

Spatial Analysis of Public Services (schools) in Nablus City Using the Tool of Geographic Information System (GIS)

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Abstract

This paper basically aims to study the existing public services (schools) in Nablus city in terms of their capability, distribution and suitability for the urban expansion and population growth in the city. This paper includes a comprehensive survey of all schools in the city in order to provide a database of this service, in addition to data about the number of students, teachers and architectural characteristics of the building and their services. It also measures the level of satisfaction of such public services was measured through the results of the questionnaire distributed to a random sample of students. The methodology of the study was based mainly on the descriptive and analytical research methods by using the tool of Geographic Information System (GIS) and the Statistical Package for Social Sciences (SPSS) as well as using certain geographic models like nearest neighbor analysis. The results of the study indicated the existence of randomness in the distribution of schools in Nablus city due to the absence of proper planning and reference to planning regulations. In addition, the study showed the lack of efficiency and capability of such services.

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1. Introduction

The importance of urban planning is that it's a comprehensive study of all aspects that affect the formation of the urban environment, (Yaakup & Sulaiman, 2007) which include urban form, economic, social and administrative. It also helps in providing public services to the population such as education, health and other services, (Scholten & Stillwell, 2013). Furthermore the importance of proper planning of land use and how to distribute the public services in a scientific and systematic manner because it is a priority for developing societies. Nowadays there are several softwares that could support decision makers and planners and help them analyze and control the data such as GIS (Rahaman & Salauddin, 2009), which can be used for many different purposes in public services to meet the population's needs (Attfield, Tamiru, Parolin, & De Grauwe, 2002) (AbuSada & Thawaba, 2011).

Nablus city and other Palestinian cities suffer from indiscriminate distribution of public services including educational services as well as failure to observe the planning criteria for these services. This is due to several conditions, (Shaheen, 2013) including inadequate government land allocated to these services and lack of financial resources to purchase private land and other political factors such as the lack of control over land as a result of Israeli occupation (Abdulhadi, 1990).

The aims of this study is to help improve the existing public services (schools) in Nablus city in terms of capability, distribution and suitability for the urban expansion and population growth in the city, which includes a comprehensive survey of all the schools in the city in order to provide a database for this service. The level of satisfaction of such public services was measured through the results of the questionnaire distributed to a random

sample of students. It also determines the population's need for the educational service in the future because Nablus city has rapid population growth.

2. Data and methodology

The research methodology is divided into five steps:

- General Survey and theoretical framework: This stage includes a survey of the study area, concepts, models and theories that are related to the subject of this study.
- Data Collection: This stage includes collecting the descriptive and spatial data depending on the formality statics, reports, interview, observation and questionnaire.
- Data preparation: This stage includes data processing, coding and data entry, and dropping data collected on digital maps and tables to carry out an analysis this data by using ArcGIS10.2 software and the program of statistical package for social sciences SPSS.
- Spatial and Quantitative Analysis: In this stage, the current reality of the educational service distribution was analysed and the problems and vulnerabilities faced with developing proposals and appropriate solutions and perceptions of the future were identified.
- Results and conclusion: This stage evaluates the results and develops recommendations in order to get rid of the problems of the educational services sector. Finally, view the study's conclusion and recommendation of this study.

2.1. Study area

The study consists of educational services (schools) within the boundaries of Nablus city except the camps. The study area also was divided into nine sections of each section representing a neighborhood. The sections were separated according to the streets that separated the neighborhood and the other. The field survey was conducted for all the surrounding area as shown in (figure 1).

