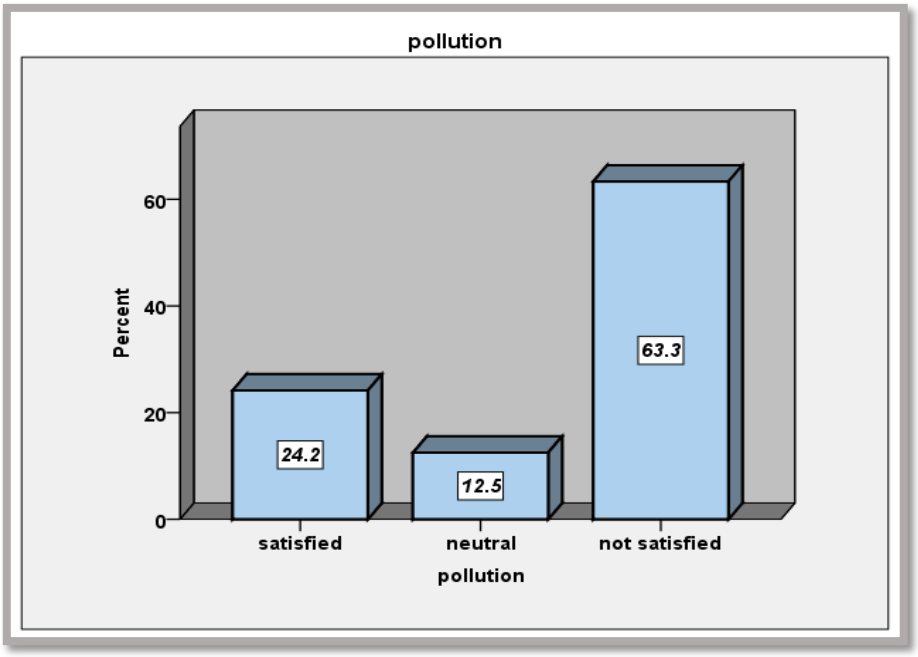

Figure 4.25: Graph for resident satisfaction about the visual pollution surrounding the residential area

It can be said that the residential complex is located on an international road (Baghdad – cout) province. There are a lot of abandoned places and industrial places on both sides of the street which have become places for repairing cars, trucks and garbage collection (Figure 4.26).

(A) International road

(B) Abandoned places

Figure 4.26: The visual pollution surrounding the residential area (Ziada, 7.8.2018)

- **Air pollution**

The results showed that the highest proportion 80.8% of the residents were satisfied, 4.2% were neutral, 15% were not satisfied with the air pollution surrounding the residential area. Table 4.11 shows the statistics of the population research sample in terms of air pollution. Figure 4.27 shows the graph for resident satisfaction with air pollution.

Table 4.11: Statistical table of the population for resident satisfaction about the air pollution surrounding the residential area

		Frequency	Percent
Valid	Satisfied	97	80.8
	Neutral	5	4.2
	Not satisfied	18	15.0
	Total	120	100.0

After studying Table 4.11 it was found that the highest percentage of the population were satisfied 80.8%, where the lowest proportion of the population was neutral 4.2%.

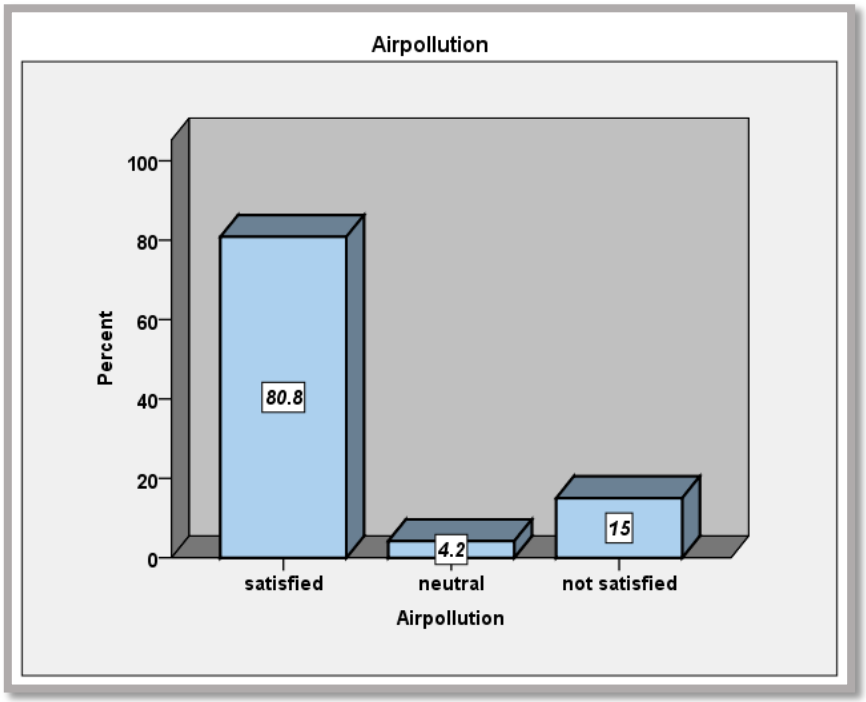

Figure 4.27: Graph for resident satisfaction about the air pollution surrounding the residential area

4.9.3 Satisfaction of the residents about the public services

- **Commercial services**

The results showed that the highest proportion 61.7% of the residents were not satisfied, 30.8% were satisfied, 7.5% neutral with the commercial services. Table 4.12 shows the statistics of the population research sample in terms of commercial services. Figure 4.28 shows the graph for resident satisfaction about the commercial services.

