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ANALYSIS AND EVALUATION OF SOIL AND WATER GEOGRAPHY IN DISTRIBUTION OF HEALTH SERVICES IN RANIA DISTRICT BY USING GEOGRAPHIC INFORMATION SYSTEM

MASTER THESIS

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This dissertation, created by Abdalla Khalid Abdalla KHOSHNAW under supervision of Prof. Dr. Alaaddin YÜKSEL was accepted as a Master thesis in department SOIL SCIENCE AND PLANT NUTRITION by the following committee on 19/04/2019 with the vote unity.

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PREFACE

Firstly, thanks to Allah for the opportunities that he granted me. I would like to express my sincere gratitude to my supervisor Prof. Dr. Alaaddin YUKSEL, for his valuable guidance, enduring patience and support providing sufficient space to work in the Department of Soil Science and Plant Nutrition in Bingöl University. I would like to express my deep appreciation to my friend Awara Mohammed Amin KAWARTY (M.Sc.) for preparing this study. Finally, I would like to thank my family for their kindness, help and also support in the successes of the Master's degree. I dedicate my thesis to my honorable, father, mother, brothers and sisters.

Abdulla Khalid ABDULLA

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CONTENTS

LIST OF SYMBOLS AND ABBREVIATIONS

km	: Kilometer
m	: Meter
cm	: Centimeter
km^2	: Square Kilometer
m^2	: Square Meter
W	: West
N	: North
S	: South
NE	: Northeast
NW	: Northwest
SE	: Southeast
SW	: Southwest

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COĞRAFİ BİLGİ SİSTEMİ KULLANILARAK RANIA BÖLGESİNDE SAĞLIK HİZMETLERİNİN DAĞILIMINDA TOPRAK, SU VE COĞRAFYANIN ANALİZİ VE DEĞERLENDİRİLMESİ

ÖZET

Hızlı kentleşme ve beraberinde şehirlerin planlanmamış büyümesi, altyapı tesislerinin tahrip edilmesine, tarım arazilerinin üretkenliklerinin kaybına, su kütlelerinin kirletilmesine, açık alanların yok olmasına ve iklim değişikliğine neden olmaktadır. Şehirlerin nüfusundaki hızlı artışlar, kentsel olanakların eşit olmayan dağılımına yol açmaktadır. Devletin sunduğu hizmetlerin bölgeler arasında dengesiz dağılımı, vatandaşların sosyal adalet duygusunun zarar görmesine, siyasal istikrarsızlığa ve sosyal krizlere yol açmaktadır. Bir bölgedeki sosyal adalet, farklı bölgeler arasında devletin kaynaklarının ve hizmetlerinin eşit mekansal dağılımı ve bunlara eşit erişim ile mümkün olabilir. Bu çalışmada, Irak'ın kuzeyinde Rania bölgesinde yer alan sağlık hizmetlerinin dağılımında etkili olan çeşitli faktörlerin etkileri belirlenmiş ve arazi kullanımı açısından değerlendirmeler yapılmıştır. Sağlık hizmetlerinin yerlerinin belirlenmesi ve ilgili kriterlerin yorumlanmasında coğrafi bilgi sistemleri (CBS) yoğun bir şekilde kullanılmıştır. Sağlık hizmetleri, bir bölgede yaşanyanların temel gereksinimlerden biridir ve herkes için erişilebilir olmalıdır. Bu nedenle, şehir plancıları sağlık hizmetlerinin dağılımını planlarken erişelebilirliğe oldukça önem vermeleri gerekir. Kentsel olanakların sağlanması için sağlık merkezlerinin arsa uygunluğu büyük öneme sahiptir. Arazi kullanım uygunluğunun değerlendirilmesi, kentsel ve banliyö planlamalarını ve karar alma sürecini önemli ölçüde belirlemektedir. Merkez ilçe dahil toplam 5 ilçesi olan Rania bölgesinde bir çok sağlık hizmeti lokal ve ulusal standartlara kıyasla iyi durumda olmasına rağmen, uluslrarası standardların altında olduğu anlaşılmaktadır. Sağlık hizmetlerinin dağılımında ise belirgin bir eşitsizliğin olduğu görülmektedir. Bu düzensizlik, şehrin plansız genişlemesi ve normalin çok üzerinde gerçekleşen şehirleşme hızından kaynaklanmaktadır. Şehirleşmenin hızlı artışı beraberinde çok önemli çevre sorunlarının ortaya çıkmasına neden olmaya başlamıştır. Bu sorunların daha da ilerlememesi için CBS tabanlı oluşturulan planlamaların uygulanması önemlidir.

Anahtar Kelimeler: Rania, Sağlık hizmetleri, mekânsal dağılım, arazi kullanımı, Süleymaniye, Kuzey Irak.

ANALYSIS AND EVALUATION OF SOIL AND WATER GEOGRAPHY IN DISTRIBUTION OF HEALTH SERVICES IN RANIA DISTRICT BY USING GEOGRAPHIC INFORMATION SYSTEM

ABSTRACT

Rapid urbanization and the unplanned growth of the cities lead to the destruction of infrastructure facilities, loss of productivity in agricultural lands, pollution of surface and groundwater resources, extinction of open areas and climate change. Rapid increases in the city populations lead to unequal distribution of urban facilities. The unbalanced distribution of the services provided by the state among the different regions damages sense of social justice, leads to political instability and social crises. Social justice in a region can be achieved through equal spatial distribution and access of resources and services of the state among different regions. Rania district of northern Iraq undergone severe population increase rates in the last three decades thus raised problems of pollution, uneven distribution of urban facilities, loss of agricultural lands due to the sprawl of constructions. The present study aimed to determine the quantitative and qualitative spatial distributions of healthcare centers and facilities in Rania district. In this study, the impacts of various factors that are effective in the distribution of health services in Rania district have been determined and suitability of land uses for the locaton of medical care centers has been evaluated. Geographical information systems (GIS) have been used extensively to determine the location of health services and to interpret the relevant criteria. Health care is one of the basic requirements of life in a region and should be accessible to everyone. For this reason, urban planners need to give importance to accessibility when planning the distribution of health services in a region. Land suitability of health care centers is of great importance for the provision of urban amenities. Assessment of land use suitability significantly determines the urban and suburban plannings and decision-making process. Although the Rania district, which has a total of 5 sub-districts including the central district, is in good condition compared to local and national standards, it is still below the international standards. There is a significant disparity in the distribution of health services. This irregularity is due to the unplanned expansion of the city and the unpredicted speed of urbanization. The rapid increase in urbanization has already caused significant environmental problems. It is important to implement GIS-based plans so that these problems do not progress further.

Keywords: Rania, medical care centers, spatial distribution, land use, Sulamania, North Iraq.

1. INTRODUCTION

Healthcare services are vital to sustain the human life. Providing convenient and uniform healthcare to every citizen is an important matter in the welfare of a country (Van Lerberghe 2008). The distribution pattern and accessibility of healthcare services are of great importance in meeting the demands of citizens. Health condition of citizens is the most important criteria to define the development stage of countries. Easiness to the accessibility of healthcare services is an important criterion in the progress of a community (Soltani et al. 2019).

City planners should carefully choose the location of healthcare centers for quick and convenient access without encountering obstacles in the city environment.Therefore, this study attempted to use Geographic Information System (GIS) to analyze the spatial distribution of and access to the hospitals in Rania district, northern Iraq.

The level of health reflects the trend of development in each part of the world because the development needs healthy individuals in order to achieve its activities. Health system in Iraq during the 1970s and 1980s was much better than al the other countries in the Middle East (Alwan, 2004). The health care system in Iraq was extremely centralized, hospital-oriented and entirely government-supported with incomes coming from the rich nationalized oil companies (WHO, 2006). However, in the last few decades, the capacity of health care has been badly wrecked by the effects of various wars, sanctions, ethnic outrages, and political imbalance. Therefore, the health care system had to be rehabilitated in the consequence of the occupation of Iraq. The Ministry of Health introduced plans expanding the health service provision (Anonymous 2008). Consequemce of the introduced new heath care System, health care centers per 100,000 population increased from 5.5 in 2003 to 7.4 in 2012. However, the improvement in the provision of health service significantly differed within the country. The average increase of primary health care centers in the Kurdistan region was 4.3 per 100,000 population whereas it was only 1.4 in central/southern Iraq. The number of public hospitals per

100,000 population increased from 1.3 to 1.5 in Kurdistan, while it didn't change (0.6) in the center and south of Iraq (Cetorelli and Shabila 2014).

Unfortunately, the health services in Rania district as in other parts of the country have been distributed randomly and there is no balance between their distributions, size of the region and population density. Health services are few compared to the population, especially in the last few years. The planning standard has not taken into consideration when constructing health centers. The authority has given the priority to the functional aspect more than the spatial aspect. Moreover, the difference between the level and efficiency of the services provided in the health sector significantly varies within the district. Therefore, the study aimed to analyze geographic distribution of health services in Raniya district to identify the efficiency and evaluate the services based on the number of population. This was achieved in parallel with the local and international standards as well as using the tools of GIS.

This study has concentrated on health services which are directly related to the lives of humans and the social development. Since the health services composed an important part of the internal services of the district, and the district has recently witnessed high population increase. However, the lack of scientific references especially on study area is the most important challange of the study. Accessing the current data and information is not easy, especially on human phenomena.

2. LITERATURE REVIEW

Human activities on earth determines the type of land uses. Human activities are rapidly increasing by the increase in population and living standards. Land use involves the process of shaping, transforming and managing the land in a physically, chemically and biologically different manner to obtain various socio-economic benefits. Transformation of land into different types of land use often leads to deterioration of the environment and results in a number of environmental problems, such as soil erosion, water and soil pollution (Xie et al. 2015).