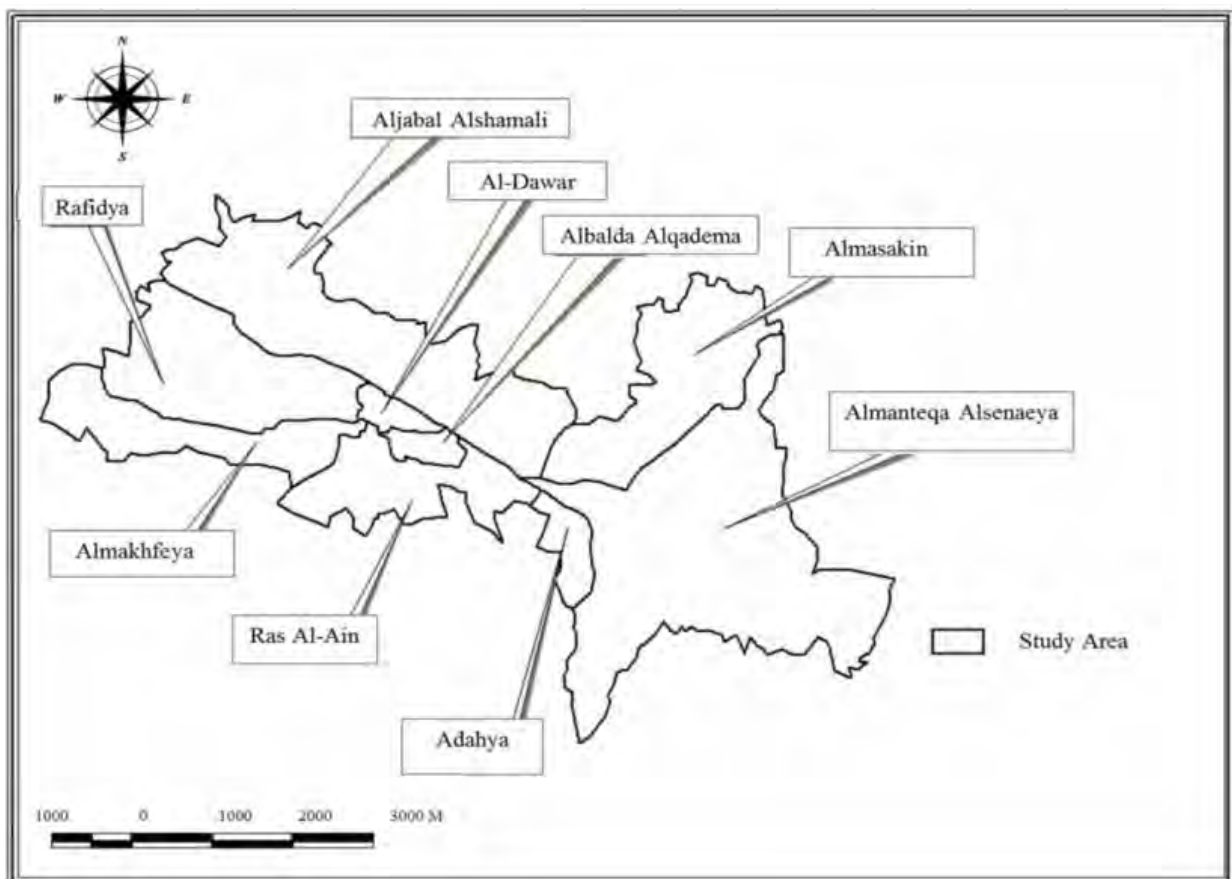


Figure 1 study area

3. The spatial and Statistical analysis

3.1. Nearest Neighbor analysis

It is based on the study of the distribution of educational services (schools) in the neighborhood to understand the pattern of distribution which is clustered, random, or regular, which helps to make a proper future plan and the following equation can be applied in the study of the nearest neighbor analysis:

$$R = (2 * D) * N / A$$

R = nearest neighbor analysis

D = average distance between points (real distance) and the average is the distance between points and divide it by the number of readings (measurements).

N = Number of service location points.

A = Area of the search area.

The value of the nearest neighbor analysis ranges from 0-2.15 where the quantitative meaning has a clear and specific meaning. If the value is nearly zero, this means it is clustered and if the value is nearly 2.15, this means the height of the spread, therefore (Appendix 1) shows the pattern of distribution of schools.

Figure 2 shows the neighborhood affiliation of the schools in the study area and according to the correlation equation, the total distance between the school sites in the study area is equal to (25500)m and the number of schools is (85). The land area of the studied location is equal to (28690932) m² and is derived from the nearest neighbor analysis equation: (0.0017770). Near zero, this means that the pattern of distribution of schools is clustered in the total study area and in the neighborhoods.