Table 4.12: Statistical table of the population research sample in terms of commercial services

		Frequency	Percent
Valid	Satisfied	37	30.8
	Neutral	9	7.5
	Not satisfied	74	61.7
	Total	120	100.0

After studying Table 4.12 it was found that the highest percentage of the population was not satisfied 61.7%, where the lowest proportion of the population was neutral 7.5%.

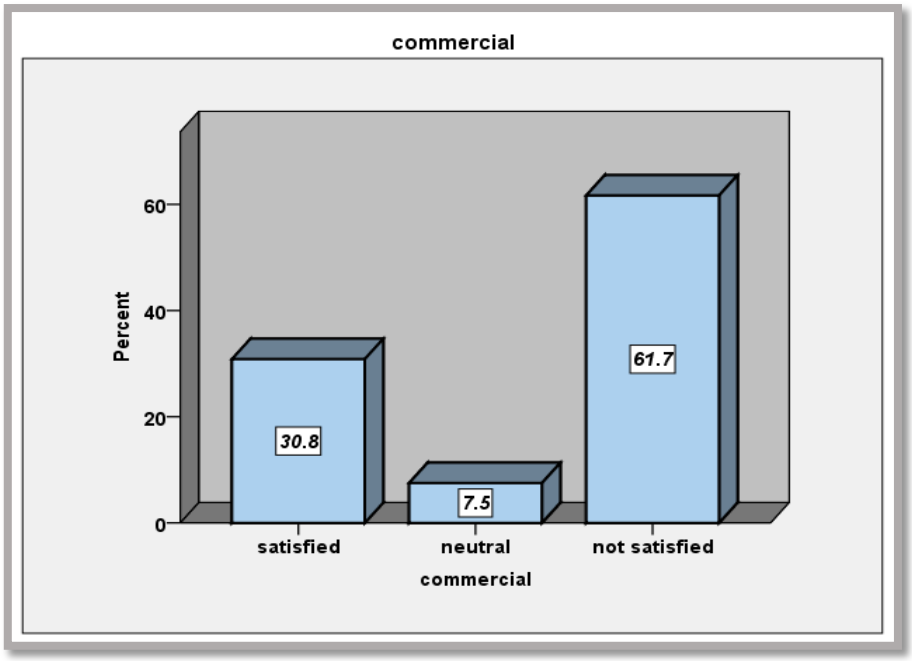

Figure 4.28: Graph for resident satisfaction about the commercial services

- **Educational services**

The results showed that 95% of the residents were satisfied, 5% were neutral with the educational services. Table 4.13 shows the statistics of the population research sample in terms of educational services. Figure 4.29 shows the graph for resident satisfaction about the educational services.

Table 4.13: Statistical table of the population research sample in terms of educational services

		Frequency	Percent
Valid	Satisfied	114	95.0
	Neutral	6	5.0
	Total	120	100.0

After studying the table above it was found that the highest percentage of the population were satisfied 95%, where the lowest proportion of the population was neutral 5%.

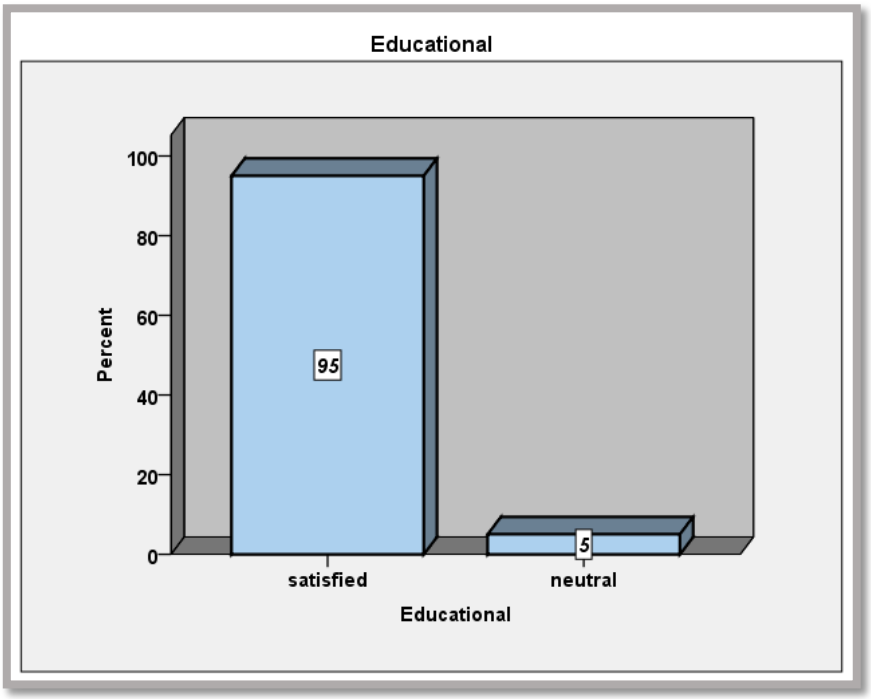

Figure 4.29: Graph for resident satisfaction about the educational services

- **Recreational services**

The results showed that 56.7% of the residents were not satisfied, 37.5% were satisfied, 5.8% were neutral with the recreational services. Table 4.14 shows the statistics of the population research sample in terms of recreational services. Figure 4.30 shows the graph for resident satisfaction about the recreational services.