Sustainable development in urban areas can be achieved by proper land-use planning (Shen et al. 2011) which is classifying the human activities of land-based. Sprawling urbanization causes expansion of urban areas and changing of existing land use patterns. Land-use planning is a practical means of making the alterations in a sustainable fashion, and also to manage the possible alterations and conserving the land from detrimental changes (Ullah and Mansourian, 2016). Suitability analysis is the prerequisite to obtain a succesful land use planning for a given settlement (FAO, 1996).

There are no commonly accepted factors and principles to define land-use planning in urban areas. Several studies conducted to determine the possible factors influencing the planning of urban land-use. Land use planning of Lanzhou city was studied by Dai et al. (2001) considering topography, ground conditions, groundwater and geological hazards as the imporatnt factors on land use planning. In an urban integrated assessment, land use planning was performed by Dong et al. (2008) who evaluated environmental backgrounds, soil/water resources and socio-economic development factors. Community services like eductional facilities, healthcare services should be taken into account as important factors of land use plannings.

Service is identified as one of the important subjects which are related to the lives of humans and their development, because it is an important and basic aspect of the progress

of the life in each country. Another definition of service suggests that it is a directed work in order to meet the needs directly, or an identified person demands to meet this need whether it is a financial or non-financial one.

Geography is the science which studies the phenomena on the surface of the earth, whether natural, human or even their distribution. Health is one of the main right for all humans without discrimination between races, religion, political orientation or social and economic differences (Brabyn and Skelly 2002). The World Health Organization (WHO) has defined health as safety and full physical, mental and social activity, which occupies a wider range more than including some illnesses. In order to secure good health for humans, both geography and health can participate as two sciences. For example, we can identify the geography of health as a new specialization in the science of geography, because it shows the impact of the geographical factors on the health services and clarifies the role of those factors in the distribution of health services (Al-Hilfi et al. 2013).

Health services consist of the activities which are directed in order to protect humans and their safety through treatment or protection of illnesses. Some other researchers think that the health service is one of the necessary services which has relation with the individual and the community. They also consider it as one of the important criteria in order to recognize the level of community development in the field of health. Researchers also have said that health services are those provided to residents through health institutions and departments such as hospitals, health centers, and specialized centers in both governmental and non-governmental sectors through the staff of those institutions and departments

Health services consist of the activities and experiences which are provided by a group of specialized persons in the fields of medicine and treatment in order to provide the necessary services for human lives, as well as securing safety through getting benefits from scientific experiences in order to treat and supervise patients (Al-Hilfi et al. 2013). Some other researchers think that the health service is one of the necessary services which has relation with the individual and the community. They also consider it as one of the important criteria in order to recognize the level of community development in the field of health. It include many connected sorts which aids the humans in following up

the health of individuals within their place of residence, work or any other place (Al-Hilfi et al. 2013).

Health services are those provided to residents through health institutions and departments such as hospitals, health centers, and specialized centers in both governmental and non-governmental sectors through the staff of those institutions and departments. Others say that the health services include all activities which are directed to protect the human and his/ her safety through treatment or protection from illnesses. After stating the above identifications, we can say that the health services include all services of the health sector which are provided on the level of the country in order to treat and protect humans from illnesses. All these are implemented in order to raise the level of health for the residents and the community.

The provided services for residents could be provided through health institutions such as hospitals, health centers, private centers, governmental and non-governmental health sectors by the staffs who work in these institutions. Health services consist of the activities and experiences which are provided by a group of specialized persons in the fields of medicine and treatment in order to provide the necessary services for human lives, as well as securing safety through getting benefits from scientific experiences in order to treat and supervise patients (Al-Hilfi et al. 2013).

Some other researchers think that the health service is one of the necessary services which has relation with the individual and the community. They also consider it as one of the important criteria in order to recognize the level of community development in the field of health. It include many connected sorts which aids the humans in following up the health of individuals within their place of residence, work or any other place. Researchers also have said that health services are those provided to residents through health institutions and departments such as hospitals, health centers, and specialized centers in both governmental and non-governmental sectors through the staff of those institutions and departments. Health services include all activities which are directed to protect the human and his/ her safety through treatment or protection from illnesses. After stating the above identifications, we can say that the health services include all services of the health sector which are provided on the level of the country in order to treat and

protect humans from illnesses. All these are implemented in order to raise the level of health for the residents and the community.

The provided services for residents are implemented in three ways: **Treatment services:** This type of service is considered as the most important type of health services which are provided to humans after they get ill or bad influenza in the health institutions such as hospitals, health centers, private centers, .etc. the person who needs health services, after he/ she tells the doctor about his/ her case, the doctor starts to provide the medical instructions and treatment to the patient. However, sometimes the patient needs some tests or analyze in order his/ her illness to be identified. After the type of illness is identified, the illness may need a short or a long period of treatment, and sometimes a surgical operation is needed. **Protection service:** This type of services consists of a group of actions and instructions in order to resist illnesses and treat them for a long period of time when humans resort to it. This type of services is done through controlling the illnesses and limit their spread. For this purpose, there are some necessary ways and regulations for the protection against illnesses and diseases. For example, the camping of vaccination, rising awareness and distributing the health instructions through mass media. **Natural service:** This type of services is different from the services of treatment and protection, because this type of protection happens when the human is hit through an accident such as falling from high place or a traffic accident….etc. this type of illnesses does not need treatment or medicine but it needs exercise, sport or sometimes exercising by sport equipment which needs supervision by sport specialists.

The term spatial analyze is used widely in the geographical researches, because most data has the spatial specification which performs the analyzing and organizing of this data according to the specified technology. The spatial analyze includes an identified statistical method which has been programmed in the geographical information system (GIS) in order to apply it on the geographical phenomena to get a useful outcome

The efficiency of services is one of the most important characteristics which are related to the life of humans because it is an important and basic reference for life development of a country. It is also one of the most important objectives which the governments try to achieve it. Services are complimentarily work so that no service could be neglected in order to secure the progress and development for humans.

The GIS is sometimes known as spatial information system because it basically gives importance to spatial information with all of its kinds. Various specialists such as geographers, engineers, geologists, agricultural engineers and others use the GIS to identify and classify the objectives on earth. The GIS is the science of collecting, registering, solving, showing and issuing descriptive and initial geographic information for definite purposes through using the computer within linking this information with the geographical sites according to the identified axes and organizing them in order to compose the map of a geographical location so that the geographical characteristics are shown.

The purpose of planning the settlements in a region is to provide adequate and fair representation of the services required by all groups in the region (Murray 2001). Before planning the future development of the settlement, it is necessary to obtain sufficient and accurate information about the distribution and structure of existing facilities. cities, Rania district is located in the northern Iraq and has fertile agricultural lands, plenty of surface and ground water resources to attract rural populations of the Kurdistan region of Iraq. However, the district has very fragile ecosystem due to the over population and unplanned expansion of the cities. Rapid urban growth in the last thee decades caused enourmous pressure on the social amenities of the settlements. Thus, innovative techniques are needed urgently to revise the city plans considering the conservation of soil and water resources. The GIS provides great easiness to choose the location of facilities such as health care service. The abilityof GIS to determine alternative scenarios for urban development is one of the major advantages of using GIS in land compliance analysis. Field compliance analysis for GIS is a geographic or GIS-based process used to determine the suitability of the site for a particular use. The GIS compliance analysis examines the landscape from all aspects and decides whether the site is suitable for the planned activities (Parry et al. 2018).

3. MATERIAL AND METHODS

3.1. Study Area

Rania district is located on southern Kurdistan region in the northeast of Iraq and has the most fertile lands of the Kurdistan region. Rania district is located in the northeastern part of Sulimania governorate. Rania district is lies within 36°10′–36°35′ north latitudes and 44°30′–44°50′ east longitudes in the elevation ranges from 500 to >2000 m above sea level. The coverage area is estimated at 145 km^2 of which 105 km^2 is covered by water due to the construction of Dokan Dam (Figure 3.1).

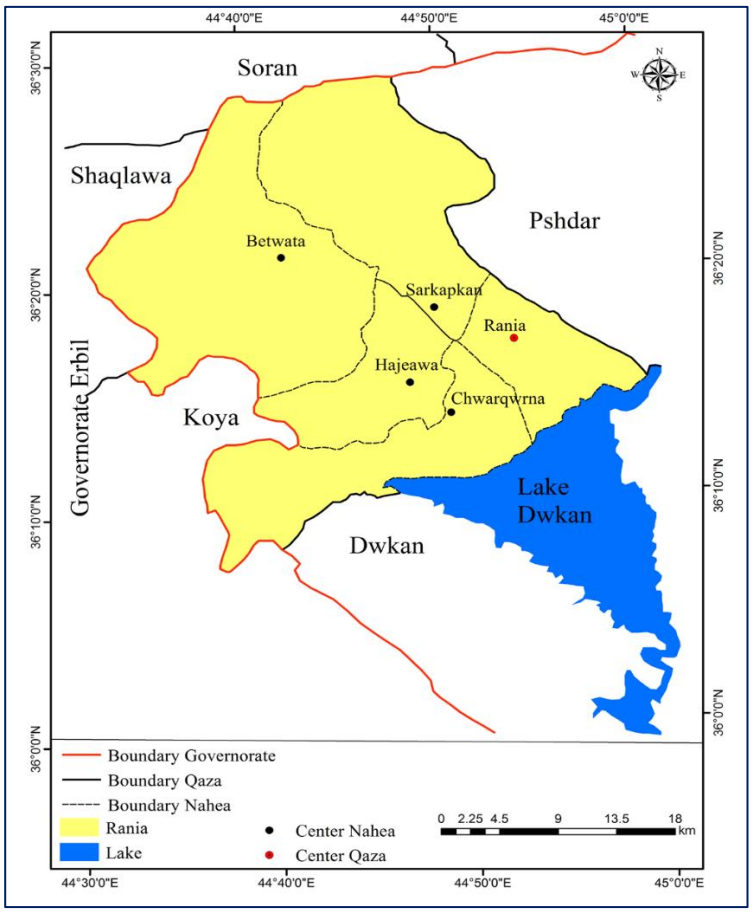

Figure 3.1. Location of Rania district and the other neighboring districts (KRG, 2017)

Rania district is surrounded by Soran district and Shaqlawa district in the North, Dokan district in the south and southeastern part, bordered by Pshdar district in the east, and bordered by Koya district in the west.