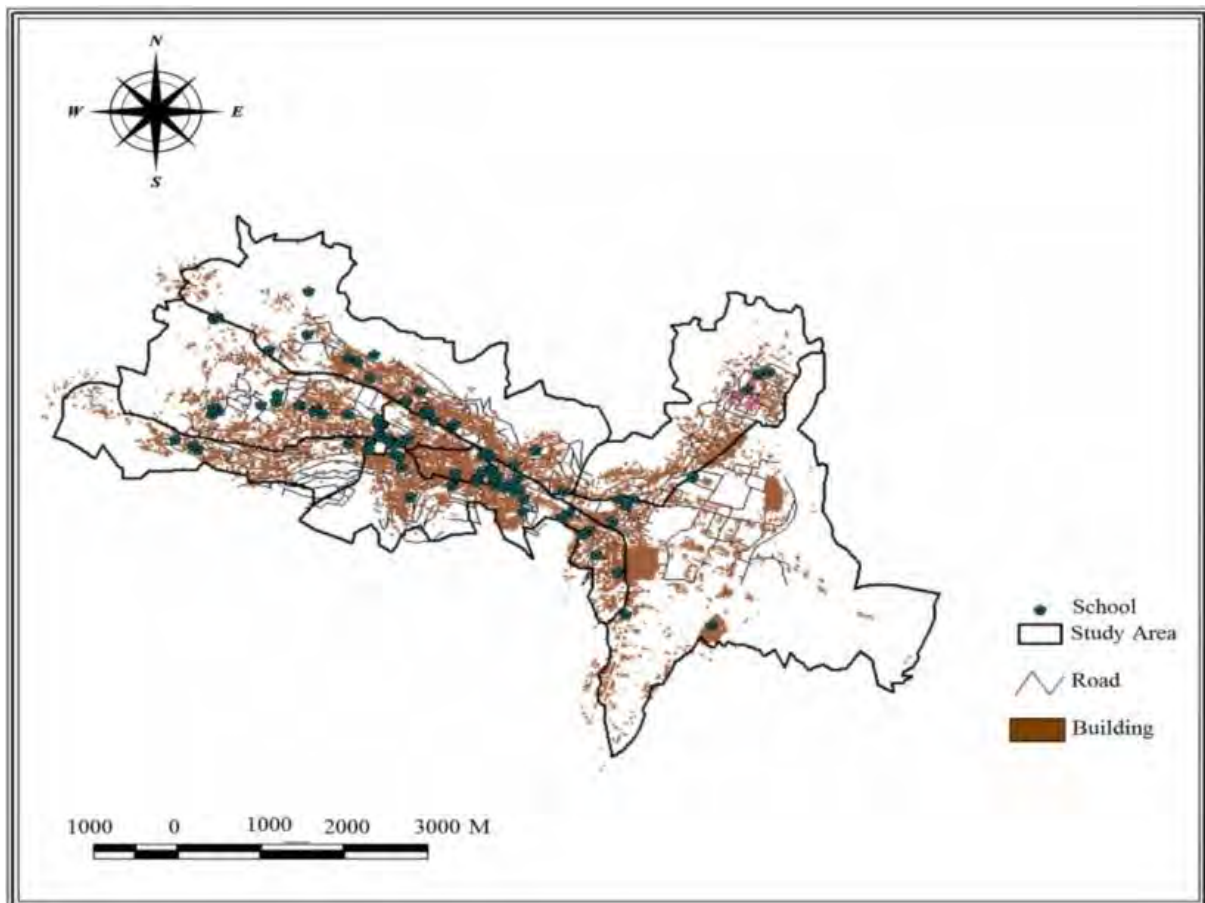


Figure 2 distributions of schools

3.2. Statistical analysis:

Nablus city has a population of about (153097) people and (85) schools with (34149) students. About (16903) of them are males and (17246) are females.

The percentage of education in Nablus city is (0.22305 %) by dividing the total number of students on the population. The statistical analysis will be achieved by dividing the city into separate neighborhoods.

