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ACCESSIBILITY ANALYSIS OF THE URBAN FACILITIES IN KABUL CITY BASED ON CITY PLANNING STANDARD

PART 2 (EDUCATION FACILITIES AND TYPES OF HOUSING)

Ansari Mohammad Reza[1], Hiroko Ono[2]
[1]Department of Civil Engineering and Architecture, University of the Ryukyus, Okinawa, Japan
[2]Department of Civil Engineering and Architecture, University of the Ryukyus, Okinawa, Japan

***Abstract*—In this study we tried to evaluate the relationship between the type of housing and the accessibility rate to the existing education facilities in Kabul city. The aim was set to find how much do really the type of housing has affected the accessibility to the existing education facilities in the city. The study has been undertaken based on the manipulation and analysis of the geospatial collected data in ArcGIS and Microsoft Excel software.**

The result of the study revealed the influence of the type of housing in accessing the education facilities in Kabul city. Based on our calculation the apartments are the type with the most access to the existing education facilities where the accessibility rate in the apartment areas of the city are calculated as high as 85%. We also found out that the regular houses, irregular houses and finally hillside houses are the next categories with the best accessibility rate to the education facilities accordingly.

***Index Terms*—Education Facilities, Formal Residential Areas, Informal Residential Areas, Kabul**

I. INTRODUCTION

Kabul the capital of Afghanistan has a population of around 4.7 million. [1]-[2]-[3] According to the constitution law in the country, every citizen has the right to have access to free primary education—up to the 12th standard. Hence it is the responsibility of the government of Afghanistan to provide the infrastructure and equal opportunity for everyone in the country. On the other hand, the importance of the education is quite evident and accepted within the societies all around the world especially after the emergence of the democratic countries. Now, it is believed that the citizens through this system will learn to practice their right. At the same time, the correlation between educational attainment and civic participation is strong and well-documented where the researches quite well proved that the educated citizens have more opportunities to obtain and exercise civic skills, they are more interested and informed about politics, and in turn, are more likely to vote. [4]-[5] Hence an equal opportunity and equal accessibility of the educational facilities, regardless of their caste, religion and race is important for a better future of not only the citizen but the countries too. In our last study we found out that the accessibility to education's facilities is much higher in formal residential areas than informal residential areas of the Kabul (Please see Ansari and Ono, 2019). [6] In this study we are going to go one step further and find do the type of housing can also affect the accessibility of the citizens to the education facilities in Kabul city or no. This is while it is commonly believed that the people with good income and higher salaries are usually living in the middle-class area like apartment housing and thus in turn has more accessibility to the high-quality education than the poor living in the unplanned and informal areas. [7]

II. AIM AND PURPOSE

In this paper we are going to find the relationship between the type of housing and the accessibility rate to the existing education facilities in Kabul city. Our aim is to find how much do the type of housing has affected the accessibility to the education facilities in the city.

III. RESEARCH METHODOLOGY

This study is done based on a 3-stage methodology: 1-Data collection, 2-Analysis, and 3- Presentation of the result.

A. Stage 1: Data Collection

Through the first stage of the study we started to collect the necessary data and information regarding the type of housing and the existing education facilities in Kabul city. The acquired data and information in this regard can be presented as the three geodatabases or GIS layers which are prepared by the help of ArcGIS software. These three layers are as following:

1) Housing Data

Housing data that hereinafter in this study will be refers by the term 'Kabul Housing' were subsequently those data that provide information regarding the type of housing in Kabul city. For this study, we could successfully collect one comprehensive geodatabase from the Ministry of Urban Development and Land of Afghanistan (MUDL). Within this specific important geodatabase, the residential areas of the city were divided by type of housing into four different categories.

This precious important geodatabase which is prepared by the help of ArcGIS software is the result of cooperative study that took place among the MUDL, Kabul Municipality, Independent Directorate of Local Governance of Afghanistan (IDLG) and the GIS-team of UN-Habitat altogether. [8] The layer has been prepared on top of the 50-cm spatial-resolution 2014 Kabul's satellite images and covers the whole municipality area (1,040 sq.km).