Rania district is situated at the foot of the mountains in Kurdistan region and on a wide plain known as Rania. The existing land-covers of the study area are urban settlement, agricultural fields, water bodies and mountains. The cities in Rania district are Betwate, Sarkapkan, Rania, Hajeawa and Chwarqwrna (Figure 3.2-3.5).

Figure 3.2. Satellite image of Hajeawa city (Anonymous, 2019a)

Rania district become an important urban center and attracted a lot of population, due to the fertile lands, water resources and moderate climate (Figure 3.2-3.5). The cities in Rania district is expanding in an unplanned manner as in other districts of the country. The district also has various public services including health and education services.

Figure 3.3. Satellite image of Chwarqwrna city (Anonymous, 2019b)

Figure 3.4. A view of Chwarqwrna city (Anonymous, 2019d)

Figure 3.5 The city of Rania in the Rania plain of Sulaimani governate (Anonymous, 2019d)

Figure 3.6. Satellite image of Sarkapkan city (Anonymous, 2019c)

3.2. Methods

We relied on a descriptive method to understand the embodied status of health services as well as identifying the number of employees, in addition to regulate the comparision procedures to identify the differences in the distribution of health service capacities. Spatial analysis was used to identify the nature of distributing the spatial capacity of health services.

3.2.1. Health Planning

Planning term is used in many sciences, especially those give importance to the practical aspects. Planning consists of a group of theoretical and practical changes which are reached by humans through awareness on various elements of the environment to secure the highest benefits and the best using in favor of humans and nature for a better situation in the future. Planning is the base of all administrative works. If there is planning in all administrative works, it will be the reason and factor of success when the planning is implemented as already planned.

We can say that the health planning (HP) is represented in a clear policy for the purpose of securing good health for the residents in the form of the programs of departments and institutions, and projects in order to promote the health level for the individuals and the community on equal basis for securing balance and equality of health services in all identified locations. It is also implemented based on the modern sciences in order to make health progress, as well as organizing and confirming high competence.

The HP is an important part of cities and governorates' planning, it is also a necessary step in balancing the necessary services for residents. It also has main role in administrating the health services. The HP is important to identify the objectives of administrating health services. The HP provides an ideal framework for the purpose of receiving the general decision of the administrative units in the field of health services. It has a role in unifying the cooperation between different administrative units in order to administrating health services. The HP eases the identifying of the units of used criteria in order to control and promote the health sector and develop it.

3.2.2. Criteria for the Health Service Efficiency

The criteria of health service are used to evaluate and measure the efficiency of health services. Their criteria should be at the level of the capacity and the efficiency of their duties according to those variables used in evaluating health institutions. So that it is possible to identify and show the scope of the efficiency for these services. For this purpose, there are many standards we rely on that require financial capacity in order to provide suitable health services in all health institutions for all residents. The standards for health service efficiency are number of population to doctors and beds for residents,

standard of hospitals and pharmacies per population, health service quality, specialized doctor per person, doctor per inpatients, percentage of the medical professions to the residents, average surgeons, location of health service institutions and individuals per area of health services.

3.2.2.1. Average Number of Population to Doctors

The percentage of doctors differs from country to country according to the economic and social situation. According to the standards of the WHO, one doctor is allocated for each 700 persons, but this number increases in the newly developed countries, one doctor is allocated for between 200 and 600 individuals. According to the Iraqi standards, one doctor is allocated for each 1.000 individuals.

3.2.2.2. Number of Beds for Residents (NBR)

The NBR standard shows the number of beds in hospitals comparing with the number of residents. The NBR varies from country to country, and in newly developed countries, one bed is allocated for each 300 to 500 individuals. However, in the developed countries, one bed is allocated for 80 to 120 individuals.

3.2.2.3. Standard of Hospitals per Population (HPP)

The HPP standard is one of the most important standard which compares the size of population and the number of hospitals to figüre out a suitable plan to unify the health level of the hospitals. The HPP standard also differs from one country to another country. In the developing countries, one hospital is allocated for 50.000 to 60.000 individuals. However, in the developed countries the number of individuals is less, one hospital is allocated for 600 individuals as in Sweden, Germany and Great Britain. According to the Iraqi standard, one hospital is allocated for 20.000 individuals (Al-Hilfi et al. 2013).

3.2.2.4. Standards of Pharmacies per Population (PPP)

The pharmacies provide medicine to hospitals and individuals and are basically considered as heath complementary services. Pharmacies are needed for medical clinics and centers. The PPP standard is also different from a country to another. For example, in

the developing countries, one pharmacy is allocated for 20.000 to 60.000 individuals. According to the Iraqi standard in general, one pharmacy is allocated for 20.000 individuals (Al-Jumaili et al. 2013).

3.2.2.5. Standard of Health Service Quality (HSQ)

The HSQ standard is one of the basic health services which includes the number of the specialized and unspecialized staffs, the sections of X-ray, sonar, pharmacy and the laboratory (Ahmed et al. 2014). The HSQ varies from a country to another, even within the same country. The HSQ should be consistent with the living of the residents. People in health care centers should have high levels of professions. The advanced devices and equipments should be operated by specialized staff to reach the highest level and keep the damages at the lowest level.

3.2.2.6. Standard of Specialized Doctor per Person

This standard clarifies the relation between the residents and the specialized doctors. For example, if there is a big number of doctors and the number of residents is divided by the number of those doctors, we find out that the percentage of the doctor decreases, but we classify them according to their specialization, then we find that the number is different. This standard also varies from country to another. For example, one specialized doctor is allocated for (10.000- 30.000) especially for pediatricians, internists and neurologists.

3.2.2.7. Standard of the Number of Doctors Per Inpatients (DPI)

The DPI standard is the ratio of of each doctor to the number of inpatients in the health institutions. If the number of the inpatients increases comparing with the number of doctors, this will have negative effects on the efficiency of the health services causing the lack of enough time to see and supervise each patient. According to the local and international standards, each doctor should see 20 inpatients in a day (Al-Hilfi et al. 2013).

3.2.2.8. Percentage of the Medical Professions to the Residents (MPR)

The MPR standard is used to know the level of health service efficiency, the people who work in the health sector in different periods according to their different specialization

(Al-Hilfi et al. 2013). The MPR standard refers to how the numbers of specialized staff in a health sector is consistent with the number of population and the service needs. According to the local standard, each health professional should allocate for 400 to 500 individuals (Al-Jumaili et al. 2013).

3.2.2.9. Average Number of Surgeons (AS)

The AS standard has special importance on the health service efficiency, and takes the accuracy and experience of the doctors into consideration. The AS needs a good efficiency and preparation of the doctors because some of them provide the surgery of heart and stomach.

3.2.2.10. Location of Health Service Institutions (LHSI)

The LHSI is one of the most important standards in health services, because the LHSI should be easily accessed and far from noise and pollution. It is preferable that the health buildings are naturally open. The buildings should meet all ventilation conditions and exposure to sunlight. The health institutions, especially hospitals, should have green zones with the building in the middle of the green zone, which has positive impact on patients.

3.2.2.11. Individuals per Area of Health Services (IHS)

The IHS standard is used to clarify the ratio of individuals within health services. According to the standard of the international health service institutions, the IHS of each 100 individuals is 20-50 m^2.

3.2.3. Classification of Health Services

The health servıces are classfied as Hospitals, Health Care Centers and Public clinics. Hospitals are a basic part of the social and health system, and their duty include providing health services to the population. Hospitals are locations where the needs of the patients and the doctors are met. They are centers for training the medical staff (doctors, nurses …etc.) for emergency cases. (Al-Hilfi et al. 2013). Hospitals are classified as follows: local hospitals, central hospitals, public hospitals and private hospitals. Local hospitals are small and consist of internal and external clinics which detect some illness and

conduct some small and simple surgical operations, wound dressing. They also include laboratories, X-rays and beds. That means they provide services on the level of number of residents. Central hospitals are considered as a main, social and health part which provide health services and care to the residents. They are existed in cities and residential complexes where the number of population is ranged between 20.000 and 25.000, and they include 100 to 200 beds. The area allocated for each bed is 50 to 70 m^2. The central hospitals are constructed in the middle-sized cities. Public hospitals mostly look like the central hospitals. According to the Iraqi standards, pulic hospitals should have 300 to 500 beds and sometimes up to 1.000 beds. The area allocated for each bed is 50 – 70 m^2 according to the developing countries. If the population is between 30.000 and 40.000, the area allocated is for 6 - 8 beds. The public hospitals are founded in large cities and capitals. They include all kinds of health services the patients need, as well as the advanced technology and all specialist doctors

During planning it is necessary to take the type of hospital, its capacity and the nature of services into consideration. When choosing the location of those services and hospitals, ease access to the hospital (roads and bridges), selecting an open place which give the chance to expanding the building of the hospital, no factories near the location of the hospital in order not to pollute the area or make noise and providing the means of health facilities and services of sewages, and reducing the expenses of establishing the hospital ar imporant factors (Reshadat et al. 2018).