Table 4.14: Statistical table of the population research sample in terms of recreational services

		Frequency	Percent
Valid	Satisfied	45	37.5
	Neutral	7	5.8
	Not satisfied	68	56.7
	Total	120	100.0

After studying Table 4.14 it was found that the highest percentage of the population was not satisfied 56.7%, where the lowest proportion of the population was neutral 37.5% with the recreational services.

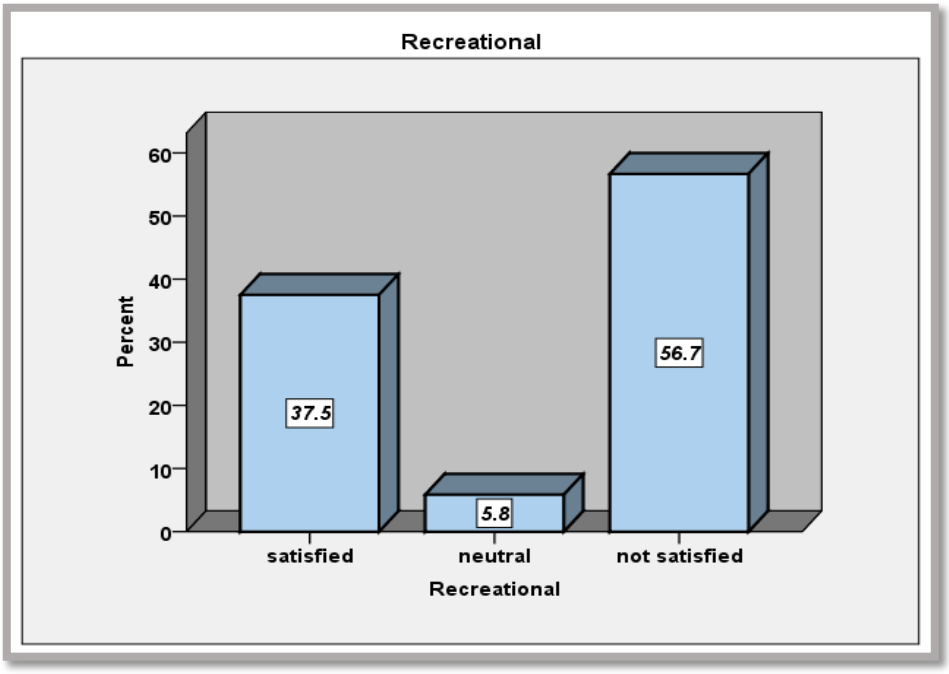

Figure 4.30: Graph for resident satisfaction about the recreational services

It can be said the recreation areas and playgrounds are very close to the streets within the residential complex and lead residents to accidents (Figure 4.31).

Figure 4.31: The recreation areas and playgrounds (Ziada, 7.8.2018)

- **Places to sit in green areas**

The results showed that 76.7% of the residents were not satisfied, 15% were satisfied, 8.3% were neutral with the places to sit in green areas. Table 4.15 shows the statistics of the population research sample in terms of green areas. Figure 4.32 shows the graph for resident satisfaction about the green areas.

Table 4.15: Statistical table of the population research sample in terms of green areas

		Frequency	Percent
Valid	Satisfied	18	15.0
	Neutral	10	8.3
	Not satisfied	92	76.7
	Total	120	100.0

After studying Table 4.15 it was found that the highest percentage of the population was not satisfied 76.7%, where the lowest proportion of the population was neutral 8.3% with the recreational services.

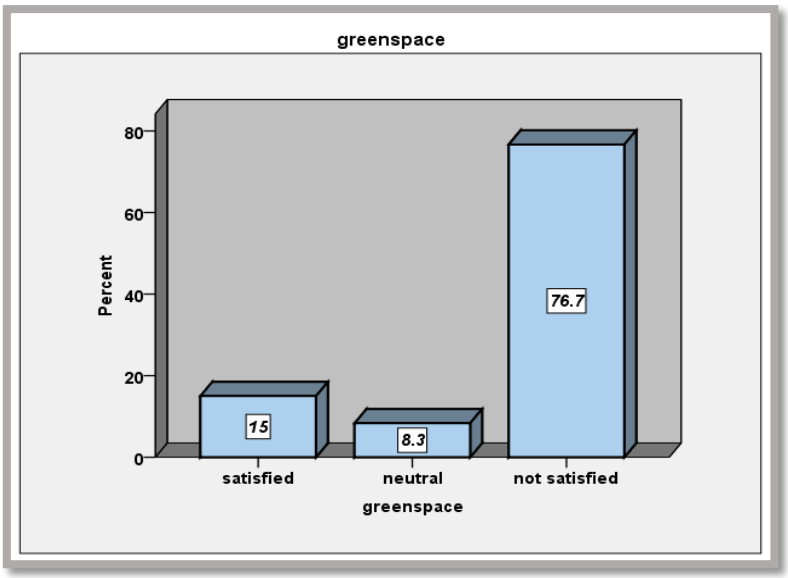

Figure 4.32: Graph for resident satisfaction about the green areas

It can be said the places of sitting in the green areas are very few, forcing the population and the aged in particular to bring seats with them. Where there is no place to gather residents of buildings away from housing units, which leads to the gathering near the units and lead to noises issues (Figure 4.33).