In this important geodatabase the residential areas of the city as previously stated are categorized by the type of their housing into four categories of:

1- Apartment: which are the blocks of apartments;
2- Regular Houses: Are usually the detached houses constructed on the flat areas of the city with the regular street pattern;
3- Irregular Houses: are usually the detached houses constructed on the flat areas of the city with the irregular street pattern. They are usually the unplanned areas of the city;
4- Hillside Houses: are the houses constructed on the hill areas of the city. (Fig.1)

These categorizations subsequently made it possible to precisely scale the differences between the different types of housing in the city and their access to the education facilities respectively.

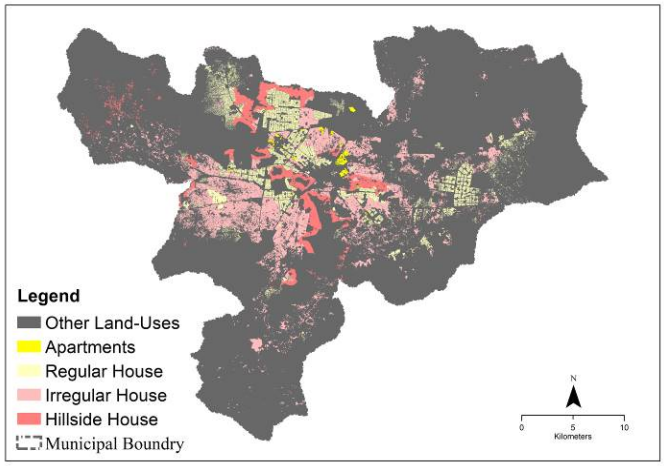

Fig. 1. Kabul Housing Layer

2) The Facility Data

The facility data for this study is extracted from our previous study on the issue which took place under the title of "Accessibility Analysis of the Urban Facilities in Kabul City Based on City Planning Standard: Part 1 (Education Facilities and Residential Areas)". (Fig.2)

3) Education Facility Accessibility Layer

Education facility accessibility layer is the result of combination of the existing education facilities and the city planning standards [9]. For this purpose, the accessibility range for each particular existing education facility in the city is defined by taking into consideration of the city planning standard of Islamic Republic of Afghanistan. (Fig.3) This specific important layer is extracted for the study from our previous study on the issue (Ansari and Ono, 2019).

It is noteworthy to mention access or accessibility in this study as same as our last study means to be located within the geographical location away from the facility to the extent that is defined by the city planning standard. In other words, it is simply defined as to be located within the radius of accessibility of each particular education facility. [6]