Private hospital is built in a specific place and is not related to the population density. Private hospital is specific health center for illnesses such as breast, mental, cancer and eye diseases. Pravite hospitals are specialized in treating a specific group of illness, and their services are special for a specific group of the community such as women and children, or treating a specific part of the body. This type of hospitals should commit to keep the air clean. They should also be away from the noise and pollution. Therefore, they often choose the banks of rivers, seaside or green zones for this purpose. This type of hospitals has laboratories and various equipment with high quality. The population who can benefit from this services is 150.000 to 300.000, but according to the ratio of population to beds: each two beds are allocated for 1.000 persons, and the area allocated for each bed should be 80 m^2.

Health care centers consist of the services which are provided to the family and community by the health institution for the purpose of securing good health care for the community in general and organizing supervising mothers and babies and protecting them from contagious and chronic illnesses. Healthcare centers provide medical treatment to the elderly. According to the Iraqi standard, the area allocated for each primary health center is 5.000 m^2. At the same time, and according to the local standard, each health center provides services to 10.000 persons. The distance between the residents and the health center is 800 m (Park 2015).

Public clinics are constructed by the government to support health services in the large hospitals and the health centers, and providing health services to the residents whose financial situation is consistent with those clinics.

4. RESULTS AND DISCUSSION

4.1. Distribution of Health Services in Rania District

The distribution of health services depends on the size and density of population, social and economic reasons and the location of the health institutions. Health services in the study area are four hospitals with beds, 35 health centers, 236 general and specialist doctors, 380 nurses, 230 medical professionals who are distributed in all hospitals and health centers. There are also 39 pharmacies, 62 medical clinics, 38 laboratories and 6 medical complexes (Table 4.1).

Table 4.1. Rania district space according to the administrative units (KRG, 2014)

Administrative units	
Distirct center	2
Chwarqura	1
Hajiawa	1
Total	4

The hospitals in study area are distributed in each of the district center and sub-districts (Chwarqura and Hajiawa) (Figure 4.1). Health centers are important part of the institutions which provide health services to the residents, because the most crucial thing in the human's life is the existing of good health. Study area includes 34 main and sub-health centers, so that the main health centers are distributed on districts and sub-districts and the sub-heath centers are distributed on villages (Table 4.2). The main health centers include specialist doctors, sections of sonar and laboratories, and some of them even have ambulances. However, the sub-health centers only include assistant doctors and nurses.

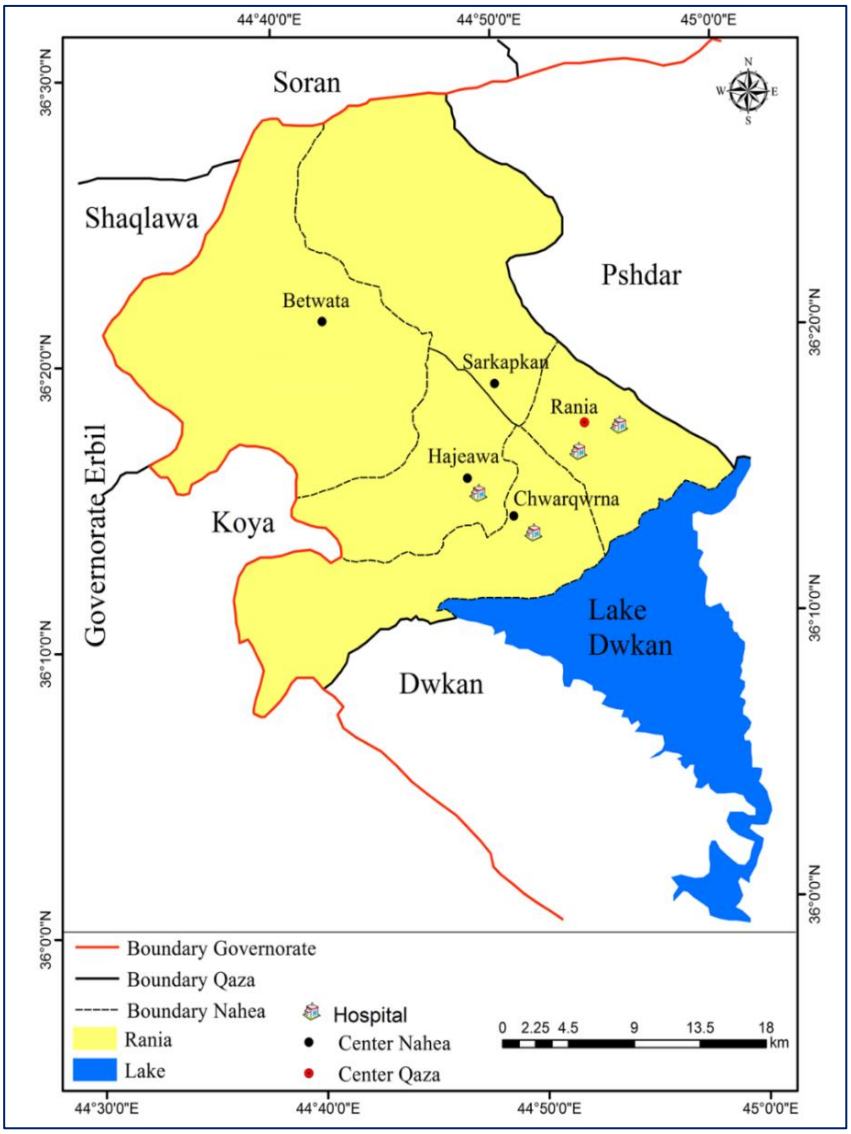

Figure 4.1. The geographical distribution of hospitals in the area of research 2017 (KRG, 2017)

Regarding the distribution of health centers, there is a distinctive difference between a sub-district and others. For example, Chwarqurna sub-district has 35.3% of health centers, which are 12 and the lowest percentage is in the center of the district 2.9% This is due to the existence of hospitals in the center of the district. Hajiawa sub-district includes 6 health centers, all of them are located in villages, which participate in providing health services with 17.6% in Raniya district. The sub-districts of Betwaya and Sarchawa include 13.7% of the health centers which are 8 centers. The sub-district of Sarkabkana includes 11.8% of the health centers which are 7 centers.

Table 4.2. Health centers of Rania district in 2017 (KRG, 2017)

No	Health center	Location	Area m^2	Doctor	Nurse	Medical professionals	Ambulances
1.	Daraban	Rania	400	-	3	2	
2.	Bosken	Rania	600	6	5	4	1
3.	Qwrago	Rania	450	-	2	2	
4.	Saidawa	Cantary qaza	800	8	13	5	2
5.	B.T.grtnu gwastnawa	Cantary qaza	1500	11	12	15	2
6.	Grdchan	Chwarqwrna	2500	8	12	7	1
7.	Qaraneaxa	Chwarqwrna	3000	5	10	12	1
8.	Kany maran	Chwarqwrna	2000	3	4	3	-
9.	Kulawsurn	Chwarqwrna	1500	-	4	1	-
10.	Hizopy gawra	Chwarqwrna	850	-	3	4	-
11.	Hizopy bchwk	Chwarqwrna	700	-	2	1	-
12.	Bestana	Chwarqwrna	650	-	3	2	
13.	Qamtaran	Chwarqwrna	1000	-	4	3	
14.	Kfradol	Hachiawa	2850	4	7	4	1
15.	Istrelan	Hachiawa	1500	-	2	1	-
16.	Qwrabaraza	Hachiawa	900	-	1	1	
17.	Garmka dal	Hachiawa	400	-	3	1	
18.	Dashtewan	Hachiawa	300	-	2	1	
19.	Makok	Betwata	2000	3	5	4	
20.	Shkarta	Betwata	4000	6	5	12	1
21.	Dwawa	Betwata	3500	-	8	10	
22.	Niwa	Betwata	550	1	3	2	
23.	Mirgasar	Betwata	5000	10	15	6	1
24.	Sarashkawtan	Betwata	550	-	4	2	
25.	Bitwata	Betwata	400	-	4	2	
26.	Zewa	Betwata	550	-	3	1	
27.	Chiway sarw	Betwata	450	-	2	2	
28.	Chiway xwarw	Betwata	300	-	3	2	
29.	Gulan	Sarkapkan	550	-	4	2	
30.	Xwran	Sarkapkan	600	-	3	1	
31.	Bamokan	Sarkapkan	800	-	2	2	
32.	Pashqotal	Sarkapkan	1000	-	2	1	
Total			42150	65	155	118	10

Field visits were conducted on December 18, 2017. There were 236 doctors in the entire district, and there were 68 doctors in health centers. The sub-district of 39 has large numbers of doctors (Figure 4.2). This large number is due to the existence of main health centers, the high number of population and the area of the sub-district.