Figure 4.33: Green places for the population gathering (Ziada, 7.8.2018)

- **Waste collection sites**

The results showed that 71.7% of the residents were satisfied, 2.5% were neutral, 25.8% were not satisfied with waste collection sites. Table 4.16 shows the statistics of the population research sample in terms of waste collection sites. Figure 4.34 shows the graph for resident satisfaction with waste collection sites.

Table 4.16: Statistical table of the population research sample in terms of waste collection sites

		Frequency	Percent
Valid	Satisfied	86	71.7
	Neutral	3	2.5
	Not satisfied	31	25.8
	Total	120	100.0

After studying the table above it was found that the highest percentage of the population were satisfied 71.7%, where the lowest proportion of the population was neutral 2.5% with waste collection sites.

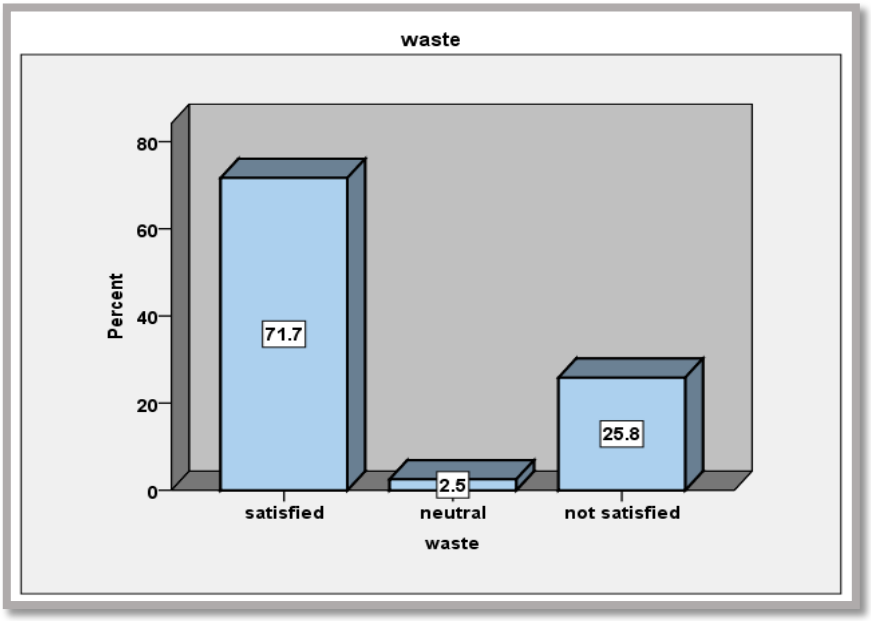

Figure 4.34: Graph for resident satisfaction about waste collection sites

It can be said the waste collection system is the old traditional system and if it had accumulated, it will adversely affect the environment (Figure 4.35).

Figure 4.35: Waste collection sites (Ziada, 7.8.2018)

- **Medical services**

The results showed that 80.8% of the residents were satisfied, 5% were neutral, 14.2% were not satisfied with medical services. Table 4.17 shows the statistics of the population research sample in terms of medical services. Figure 4.36 shows the graph for resident satisfaction with medical services.

Table 4.17: Statistical table of the population research sample in terms of medical services

		Frequency	Percent
Valid	Satisfied	97	80.8
	Neutral	6	5.0
	Not satisfied	17	14.2
	Total	120	100.0

After studying Table 4.17 it was found that the highest percentage of the population were satisfied 80.8%, where the lowest proportion of the population was neutral 5% with medical services.

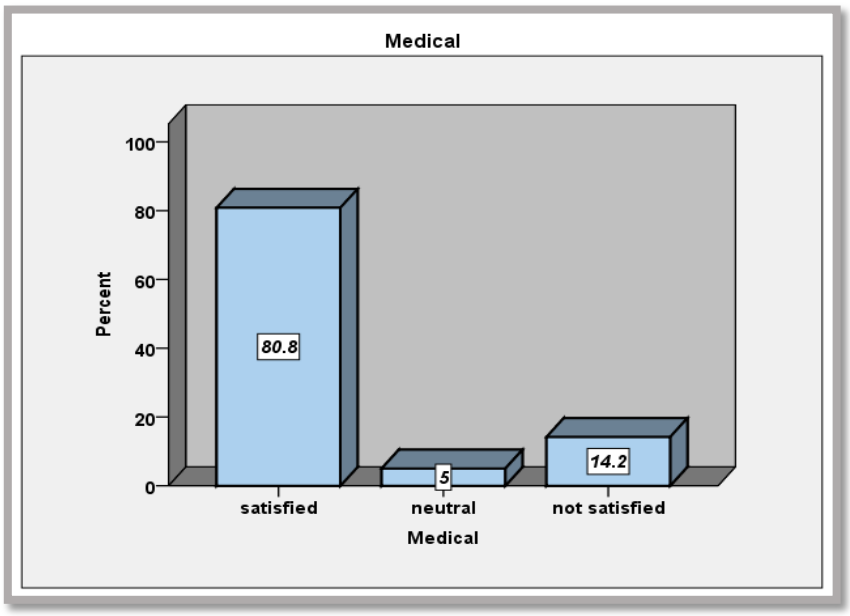

Figure 4.36: Graph for resident satisfaction about medical services

4.9.4 Satisfaction of the residents about the social environment and psychological behavior

- **Life inside the residential complex**

The results showed that 53.3% of the residents they live a comfortable life, 30.8% of them said probably, 15.8% of them said they living uncomfortable life inside the residential complex. Table 4.18 shows statistics of the population research sample in terms of a comfortable life inside the residential complex. Figure 4.37 shows the graph for resident satisfaction about a comfortable life inside the residential complex.