The following (Appendix 2) shows the distribution of schools in the study areas, the number of students who are studying in these schools, and the number of students who live outside the neighborhood and who study in nearby schools but are not affiliated with their neighborhood. It is, therefore, good to study the schools that are located within the neighborhood in which the students live in order to facilitate and control the efficiency of distributing the services. Aljabal Alshamali, Albalda Alqadema, Almakhfeya, Almasakin, Al-Dawar and Adahya neighborhood have a large number of students who study there but come from different neighborhoods. Ras Al-Ain, Rafidya and Almanteqa Alsenaeia neighborhoods are also sought out by a large number of students who live outside of these neighborhoods, which causes overcrowding and lack of control and efficiency of education. Appendix 3 indicates the neighborhoods' area and the population numbers and the density. Appendix 4 shows the standards of primary, middle and secondary schools in the Palestinian Ministry of Education. Appendix 5-13 show the standards that match with the schools.

3.3. The level of satisfaction

In order to obtain results on the level of satisfaction of the educational services provided to the students, a questionnaire was used. About (380) questionnaires were distributed to students in (85) schools. The number of valid questionnaire for analysis is (300). (Table 1) shows students satisfaction in the distance between the school's location and the living place. The data indicates that 53% of the suitables think the schooling is suitable, 34% think schools are acceptable, and 13% think they are not suitable.

Table 2 shows what the students think of the school building. About 43% of them think that the school building is suitable, 41% feel it's acceptable, and about 16% believe it's not suitable. Table 3 shows the possibility of leaving the building in case of emergency. 44% said it is suitable, 38.7% of respondents said it's acceptable while 17% said it's not suitable.

Table 1 distance between the school location and the living place

	Frequency	Percent
Suitable	159	53
Acceptable	102	34
Not suitable	39	13
Total	300	100

Table 2 the view of the students on the school building

	Frequency	Percent
Suitable	129	43
Acceptable	123	41
Not suitable	48	16
Total	300	100

Table 3 the possibility of leaving building in case of emergency

	Frequency	Percent
Suitable	133	44.3
Acceptable	116	38.7
Not suitable	51	17
Total	300	100

4. Discussion and result:

In Rafīdyā, Almahfeyā, Ras Al-Ain, and Al-Dawar neighborhood, according to the data, the location of the school doesn't meet the required standards so we recommend that the location is moved to a site that is suitable for the number of students who have study in this school. Additionally, the schools in Albaldā Alqadema neighborhood are not meeting the required standards of primary school and the student's proportion of the built up area and the student's proportion of the total area of the site also doesn't meet the standard. Therefore, we suggest that the location should be suitable for the number of students who have study in these schools, moreover the number of students in each class also is not suitable. The same could be said about schools in Almanteqā Alsenaeāya neighborhood, Adahya neighborhood, Aljabal Alshamali neighborhood, and Almasakin neighborhood.

As for Almahfeyā, Al-Dawar, Albaldā Alqadema, Adahya, Aljabal Alshamali, and Almasakin neighborhoods, we recommend that new schools be built in these area including primary, middle and secondary schools because most of the students in those neighborhoods seek schools elsewhere.

5. Conclusion and recommendation

The study area suffers from poor efficiency in providing educational services. Most school sites were not based on prior planning, but according to the availability of the land and the conditions of financial support. The analysis of the neighborhood link method shows that most educational services are clustered. Moreover, the lack of administrative Management from the Ministry of Education fails to distribute the students according to the geographical location, which leads to poor services in some areas of the neighborhoods in the city.

It's necessary to identify local planning regulations for public services in Nablus City in particular and in other Palestinian cities in general. It's also necessary to establish a spatial planning department at the Ministry of Education who will be responsible for the distribution and planning of educational services as well as applying the planning regulations according to the population growth and geographic features of the settlements.