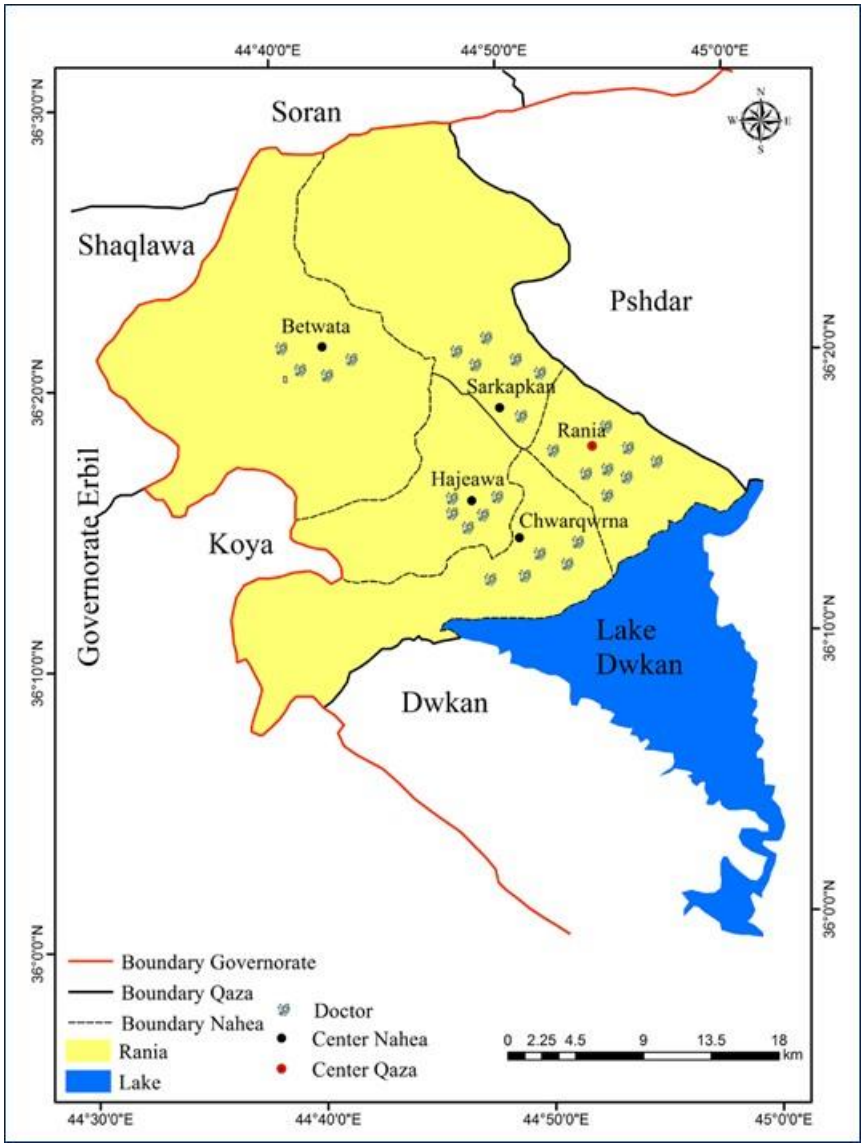

Figure 4.2. The distribution of health centers in Rania district (KRG, 2017)

4.1.1. Distribution of the Doctors, Nurses and Other Medical Professionals

Doctors are the most important medical staffs and have great importance in the efficiency of the health services. This is due to their specific functions and conducting laboratory analyzes, X-rays, check in beds as well as giving instructions for treatment and protection for avoiding various illnesses.nThere are 236 doctors in the hospitals and health centers in Raniya district. There are 101 doctors in Chaqurna sub-district. The high percentage of doctors is due to the existence of one hospital and 65 health center. The center of the district has 14 doctors, 27.5% of the doctors in the Raina district participate in services. Although there is one hospital and 5.9% health centers in 6 sub-districts, but the numbers

of doctors is very few comparing with sub-districts of Betwata, Hajiawa and Chwarqurna. The total number of doctors is 14 because the planning standard has not been applied as well as the lowest percentage is in Sarkapkan-Betwata sub-districts in order with the percentages 2.5-3.4% who participate in the medical services in the study area. This is due to the imbalance in distributing hospitals and health centers.

There are 380 nurses, and the highest percentage is in the sub-district of Rania and Hajiawa. The reason for the high ratio in Hajiawa sub-district comparing to other sub-districts is because there is a hospital and 12 health centers as well as the large area of the sub-district and the large number of its villages. The lowest percentage in Sarkapkan sub-district is 4.3% (Figure 4.2). The number of medical professionals in the study area is 230. The high percentage in both sub-districts because there is a hospital and many health center, on the one hand, and the high number of residents on the other hand. The center of the district comes in the third place with 19.1%. However, the lowest percentage is in Sarkapkan sub-district with 4.3%.

Table 4.3. The distribution of doctors, nurses and medical professionals in Rania district in 2017

Administrative units	%	Medical professionals	(%)	Nurses	%	Doctors
District Center	65	27.54	93	24.34	44	19.34
Chwarquran	101	42.55	134	35.52	76	33.04
Hajiawa	43	17.54	81	21.31	61	26.52
Betwen	8	3.38	29	7.63	19	8.36
Sarkapkan	6	2.54	12	3.15	10	4.34
Total	14	94.3	350	99.97	210	99.98

4.1.2. Distriution of Pharmacies and Medical Clinics

Pharmacies give and provide medicine for patients, and are considered as an important part of the health services. There are 39 pharmacies in the study area, however they are unequally distributed on the sub-districts. The highest number of pharmacies are located in the center of the district, and the lowest number of the pharmacies is located in Sarkapkan sub-district (Table 4.4). The reason for this imbalance is due to the difference in the number of population, the modernity of the sub-district and the difference of economic capacity.

Medical clinics are also important special services, and are considered as important as the health complexes, like a little health institution. Both of them aim at providing services of treatment for communities. The work of these clinics is to provide primary treatment and wound dressing.

Table 4.4. The distribution of Pharmacies and Medical clinics in Raniya district in 2017

Administrative units	Pharmacies	%	Medical Clinics	%
District Center	27.54	93	24.34	19.34
Chwarquran	42.55	134	35.52	33.04
Hajiawa	17.54	81	21.31	26.52
Betwen	3.38	29	7.63	8.36
Sarkapkan	2.54	12	3.15	4.34
Total	94.3	350	99.97	99.98

4.1.3. Distribution of Laboratories

Laboratories are important of health services. The staff of laboratories conduct an important work because the patient needs accurate checkup and analyze such (blood, ration of the blood, fat, rheumatism….etc. The analyses are conducted and their results are sent to the specialist doctors, and the doctor recommends suitable treatment according to analyze and its results. The number of laboratories is 28 (Table 4.4.) as in the hospitals, main health centers, medical complexes and clinics. These laboratories are also distributed in a different way on the area of our research with a lot of imbalance. This is due to the lack of planning by the planners as well as the existence of social and economic reasons in the area.

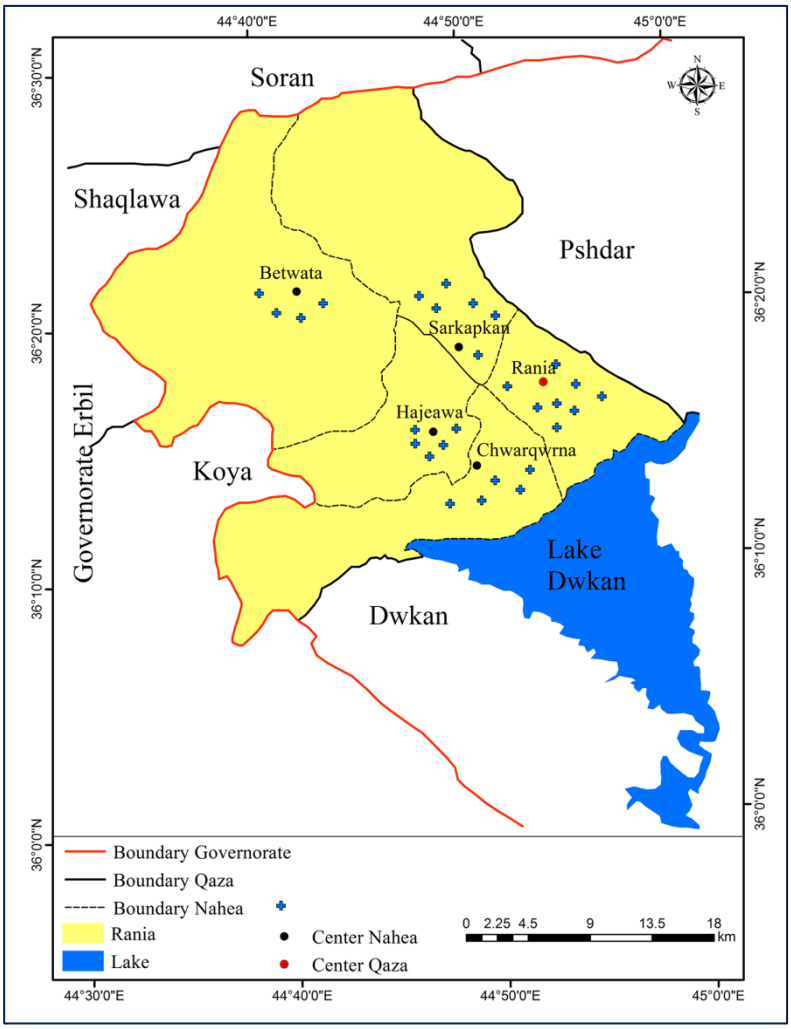

Figure 4.3. The geographic distribution of laboratories in 2017 (KRG, 2017)

4.2. Locations of Health Services in Rania District

The analyzing of distribution and the spatial difference of geographical phenomena and the modern technology have become one of the most important trends of the geographical researches. In the specialized researches of geographical phenomena, especially identifying the related problems. In this field, there are many way and forms of an advanced solving in the system when using the geographic information system (GIS) of distributing phenomena. We used some standards for analyzing the specification of spatial deviation and distributing health services in Raniya district. Mean center is one of the simplest collecting, the purpose of identifying the central point for each spatial distribution which are used by the geographers in the researches of spatial distribution through identifying the center of drawing for this distribution. This is done through

calculating the axes X and Y for all geographical phenomena of the area of research. This standard is useful for measuring the period of natural change of distributing phenomena within specific period of time, through comparing between the distributions of two phenomena or more in a specific place.

4.2.1. Standard Distance

The standard distance is one of the most important of scattering locations. Most of its uses is in statistics where it identifies and measures the rate of scattering of the standard distance. This is conducted based on the time interval between the elements of phenomenon of the standard distance through drawing a circle whose center is the center of the location, the radius is equal to the standard distance of the circle. It includes %68.3 of the elements of this phenomenon if the distribution is natural. Furthermore, the nature of the distribution changes under the effects of the reasons. Main center of health services in Raina district has been preented in Figure 4.4.