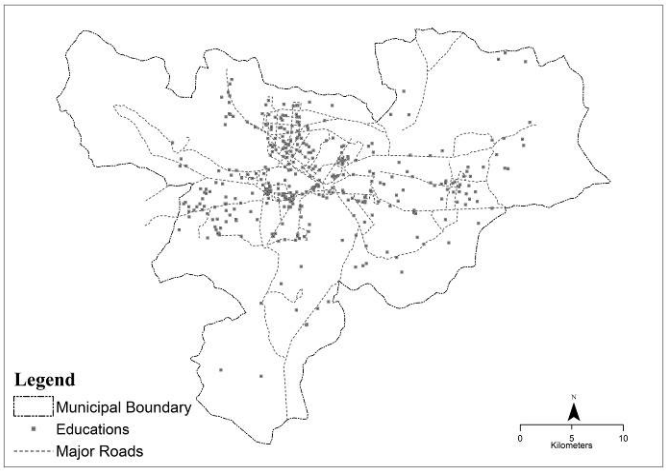

Fig. 2. Study Area and Specified Education Facilities

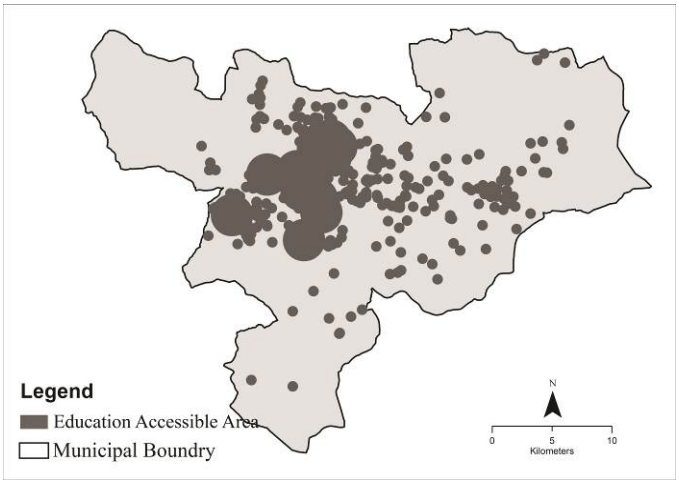

Fig. 3. Education Facility Layer

B. Stage 2: Analysis

Analysis in this study is the process of the manipulation of the geospatial collected data through ArcGIS software. In other words, it is the result of the manipulation of the three previously explained collected layer for the study.

C. Stage 3: Presentation of The Result

The results in this study as same as our last study are the direct outcome of the analysis and they will be later presented either in case of the maps, or tables and charts. Actually, again as same as our last study those results that need to be graphically presented were sent back to the ArcGIS software for the mapping and graphical presentation, others are

organized and presented in case of the tables or charts, by the help of Microsoft Excel software.

IV. EXISTING SITUATION

A. Existing Residential Situation Based on Type of Housing

A look to the Kabul Housing Layer reveals that the Kabul is a city that mostly occupied by the low and middle-rise buildings wherein the apartments only accounts for two percent of the total residential areas respectively. On the other end of the spectrum are the irregular houses where they occupy about 9,193 hectares of land in the city which account for 53 percent of the total residential share. (Table-1)

TABLE I. TABLE-1 TYPE OF RESIDENTIAL (KABUL HOUSING LAYER)

Kabul Housing Layer		
Residential Type	***Area (ha)***	***Percentage***
Apartment	356	2%
Regular House	4,583	27%
Irregular House	9,193	53%
Hillside House	3,154	18%
Total	**17,286**	**100%**

B. Existing Situation Regarding Education Facilities

A flashback to our last study on the issue shows that currently the education facilities are mostly concentrated in the central areas of the city. We clearly proved this fact in our last study by preparing the density map by the help of ArcGIS software. In this particular map which is shown in Figure-4 one-kilometer radius was assigned to each specific individual education facility in the city regardless of its type, importance level or any other criteria. (Fig.4)

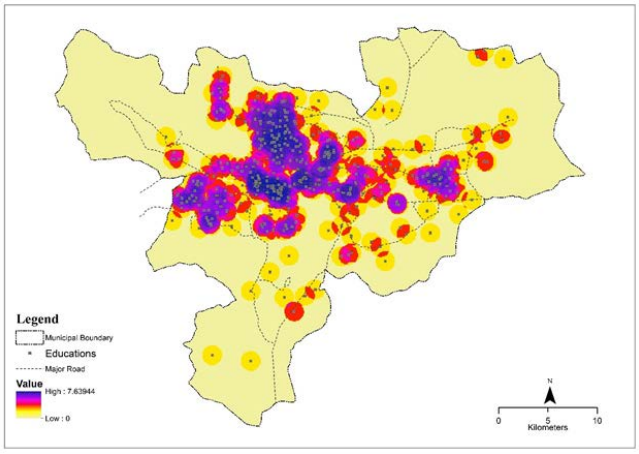

Fig. 4. Density Map of Education Facilities

V. EDUCATION ACCESSIBILITY RATE

VI. EDUCATION ACCESSIBILITY RATE AND TYPE OF HOUSING

An intersection between the Kabul housing layer and the education facility layer made it possible for us to show how the type of housing in Kabul city can affect the citizen's access to the education facilities.

A. Apartments and Access to Education

Based on our calculation from the total areas that are currently holding as apartments (356 hectares) in the city about 301 hectares of them have access to the education facilities. This means that the accessibility rate to the education facilities of the apartments in Kabul city is as high as 85%. This result put the apartments swiftly at top of the list with the most accessibility rate to the existing education facilities in the city. (Fig.5) On the other hand only about 55 hectares of them are located outside the accessibility range of the education facilities in Kabul city. A look to the Figure-5 shows that they are mostly located at the northern part of the Kabul city.