Table 4.18: Statistical table of the population research sample in terms of a comfortable life inside the residential complex

		Frequency	Percent
Valid	Yes	64	53.3
	Probably	37	30.8
	No	19	15.8
	Total	120	100.0

After studying Table 4.18 it was found that the highest percentage of the population was living a comfortable life at 53.3%, where the lowest proportion of the population living an uncomfortable life at 15.8%.

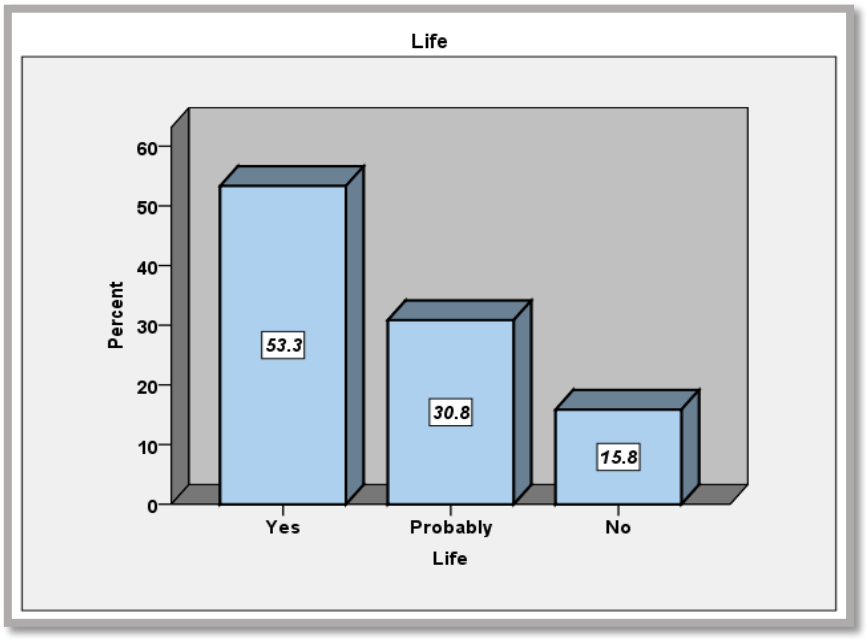

Figure 4.37: Graph for resident satisfaction about a comfortable life inside the residential complex

- **Safety in the neighborhood**

The results showed that 89.2% of the residents they feeling safe, 3.3% of them said probably, 7.5% of them do not feel safe in the neighborhood. Table 4.19 shows the statistics of the population research sample in terms of safety in the neighborhood. Figure 4.38 shows the graph for resident satisfaction about safety in the neighborhood.

Table 4.19: Statistical table of the population research sample in terms of Safety in the neighborhood

		Frequency	Percent
Valid	Yes	107	89.2
	Probably	4	3.3
	No	9	7.5
	Total	120	100.0

After studying Table 4.19 it was found that the highest percentage of the population was feeling safety 89.2%, where the lowest proportion of the population who said probably 3.3%.

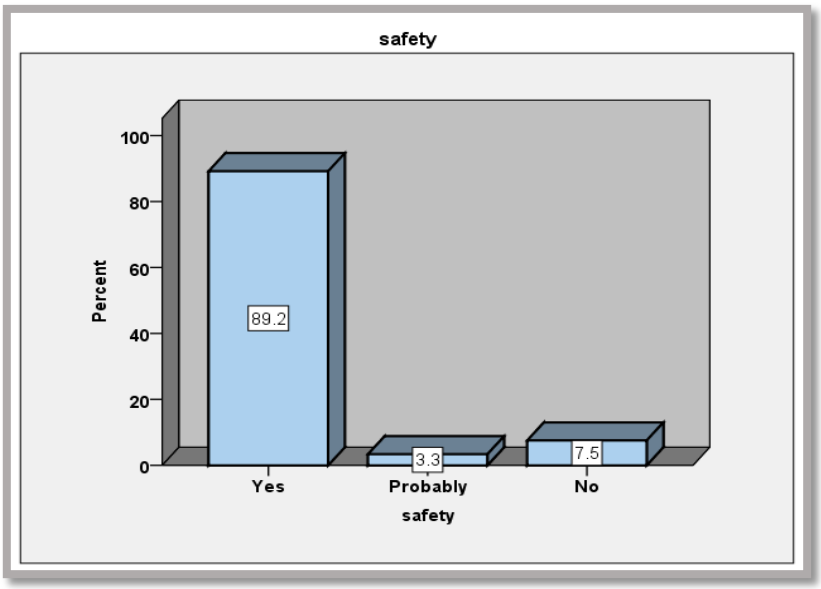

Figure 4.38: Graph for resident satisfaction about Safety in the neighborhood

- **Isolation in the neighborhood**

The results showed that 61.7% of the residents they feeling isolation, 5.8% of them said probably, 32.5% of them said do not feel isolated in the neighborhood. Table 4.20 shows statistics of the population research sample in terms of isolation in the neighborhood. Figure 4.39 shows the graph for resident satisfaction about isolation in the neighborhood.