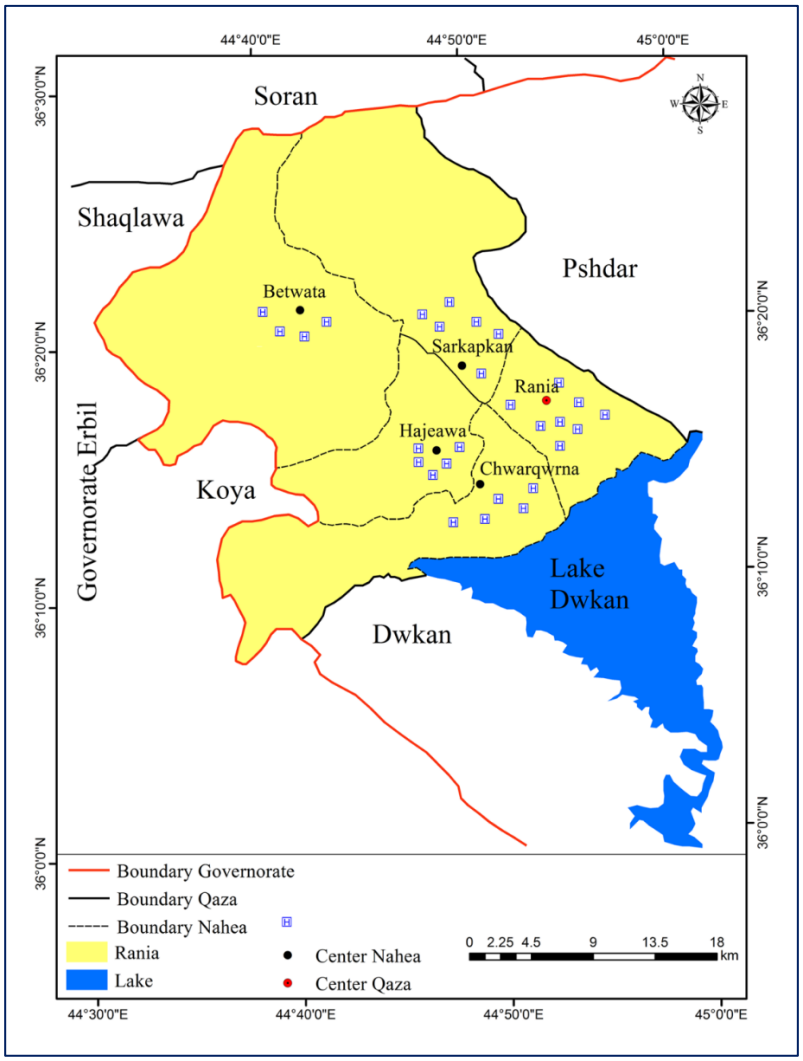

Figure 4.4. Main center of health services (KRG, 2017)

Standard distance is very important in the geographical researches if we want to know the collecting or the scattering of the elements of the phenomenon. For example, in order to know the period of the closeness and the distance of the residents from a specific service. It is possible to calculate the standard distance through the following formula:

$$SD=\frac{\sqrt{\sum(xi-x^{-})^2}}{n}+\frac{\sum(yi-y^{-})^2}{n} \qquad (1)$$

SD: Standard distance, EI: Total number of phenomenon elements, Xi: the east axes for each element of the phenomenon, Yi: the north axes for each element of the phenomenon,

X: the center of east axes, Y: the center of north axes and N: the numbers of phenomenon elements.

4.2.2. Standard Deviation

Standard deviation is used in order to identify the standard deviation of the distribution for empty spaces within the identified area. This is an important subject in geography in order to standard phenomena, so that we can get benefit from them for the purpose of conducting the actions of the planning. This standard is similar to standard distance but there is a difference in calculating in two directions, the first is on the axes and the second is on the axes. As a result, an oval shape is presented, which surrounds the elements of the phenomenon. It also gives more accurate image comparing with standard distance. Through this standard, it is possible to decide the standard deviation of the elements of the phenomenon. After applying the technique of standard deviation on the health variables in Raniya district, there was difference in the value of scatter in the oval shapes which show each variable of the area of research.

Table 4.5. Standard Deviation of health services in Rania district in 2017

Varibales	Administrative units	Pharmacies	Degree of deviation	Standard Deviation
Medical clinics	44.47179	36.564	31.82128	Northeast, Southwest
Pharmacies	44.29954	36.654	68.32122	Northeast, Southwest
Health centers	44.90876	40.32112	116.843	Northeast, Southwest
Laboratories	44.5432	36.543	148.2458	Northeast, Southwest
Medical complexes	44.33765	36.53218	16.3652	Northeast, Southwest
Total	222.5609	94.3	99.97	99.98

The distance value of the oval shapes show the difference in the deviation of each health service institution in the area of research. All variables of the health services, regarding the nature of distribution, deviated towards the northeast part, southwest part and with southeast and northeast with difference in the value of deviation of the oval shape which is 116.826 degree, in the variables of the health degree, the area of research- the district- should be widened. It had long shape between the northeast and little side towards the west. It also has the largest part of the population of the district. On the other hand, the expanding of the district towards the plains which permit the expanding of Raniya district is a reason for getting this shape.

The deviation of distribution for each variables (medical clinics, pharmacies and laboratories) had an oval shape between the northeast and the southwest. The values of each one of the deviations are 31.82128-32112, 68-46.245585. The objective of analyzing the deviation standard of the health services in Raniya district shows that there are 23 medical clinics in Hajiawa sub-district, which is higher than other sub-districts. The existence of this big number of medical clinics in Hajiawa sub-district is due to the lack of complying with the planning standards and the social factors. However, the population of the sub-district of Betwen- Sarchawa is 50.267, and there is no medical clinic but another sub-district has 23 medical clinics. The distribution of health services in the study area confirms the weakness of planning in distriution of health services. The spatial distribution has been done randomly and has not taken the density of population in the administrative units of the district.

4.2.3. Average Nearest Neighbor

Average nearest neighbor is considered as one of the most important statistical standards. In order to identify the distribution form of the geographical phenomena in a specific area, its important id represented in depending on a mathematical method in order to measure the scattering of elements of the phenomenon from each other. In distributing places, it is conducted in a random or regular way, or through addition so that the value of this standard is zero, which shows the form of accumulated distribution. This also shows the form in one distance, but if its value reaches full one, it represents the random method of distribution. If the distribution takes a definite form, this means that there is a force or a reason has affected this distribution. The analyzing and examining are difficult works, so we restore to this standard in order to know the form of distributing hospitals and health centers in Raniya district based on GIS.

Table 4.6. Value of Neighborhood Degree for the health services in Rania district

Institutions	Value of neighborhood degree	Type of distribution
Health centers	1.139915	Randomly
Hospitals	2.016256	Far from each other
Pharmacies	0.67823	Nearly collected in clusters
Medical clinics	0.676993	Nearly collected in clusters
Laboratories	0.181075	Nearly collected randomly
Medical complexes	0.524307	Far from each other

Regarding the distribution of health centers: it is noticed that the degree of securing standard which falls into the approved emergency zone, because the approved assumptions were refused when it is said that the type of distributing the health centers in Raniya district is special and organized under an effect of specific reason. After that our basic assumption was that the type of health service distribution in Raniya district is random. It was approved that the type of distribution was random and the outcomes were approved. The value of neighborhood analyze reached 14.1, the main reason for this quick wideness which is experienced by Raniya district is that this progress is not paired with the development and the progress of services on the one side. On the other hand, the difference in the size of population within the area of research, in addition to that the standards of planning were not implemented.

Regarding the type of spatial distribution of hospitals and health complexes, it is noticed that the outcome is near the neighbor, it was also distributed and organized well, where the value of its degree reached 2.56 and 2.72 degrees. Our basic assumption was refused because we refuse the basic assumption which says that the type of distributing hospitals in the area of research is random, and the outcome was stable and we approve it because it says that the type of distributing hospital is far from each other under the effect of the identified, and it is far from the random type. It is nearly 5.89 which falls outside the densely populated area.

Regarding medical clinics and pharmacies, the outcome of analyzing the spatial relations is 0.39. This means that the type of their distribution is collective which is nearly cluster type, the reason is that people always build this type of institutions in Raniya district in the place of their work, near neighborhoods and inside them, and few of them are built within the boundaries of villages, because the number of residents in villages comparing with the number of residents in urban places is less. That is why this type of services are constructed in those places in order to give more benefits to larger numbers of people. This is why in the case of the lack of these services, the villagers rely more on health centers which are existed in their area.

The outcome of analyzing the neighborhood relationship for laboratories shows that the distribution of their locations has nearly random collective type, because the laboratories are located within the boundaries of urban places. Unless they are few, the laboratories

are existed in the main hospitals, medical centers and health centers which are in the center of urban places. Some of them are private or existed in the medical clinics in order to implement their planning.

This method in the GIS is used to change the turn of inserting the points into the issued turn in a joined shape or a shape where each one is near to an identified point, during taking photos, that party could take an easy shape, so that it would not be repeated, only if each one has their own points and their location is near each one of the identified points the same as the other parties. We find out the specification of important locations and their effect on the service areas and many other places according to the close place for all health and central institution.

The effect zone is one of the most important functions of the spatial analyze in the GIS in order to measure the period and the effect zone among services. This standard is also used in order to identify shortenings in distributing these services and separate the areas which have no services. This includes a limit of specific distances which are formed in the shape of the phenomenon. These limits of this zone in the GIS are specified according to a standard.