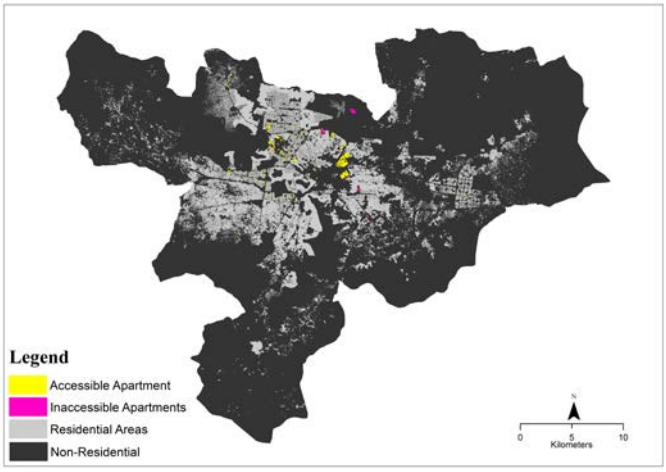

Fig. 5. Apartment and Access to Education Facilities in Kabul City

B. Regular Houses and Access to Education

Based on our calculation from all the regular houses in the city (4,583 hectares) about 3,247 hectares of them have access to education facilities that means accessibility rate to education of the regular houses is about 71%. As it is illustrated in Figure-6 the accessible regular houses—which are shown in orange color—are those that are located at the central and northern part of the Kabul. There is another visible cluster of regular houses that have access to education facilities in the eastern part of the city as well. (Fig.6)

These results subsequently clarified that the regular houses are the second housing type that are currently benefiting from the access to the existing education facilities in Kabul city.

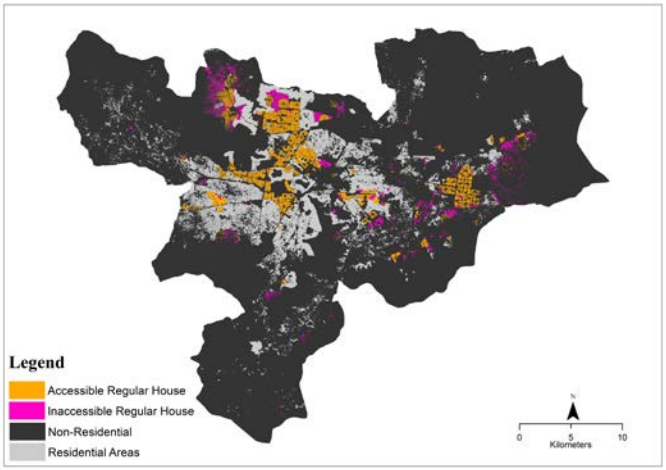

Fig. 6. Regular Houses and Access to Education Facilities in Kabul City

C. Irregular Houses and Access to Education

The results of our calculation also revealed that the accessibility rate to education facilities of the irregular houses in Kabul city is at about 55% where from the 9,193 hectares of the irregular houses in the city only about 5,063 hectares of them have access to education facilities. (Fig.7)