Table 4.20: Statistical table of the population research sample in terms of isolation in the neighborhood

		Frequency	Percent
Valid	Yes	74	61.7
	Probably	7	5.8
	No	39	32.5
	Total	120	100.0

After studying Table 4.20 it was found that the highest percentage of the population was feeling isolation 61.7%, where the lowest proportion of the population who said probably 5.8%.

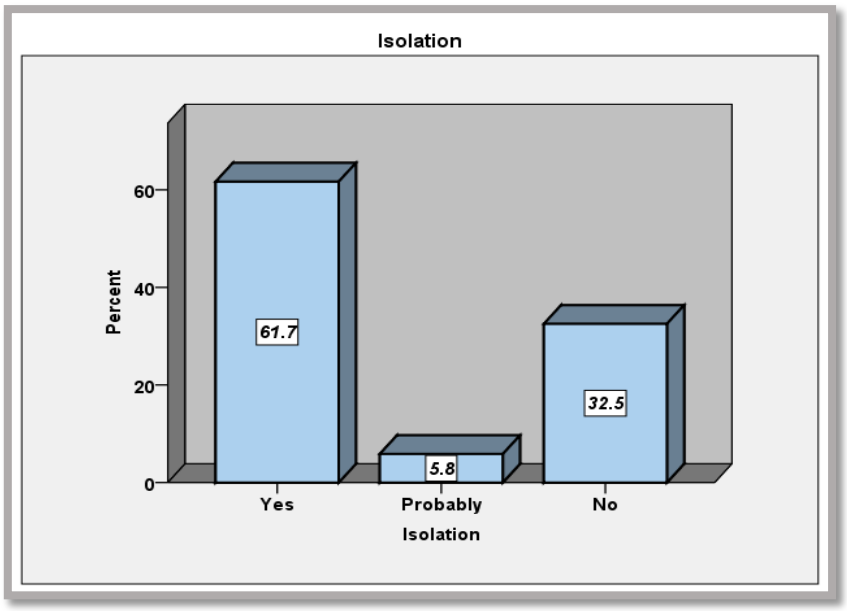

Figure 4.39: Graph for resident satisfaction about isolation in the neighborhood

- **Anxiety or fear of high floors**

The results showed that 36.7% of the residents they feeling anxiety or fear, 4.2% of them said probably, 59.2% of them said they do not feel anxiety or fear in high floors. Table 4.21 shows statistics of the population research sample in terms of anxiety and fear in high floor. Figure 4.40 shows the graph for resident satisfaction about anxiety or fear of the high floor.

Table 4.21: Statistical table of the population research sample in terms of anxiety or fear in high floor

		Frequency	Percent
Valid	Yes	44	36.7
	Probably	5	4.2
	No	71	59.2
	Total	120	100.0

After studying the table above it was found that the highest percentage of the population was not feeling anxiety or fear 59.2%, where the lowest proportion of the population who said probably 4.2%.

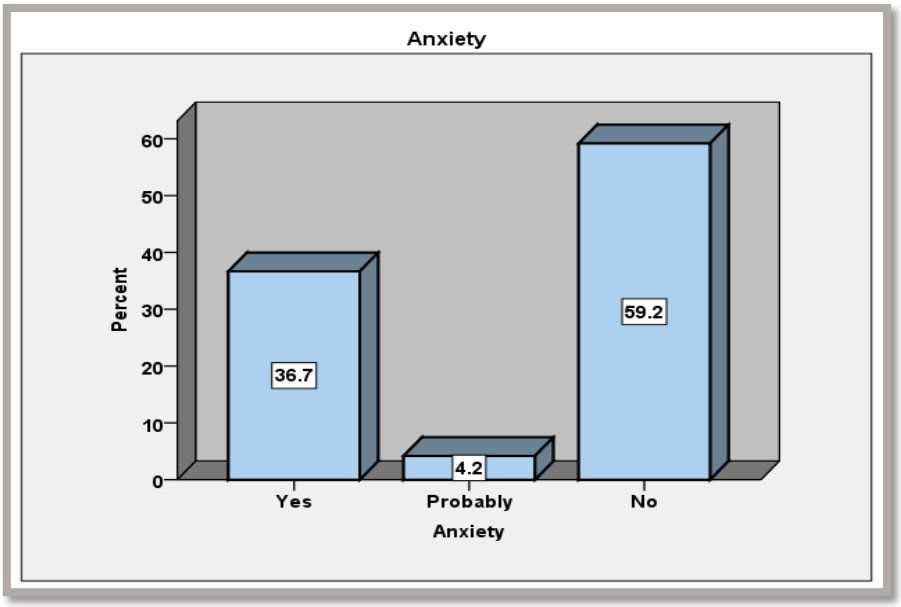

Figure 4.40: Graph for resident satisfaction about anxiety or fear in high floor

4.10 Conclusion of the Chapter

This chapter showed general information about Iraq and Baghdad in particular in terms of The geographical location of Baghdad city, climate, a brief history of Baghdad, vertical housing in Baghdad, types of vertical housing in Baghdad and the population statistics in Baghdad. Iraq in general and Baghdad in particular, suffer from the housing crisis as the crisis was exacerbated by the shortage of housing units and the large population growth as well as the large numbers of units that need to change due to poor condition. The results of the study were shown in Bismayah residential complex and their impacts on the population from the environmental and psychological aspects;