In order to know the efficiency and the capacity of the health centers and hospitals, we rely on panning standards. For example, the effect zone of the main health center is 800 m, for the sub center is 500 m, for hospital is 20 km. for the purpose of activating the analyze, we resorted to the GIS and the maps

Geographical distribution of health services has direct effect on any plan for the purpose of developing and expanding the social economy on a scientific bases in order to secure high level standard of living for the residents of the area. On the light of this point, giving importance to the analyzing the type of distribution of services in the area of the research. The trying to identifying shortenings is the most suitable way for planning aiming to recognizing the problems which are related to the area through forming and guiding the program of planning in all life aspects until getting the outcomes of this type of project planning in order to develop the district. In general, the document of distributing health services in the area of research is demonstrating the weakness of our planning, because they did not take the standards of planning into consideration during the implementation

of the projects on the one hand, and the social and political reasons, on the other hand, is another reason for the inconsistence of distributing health services in the area of our research.

Regarding specialist doctors, the ratio of the gynecologist per person is (1: 20.000), but according to the ratio of the area of our research, it is (1:24536) which is unsuitable ration. Therefore, the area of our research needs increasing the number of specialist doctors. The needs and requirements of health services are different in the future, and it will be more distinctive in the next years due to the increasing in population which becomes larger a year by year. In order to estimate the needs of health services for Raniya district, we rely on the standards of planning, which are used in building services in a way that the efficiency, location and functions are suitable with the requirements of the population.

4.3. Functional Efficiency and Future Needs of the Health Services

The functional efficiencies include the capacity of each service institution in its assigned duties for providing suitable health services according to the demand and the needs of the residents. In this part, in order to reveal the efficiency of the health services in providing service to the residents of Shaqlawa, we rely on using some specific standards which we refer to them in the first part. This will be done in a modern way and on time for the purpose of protecting the heath of residents.

4.3.1. Functional Standard

Functional standard is necessary for all institutions in order to provide suitable health services for all residents according to the demand. The functional standard composed of standard of bed per resident, standard of a doctor per resident and standard of pharmacy per resident.

4.3.1.1. Standard of a Doctor per Resident

This standard clarifies the relation between the resident and the doctor and considered as an important standard to identify the health planning. Standard of a doctor per resident aims at revealing what the residents are mssing. This standard differs from country to

country or within country, city to another depending on the economic, social, political and civil situation and it is subject to changes. According to the international standard, each doctor is allocated for 700 persons, however in Iraqi standard, each doctor is allocated for 1.000 persons (Table 4.7).

Table 4.7. Average of nearest neighbor for the health services in Rania district

Location	Residents	Doctors	The average number of residents/ doctos	Shortening
District center	140967	65	385	+
Chwarqurna	98559	101	232	+
Hajiawa	84723	42	198	+
Betwata	42688	8	89	10
Sarkapkan	19561	6	65	+
Total	386498	222	969	10

As related to the average of number of doctors per residents in the area of the research, it is revealed table that the center of the district is the best regarding the availability of doctors per residents compared to the other sub-districts because of the population density. The standard of specialist doctors is considered an important and effective standard to evaluate the efficiency of health services in an area or location. This is due to the importance of the specialist doctor in the health institution.The number of specialist doctors in the district is presented in Table 4.8. According to the specific standard, in general the percentage of gynecologist is more than other specialist doctors.

Table 4.8. Number of specialist doctors per residents in Rania district according to the international standard in 2017

WHO Doctor/ Resident	No of doctors	Resident/ doctor in the area of research	Shortening
1:30000	5	29443	+
1:30000	5	29443	+
1:10000	10	15722	+
1:20000	6	24534	1
1:10000	2	65609	+
1:60000	8	20343	+
1:60000	7	21013	+

4.3.1.2. Standard for the Number of Bed per Resident

The standard of per resident is an important standard. Allocating beds in hospitals and the large number of beds means that there is good efficiency in providing health services,

especially for patients who are staying in hospitals. According to the Iraqi standard which was prepared by the ministry of health, a bed is allocated for 200 persons. According to the above standard, there is high shortening in the number of beds in the district and sub-districts which have been revealed in Table 4.9. The reason for this shortening in the number of beds and the imbalance in distributing them is due to the lack of planning.

Table 4.9. Average number of beds to residents in 2017

Geographical location	On the level of the sub-district	Beds	Residents	Shortening
District center	140967	108	232	-17
Chwarqurna	98559	23	102	-153
Hajiawa	84723	55	159	56
Betwata	42688	-	-	-
Sarkapkan	19561	-	-	-
Total	226	493	186	386498

4.3.1.3. Standard for the Number of Pharmacy per Resident

There are 39 pharmacies in the area of the research. According to the local standard, each pharmacy is allocated for 20.000 persons. According to the population of sub-districts, in Chwarqurna sub-district: 13241 pharmacies are allocated for Rania residents. The average number of pharmacies per resident in the center of the district is 1668. The pharmacies are allocated for 3775 persons (Table 4.10). The numbers reveal the imbalance in distributing pharmacies on the level of the administrate units of the district. There is good average of pharmacies in the study area according to the local standards. As well as the easy access to the pharmacy in order to get medicine and the needs of the patients.

The imbalance of distributing pharmacies is because the standards have not been used, on one hand, and on the other hand, the high number of the pharmacies in the center of the district is due to the existence of many IDPs there. The relevant authorities have also shortenings in giving permissions to open pharmacies randomly. In fact, to open a pharmacy, the person must be graduated from the college of Pharmacy (5) and should be a member in the syndicate of pharmacies. However, a lot of pharmacies are far from this fact because of social, economic and political reasons.

Table 4.10. Average number of pharmacies per persons in 2017

Geographical location	No. of residents	No of pharmacies	Average of person in the level of sub-ditrict
District center	140967	15	1665
Chwarqurna	98559	13	3523
Hajiawa	84732	15	4987
Betwata	42688	6	1323
Sarkapkan	19561	4	987
Total	386498	53	

4.3.2. Average Number of Medical Professionals per Resident

The total number of medical professionals in the Raina district is 230. According to the local standards, one medical professional is allocated for 400 to 500 person (Table 4.11). There is large difference between the district and the sub-district. For example, Hajiawa sub-district has the best average which is: one medical professional is allocated for 260 person. However, in the center of the district, one medical professional is allocated for 640 person. As a result, there is imbalance in the distribution of medical professionals according to the above standard, so the area of the district needs more medical professionals.

Table 4.11. Average number of medical professionals to residents in 2017

Geographical location	No. of residents	No of medical professionals	Average in the level of sub-ditrict	Shortening
District center	140967	44	565	12
Chwarqurna	98559	65	260	36
Hajiawa	84732	76	652	28
Betwata	42688	14	212	18
Sarkapkan	19561	9	108	2
Total	386498	208	1797	96

4.3.2.1. Standard for the Number of Nurse per Doctor

The standard of nurse per doctor is considered as an important factor in the health services. The shortening in the number of nurses is a huge problem for the efficiency of the health services. It is preferable and important that the number of nurse will be larger

in the health institutions. This will also ease the works and duties of doctors so that they could work more efficiently in treating and seeing the cases of patients.

According to the international standards, three nurses versus one doctor. However, according to the Iraqi standards, four nurses versus one doctor of evaluating the efficiency of health services of nurses per doctors in Raina district (Table 4.12). It is obvious that there is imbalance in distributing nurses in the district and the sub-districts as shown in the table. This is due to the lack of planning by the government and its ministries in addition to political reasons on the other side, and for economic reasons in the period of 2014- 2017.

Table 4.12. Average number of nurses per doctor in 2017

Geographical location	Doctors	Nurses	Average in the level of sub-ditrict	Shortening
District center	65	93	1.4	167
Chwarqurna	101	132	3.1	75
Hajiawa	42	81	1.9	56
Betwata	14	20	3.6	26
Sarkapkan	6	12	2	12
Total	228	338	1.2	336

4.3.2.2. Standard of the Number of Medical Professionals per Doctor

This standard is one of the most important and used standards in providing and the efficiency of health services in any area or location. According to the local standards the average is three medical professionals per one doctor. As well as the average of the medical professional in the area of the research on the level of district and sub-districts according to the Iraqi standards, as shown in the table 4.13.

Table 4.13. Average number of medical professionals to doctors in 2017

Geographical location	Doctors	Medical professionals	Average in the level of sub-ditrict	Shortening
District center	65	44	1.4	151
Chwarqurna	101	76	3.1	227
Hajiawa	42	61	1.9	65
Betwata	14	19	3.6	5
Sarkapkan	8	10	2	8
Total	230	210	1.2	456

According to the used standards, we find out that there is imbalance on the level of districts and sub-districts. As a result, it has bad effect on the efficiency of health services, so that they could not conduct proper control to the patients. The area of the research needs more employee of medical professionals in the health institutions.

4.3.2.3. Standard for the Number of Doctor per Staying Patient

Each doctor is allocated to 20 staying patients. There were 5.675 staying patients in April 2017 in the area of our research. On the level of sub-districts, according to the standard: one doctor is allocated for 29 staying patients. However, in the center of the district, one doctor is allocated for 52 staying patients, but on the level of the district: one doctor is allocated for 37 staying patients (Table 4.14). Comparing our staying patients to doctors on the level of districts and sub-districts, according to the above standard, there is shortening in the numbers of doctors which has bad effects on the nature of health treatment for our staying patients. The reason for this imbalance is due to the high number of staying patients on one hand, and the lack of the planning on the other hand.