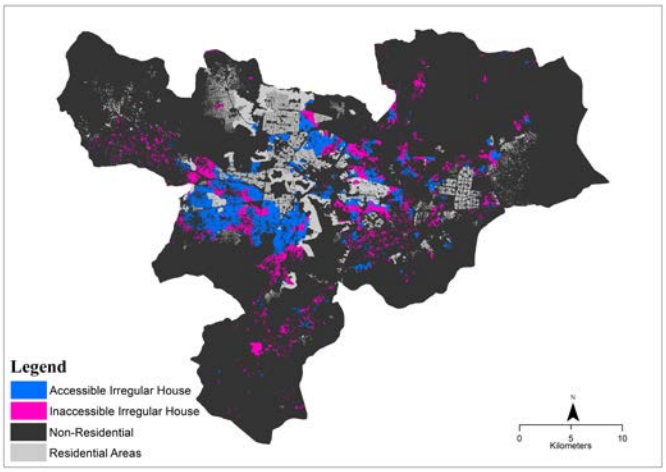

Fig. 7. Irregular Houses and Access to Education Facilities in Kabul City

This result can be simply interpreted as the important factor that indicate the bias in the existing pattern of distribution of the education facilities in Kabul city. As it is explained earlier through the text the regular houses and the irregular houses are mostly the two different categories of the detached houses in the city. While our data could not sufficiently provide us with the information regarding the materials or the quality of the construction of these two but it was well contained to the information about the street pattern in these areas. What is interesting is that the relationship between the accessibility and the street amount or the size is a fact which is undeniable. With all this information we can subsequently conclude that the education facilities not only currently mostly concentrated in the regular houses—which are mostly constructed in compliance to the Kabul Master Plan and we can call them planned areas of the city—in comparison to the irregular houses but their existing street pattern and amount provide them with much more options to access the nearby existing education facilities as well.

D. Hillside Houses and Access to Education

Finally, our calculation revealed that from the 3,154 hectares of the land that are currently hold as the hillside houses in the city about 1,126 hectares of them have access to the existing education facilities. This means that the accessibility rate of the hillside houses to the education facilities in Kabul city is as low as only 36%. (Fig.8) This result subsequently put the hillside houses in the bottom of the table as the type of housing with the least access to the existing education facilities in the Kabul city.

On the other hand, this category of housing is not only suffering from the less education facilities but at the same time the difficulty of constructing road on the slope and hillside areas put them in a very worst condition in regard of accessing to the roads and streets respectively.

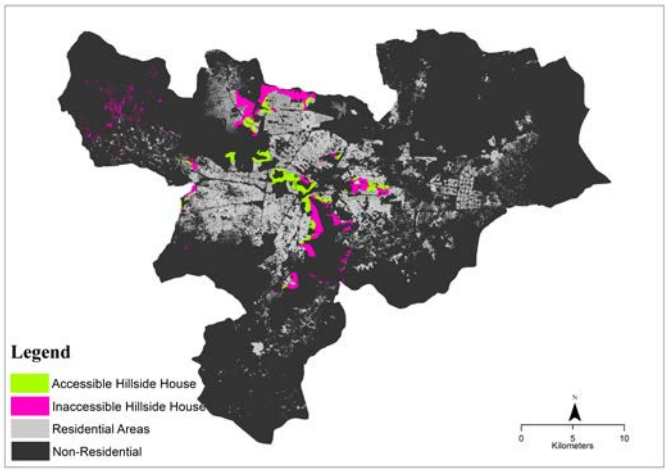

Fig. 8. Hillside Houses and Access to Education Facilities in Kabul City

VII. Conclusion

In this study we could clearly find that the type of housing can positively or negatively affect the access to the education facilities within the city of Kabul. We could conclude this, not only based on the accessibility rate but from the information that the Housing Layer could provide us for each type of them respectively. We could clearly show that if you are currently living in the Apartments your chance of access to education facilities is calculated at about 85% while this number for the hillside houses are calculated at only about 36% which shows a massive difference between the two. This massive difference can clearly state how important the type of housing that you are currently living in could be in order to provide you with the proper chance of accessing your nearby education facilities.

In this study we also calculated that the accessibility rate in the regular houses and irregular houses of the city—which are almost the same type with the different street pattern—is too different. If you are living in the regular houses your

accessibility rate to the education facilities will be about 71% which is quite good. Meanwhile if you are living in the irregular houses of the city not only you will lack the proper street pattern and amount to access your nearby facilities but your accessibility rate to the education facilities—as per our definition of the study—will be about 16% less than those who are living in the regular houses.

Based on our finding the worst case in accessing the education facilities is right now happening in the hillside areas of the city where only about 36% of the residence have access to these facilities—based on the definition of our study. And as it is stated previously right now no one can deny the fact that these settlers not only suffering from the less accessibility rate to the facilities but at the same time they are the type of housing with the less access to the road and streets in the city too—due to the difficulty of constructing road and streets on the hillside areas and slopes.

At the end we have to state that this research has thrown up many questions in need of further investigation too. Further work needs to be done to establish whether do the access to other types of facilities (e.g. Medical and health facilities in the Kabul city) is the same as the education facilities or in that case the type of housing cannot affect your access to the nearby facilities respectively.

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