- The population is dissatisfied with (61.7%) about the location of the residential neighborhood.
- Most of the population is dissatisfied with (55.8%) about the entrance to the building due to the distance of the entrance from their residential unit.
- The residents are dissatisfaction with (47.5%) about the corridor between the apartments is close in results between satisfaction and dissatisfaction, but the majority were dissatisfied.
- Most of the population was satisfied with (54.2%) about the noise level.
- Most of the population was dissatisfied with (63.3% about the visual pollution surrounding the residential area.
- The population is dissatisfied with (61.7%) about the commercial services.
- Most of the residents are satisfied with (95%) about educational services.
- The population is dissatisfied with (56.7%) about the recreational services because they contain only sports playgrounds.
- Most residents are dissatisfied with (76.7%) about the places to sit in green areas.
- The satisfaction of residents with (71.7%) about the waste collection service.
- Residents are satisfied with (80.8%) about the medical services within the residential complex.
- The population is feeling safe with (53.3%) within the residential complex.
- Most residents did not feel anxiety or fear with (89.2%) of higher floors.
- The population feeling isolation with (61.7%) in the neighborhood.

CHAPTER 5
CONCLUSION & RECOMMENDATIONS

5.1 CONCLUSION

There are several effects of living in complex residential buildings and they can be in terms of advantages or disadvantages. These factors can depend on environmental impacts, social and economic status, building location, as well as environmental pollution in cities. The scale of tall buildings, landscaping, creating green spaces around buildings, leaving appropriate distances with the other buildings, the way of designing them in terms of the urban landscape must be considered. In order to reduce the effects of residential buildings. The thesis focused on multiple procedures that determine the satisfaction of the residents including the characteristics of the residential unit, characteristics of the site, neighborhood and the services. These factors may have caused the residents from a move to other housing. The process of designing the residential complex is a difficult process including several aspects like environmental, aesthetic and social values. The lack of integration between them can lead to several problems resulting from failure to achieve the population needs. By reviewing the most important problems faced in the Bismayah residential city, it can be said that the study area is closely related to the aspects of environmental and psychological values, in the design process. After reviewing the study and its results, it can be reached to conclusions below;

- The process of achieving residential needs and designing residential complexes is a continuous process and requires effective coordination between the efforts of all parties to achieve their objectives and make their results come in the required manner.

- The absence of coordination leads to a defect in the process of achieving the housing need and therefore difficult to achieve its various objectives, which is reflected negatively on the design of residential complexes and the city as a whole.

5.2 RECOMMENDATIONS

Based on previous results, this thesis suggests the following recommendations;

- Following scientific methods in order to find the appropriate formula of population needs at a functional level that serve the residents needs from psychological, environmental and recreational aspects.

- Develop a general framework of the design process of residential buildings taking into account the privacy, safety and health needs. Benefit from previous experiences to reach the general objectives which are residents satisfaction.

- Design of residential building taking into consideration spatial plans area without ignoring integration values (environmental, aesthetic and social) of the region, where the building will be constructed.

- Design residential green buildings with urban landscape consideration to reduce the negative effects of them. Creating green spaces in floors and roofs of buildings are helpful in solving environmental problems.

- Collect questionnaires about residents as well as listen to their needs permanently, in order to process data before implementing any residential building.

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APPENDICES

APPENDIX 1

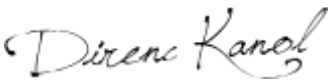
Committee of Ethics Scientific Research

Dear Mohammed T. F. Ziada

Your application titled **"The Effects of Complex Residential Tall Buildings on Residents From Psychological and Environment Aspects Surrounding It. A Case Study of Baghdad city, Iraq"** with the application number YDÜ/FB/2019/54 has been evaluated by the Scientific Research Ethics Committee and granted approval. You can start your research on the condition that you will abide by the information provided in your application form.