Table 4.14. Average number of staying patients to doctors in April 2017

Geographical location	Doctors	Staying patients	Average in the level of sub-ditrict	Shortening
District center	65	3402	52	100
Chwarqurna	101	3538	35	69
Hajiawa	42	1605	38	35
Betwata	8	-	-	-
Sarkapkan	6	-	-	-
Total	222	8545	125	204

4.3.2.4. Average of Number of Medical Professionals to Staying Patients

The average of medical professionals per staying patients is on medical professional per six staying patients. There is too much shortening in the average of medical professionals to staying patients on the level of districts and sub-districts. For example, in the sub-districts, each medical professional is allocated for 77 staying patients. In Chwarqurna sub-district, one medical professional is allocated for 46 staying patients, and on the level of the entire district, one medical professional is allocated for 38 staying patients (Table 4.15). There is need of 1.284 medical professionals to achieve the aforementioned standard. Betwen sub-district has the highest number of medical professionals which is 541, the center of the district has 490 and Sarkbakan sub-district has 48. The reason for this imbalance is that the used standards have not been applied. According to the above standard, the average of medical professionals per staying patients is not consistent to the actual need, and in general it has bad effects on health institutions as well as on the employees who cannot conduct their functional assigned works properly.

Table 4.15. Average number of medical professionals to staying patients

Geographical location	Doctors	Staying patients	Average in the level of sub-ditrict	Shortening
District center	44	3402	77	490
Chwarqurna	76	3538	46	541
Hajiawa	61	1605	26	205
Betwata	19	-	-	-
Sarkapkan	10	-	-	-
Total	210	10150	149	1441

4.3.2.5. Standard of the Area

The area is one of the standards of measuring the efficiency of health institutions, and it has great importance regarding the provision of security to humans, especially for patients, who need a wide place for treatment in order to feel psychological comfort which is very helpful for quick cure and recovery. As well as the existence of parks, gardens and green zones in the health institutions is an effective factor for securing comfort and rest for patients. In Iraq, there are many used standards regarding the area needed for hospitals and health centers. As well as the difference in type, size, getting benefit and providing services which provided to the residents.

4.3.3. Future of the Health Services in Rania District

The conducting of any research is an effort in order to identifying the services which will be needed for the community in the future. It also has a great importance in the fields of planning and service development which aims at securing the needs of the residents, which in turns need the planning of health services in order to solve the future problems.
In this axis of our research and in the light of this importance for using the health services in Raniya district, we highlight the potential needs for getting benefits health services. Through which the health service needs of the residents of the district could be secured based on the planning standard which were prepared by the Board of Urban Planning in order to provide the requirements of the community. The aim of this is to reach an efficient service system which meets the needs of the residents.

The main objective of the research is recognizing the requirements of the health services of the area of the research in 2017. In this axis, the researcher has relied on evaluating these requirements which lay under the objectives of the residents. In the light of this fact, for estimating the size of population in Raniya district in the future, we rely on the annual increasing of the population, according to the demands of the research's aims and depending on the annual increasing of population, which reached 3.5% in the period between 2009 and 2017. This increasing of population requires huge health services in the future which meet the increasing demands of the residents.

Evaluation of the capacity of health service according to standards, they have much influence on development and reach the health service in any region. This standards have many difference from one region to another region even from one region are different. This is according to environmental, political, economic and social situation in the region. In this research we are depend on the world standards and the Iraqi standards. Average number of doctor for population according to the Iraqi standard in district and sub-district in the region research is possible except the Basrma sub-district is not standards. So the average number of population for bedstead according to the Iraqi standard must be 200 person for a bedstead as well. In the district and sub-district the averages are disordered for example, in Harir sub-district the average number of population for bedstead is 1018 person, in Balisan sub-district 167 and in the level of district is 533, according to fewness bedsteads in the research region is 329 bedstead as well. The pharmacies in study area are

not in standard; from nurse it has a lot of shortages in the level of district and sub-district Salahadin sub-district has 1 or 3 nurse and Hiran sub-district has a doctor and two nurse for a doctor and in the level of district 1 or 6 as well, according to nurse fewness is 564. So the number of doctors and own health job and for stable patient in the level of district and sub-district have many disorder. About the provided area for hospital and base-hospital we can see a lot of shortages, for example Hiran sub-district has 4 base-hospitals, the total provided area is 1900 m which is for any base-hospital is 475 m . if we compare this area with the mentioned standard which is according to standard civil for any base-hospital is 500 m, it would not have possible, they neglected the reasons of standard planning by the time of building and establishing.

There is no doubt that, they have reflection and bad influence for the patient psycho. The number of population in the research region in the level of district and sub-district in 2037 will be reached 313781 person, this large number will need hospital , base-hospital , doctor, nurse and bedstead by this way 15, 31, 313, 939 and 1568. By looking the map of number is 33. We know that the population number in the level of sub-district in 2037 reached 313621, which needs a big health service, the population number in (Salahadin) sub-district in 2037 will reach 109432 person, this number need 5 hospitals for 2000 person according to central hospital standard, so Harir sub-district need 4 hospitals and each of Basrma and central sub-district need 2 hospitals as well. According to base-health standard is 10000 need a base- health, by the type in Salahadin sub-district has planning to ask 11 base health services in 2037, Harir sub-district 8 and central district 5 as well in 2037.

Concerning the doctors, 1000 person need a doctor in the level of sub-district, according to Iraqi standard, the research region need 309 doctors in 2037 in this number Salahadin sub-district need more than any other sub-districts which is 109 doctors, but Balisan sub-district need less than any others which is 11 doctors. Nurse is completing doctor in service health which four doctor against to a nurse, Salahadin sub-district is being asked 436 nurses in 2037 more than any others. Therefore, Harir needs 328 and central sub-district 208 and the other sub-districts like Basrma, Hiran and Balisan need 180, 48, and 44 nurses 2037. The number of bedstead in 2037 will be 1440. According to Iraqi standard, a bedstead is for 200 individuals. Both Salahadin and Harir will need the

highest number of bedsteads in 2037 which for any sub-district is 547 and 414, respectively.

5. CONCLUSION AND RECOMMENDATIONS

Rania is a district of Sulimania Governate, and lies in the north east of the governorate. The district consists of four sub districts, which are Chwarqurna, Hajiawa, Betwata and Sarkapkan. The discussed area is on Hamiton way and is on entrance, which starts from Sulimania to Iraq-Iran internal border, Khadza area. Rania is an important place which connects of Sulimania, Erbil and Duhok together. Because of the importance of Rania location, many people live and human population rises rapidly.

Rania district has four hospitals which have 276 seats. Rania district has 34 clinics, 236 doctors with different speciality and 380 nurses. There are total of 230 medical jobs. There are 39 pharmacies, 62 clinics, 28 laboratories and 6 medical communities. Appearing the diffrences of measurement distance value for changes of health in Rania. The highest value of change is in hospitals according to measurement distance of 1828805 m. This is highest changeable distribution. The dedicated area is 1050,714 km^2.

All of the changes of health service and their distribution go towards north east, south-west, south-east and north-west, and the difference of value move in a circular shape. The value of its moving is 116,826 degree. It depends on the expansion of the distract. It expands in a longish way between north-east and west. The distribution shape of health centers and hospitals. The measurement of z-score is 1.56. This value is lower than 1.96-2.58 range (critical value). This is a proved area, therefore the hypothesis of replacement is disapproved which says that the way of division of health center and hospital of Rania have been organized and under the effects of special reasons. It does not refer randomness. Therefore, we refer to basic hypothesis which says the ways of dividing of health center and hospital in Rania are in random method. The value of analyzing the relationship of neighbourhood has reached 1.14.

According to planning measurement, the area of 800 m is for health centers and 5000 m for health center aside and 20 km for hospitals, which serve the people of the area. Which

doing this measurement, which 800 m for basic health centers and 5000 m for health centers aside it shows that basic health center 1% of the area of the distract and it is area 14.072 square meters. So 99% of the area of the distract lacks the health service. But the health center in villages cover a great deal of the area which is 1078.597 square kilometers. It covers 73% of the area of the district. There are 4 hospitals. They cover 5027 km, which is 93.79% of the total area of the district.

According to Iraqi measurement, 3 health job owners are apposite one doctor. In the district, the results are 2.3 for Chwaqurna, 1.6 for Hajiawa, 1.4 for Betwata, 0.75 for Sarkapan and for the district is 0.68. According to the measurement there is too much disorder. So it has an effect in the capacity of health service. Stating doctors measurement for those patients who stay there. Each doctors has 90 patients who stay in hospitals or hospital centers for a while. In 2015, the numbers are 8955 in Rania district in April. But in the center of district, each doctor has 37 patients who stay there to be treated.

The numbers of clinics in Rania is 34 which cover an area of 46650 m. According to civil plan, the area of 5000 m is prepared for each clinic in the subdistrics. The prepared area for each clinic in Chwarqurna, Hajyawa, Betwata, Sarkapkan, and the center of the district is 2370, 1641, 1083, 983, 800 and 475, respectively. The projection for the rise of Rania population is 313781 in 2037. Therefore, the district will need clinics, doctors, nurses, and beds. Rania distrcit will need 15 new hospitals, 31 clinics, 313 doctors, 939 nurses, and 1568 beds.

The division of health service place in the area shows flimsy evidence of planning. This is beacause of not doing planning measurement and social and political causes. Giving more importance to such researches in the area and other areas of Kurdistan region, especially those which relate to health service so that the problems will be shown. Before building each clinic or hospital, the place should be checked well and the planning measurement needs to be considered. While choosing the best place for building health service, the growth of human population should be considered Most of the villages of Rania district. are out of health service. So there should be given more importance to the villages to provide doctors. Because, the villages do not havve any doctors. The villagers have to go a long way to get health service.

There are not enough ambulances in hospitals and clinics. More ambulance and other cars should be prepared. There not enough medicine in hospitals and clinics Enough medicine should be prepared. Avoiding the difference of dividing medicine from one hospital to another. Working for rearranging the balance of dividing health service and using Geography information system to have typical distribution on administrative units.

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It has general information about computer programs including Microsoft Office and Internet programs. , he has able to speak and writing a Kurdish language (the mother tongue). Also, able to speak Arabic, English and Turkish but is not good.