Assoc. Prof. Dr. Direnç Kanol

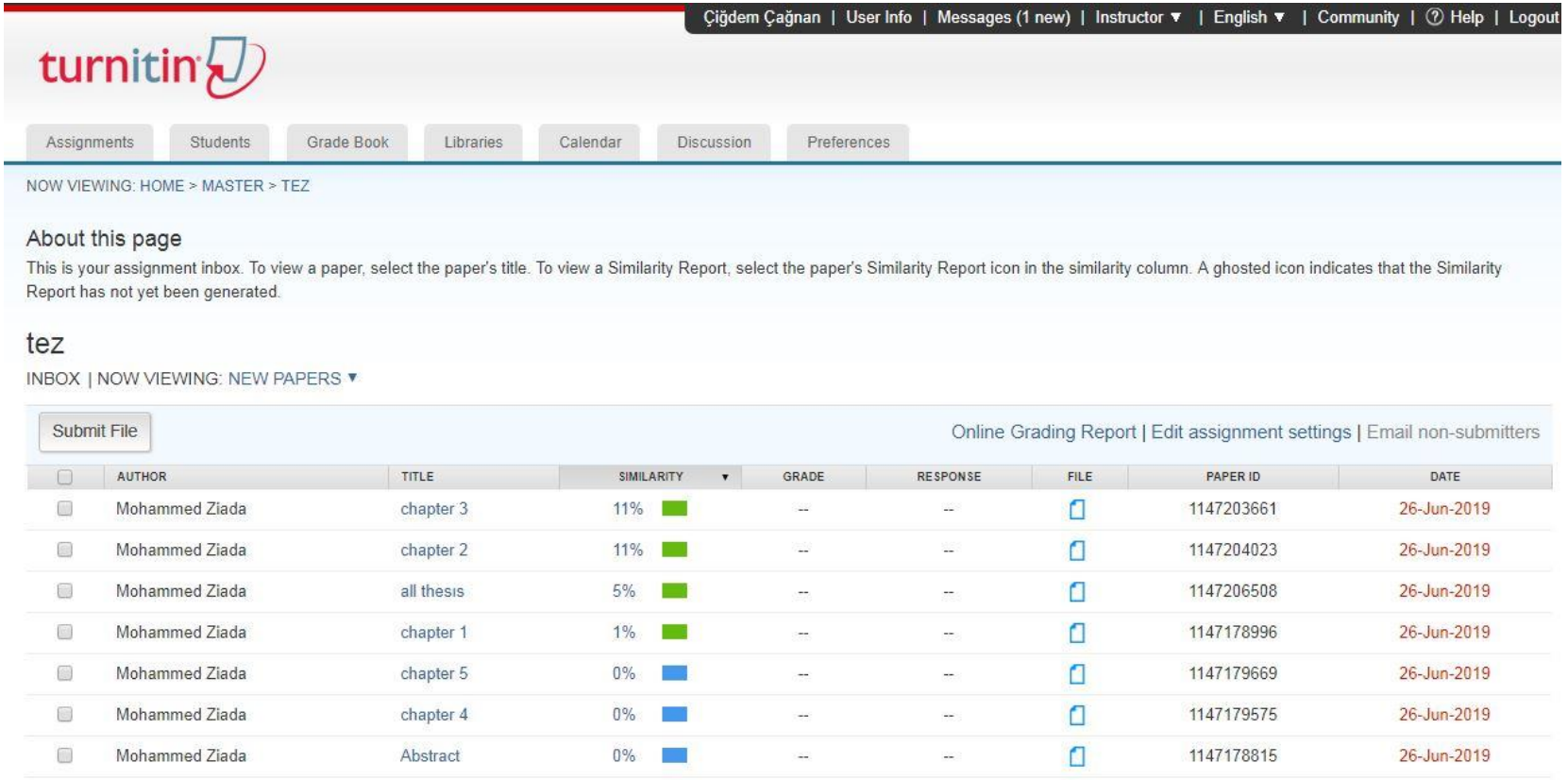
Rapporteur of the Scientific Research Ethics Committee



APPENDIX 2

QUESTIONNAIRE FORM

1. General Information About Residents										
• Gender	Male ☐	Female ☐								
• Age	20-30 ☐	31-40 ☐	41-50 ☐	51-60 ☐	61 and above ☐					
• Certificate obtained	Institute ☐	high schools ☐	BA ☐	M.A. ☐	PH.D ☐					
2. Housing. How satisfied are you with your residential unit from the environmental aspects										
• Location for Baghdad city	Satisfied ☐	Tolerable ☐	Not Satisfied ☐							
• Entrance to the building	Satisfied ☐	Tolerable ☐	Not Satisfied ☐							
• The corridor between the apartments	Satisfied ☐	Tolerable ☐	Not Satisfied ☐							
• The Noise	Satisfied ☐	Tolerable ☐	Not Satisfied ☐							
• Visual pollution surrounding the residential area	Satisfied ☐	Tolerable ☐	Not Satisfied ☐							
• Doors and windows good buffer for air pollution	Satisfied ☐	Tolerable ☐	Not Satisfied ☐							
3. Public services. How satisfied are you with the public services surrounding your buildings										
• Commercial services	Satisfied ☐	Tolerable ☐	Not Satisfied ☐							
• Educational services	Satisfied ☐	Tolerable ☐	Not Satisfied ☐							
• Recreational spaces	Satisfied ☐	Tolerable ☐	Not Satisfied ☐							
• Places to sit in green areas	Satisfied ☐	Tolerable ☐	Not Satisfied ☐							
• Waste collection sites	Satisfied ☐	Tolerable ☐	Not Satisfied ☐							
• Medical services	Satisfied ☐	Tolerable ☐	Not Satisfied ☐							
4. Social environment and psychological behavior										
• Do you feel you are living a comfortable life	Yes ☐	Probably ☐	No ☐							
• Do you feel safe in your neighborhood	Yes ☐	Probably ☐	No ☐							
• Do you feel isolated in the neighborhood	Yes ☐	Probably ☐	No ☐							
• High buildings give you a sense of anxiety or fear	Yes ☐	Probably ☐	No ☐							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