Appendix

A1 pattern of distribution of schools

LOCATION	ED	N	ED/N	2*D	A/M ²	N/A	$R=(2*D)*N/A$	R
Rafīdyā	3750	15	250	500	3683847	0.0000041	0.00205	clustered
Almahfeyā	2710	7	387.1	774.2	2348267	0.0000290	0.00224	clustered
Ras Al-Ain	3890	19	204.7	409.4	2342513	0.0000081	0.00033	clustered
Al-Dawar	100	2	50	100	371322	0.0000053	0.00053	clustered
Albaldā Alqadema	815	8	101.8	203.7	379617	0.0000210	0.00427	clustered
Almanteqā Alsenaeāya	4600	7	657.1	1314.2	9272829	0.0000007	0.00092	clustered
Adahya	1100	5	220	440	653070	0.0000076	0.00334	clustered
Aljabal Alshamali	7300	19	384.2	768.4	6023911	0.0000031	0.00238	clustered
Almasakin	400	3	133.3	266.6	3615556	0.0000008	0.000213	clustered
nablus	25500	85	300	600	2869093	0.0000029	0.001777	clustered
					2			

A 2 distribution of schools in the study areas & the number of students

LOCATION	No of Schools	No of students in neighborhood	No of students study in neighborhood schools	No of students are going study out neighborhood	No of students are outside coming to study in the neighborhood schools
Rafidya	15	3546	8209	0	4663
Almakhfeya	7	3341	2510	831	0
Ras Al-Ain	19	5704	6714	0	1010
Al-Dawar	2	2381	690	1691	0
Albalda Alqadema	8	4813	3810	1003	0
Almanteqa Alsenaeaya	7	1063	3726	0	2663
Adahya	5	2944	1052	1892	0
Aljabal Alshamali	19	7576	6239	1337	0
Almasakin	3	2778	1261	1517	0

A 3 Neighborhoods area & no of population & density

LOCATION	Area m ²	Nu of population	Density p/km ²
Rafidya	3683847	15897	4310
Almakhfesya	2348267	14979	6370
Ras Al-Ain	2342513	25573	10910
Al-Dawar	371322	10678	28750
Albalda Alqadema	379617	21582	56850
Almanteqa Alsenaeaya	9272829	4766	520
Adahya	653070	13199	2021
Aljabal Alshamali	6023911	33664	5630
Almasakin	3615556	12459	3440

A 4 The standards of schools

Item	Primary school	Middle school	Secondary school
No of students	20-700	440-560	180-540
Location area m ²	2000-7000	4000-5400	1800-5400
Build up area m ²	800-3000	1400-2300	800-2300
Location area m ² /student	10	10	10
Build up area m ² /student	1.57	1.57	1.57

No of class room	6-18	12-15	6-18
No of students in class room	37	37	30

A 5 Rafidya neighborhood schools match withThe standards

Item	Primary school	Middle school	Secondary school
No of schools	2*	8*	5*
No of students	192*	3923*	4094*
Location area m ²	1252**	17786**	18070**
Build up area m ²	515*	12798*	13557*
Location area m ² /student	6.5**	4.5**	4.4**
Build up area m ² /student	2.6*	3.3*	3.3*
No of class room	9*	114*	114*
No of students in class room	22*	35*	36*

* Relevant standard ** Not standard

A 6 Almakhfeya neighborhood schools match withThe standards

Item	Primary school	middle school	Secondary school
No of schools	2*	3*	2*
No of students	416*	1117*	977*
Location area m ²	2319**	4749**	4937**
Build up area m ²	792*	2501*	4136*
Location area m ² /student	5.5**	4.2**	5**
Build up area m ² /student	2*	2.2*	4.2*
No of class room	11*	31*	29*
No of students in class room	34*	36*	38*

* Relevant standard ** Not standard

A 7 Ras Al-Ain neighborhood schools match withThe standards

Item	Primary school	Middle school	Secondary school
No of schools	9*	3*	7*
No of students	2024*	974*	3716*

Location area m ²	8976**	6764**	26874**
Build up area m ²	4951*	5321*	15170*
Location area m ² /student	4.4**	6.9**	7.2**
Build up area m ² /student	2.4*	5.4*	4*
No of class room	65*	29*	102*
No of students in class room	37*	34*	31*

* Relevant standard ** Not standard

A 8 Al-Dawar neighborhood schools match with The standards

Item	Primary school	Middle school	Secondary school
No of schools	1*	0	1*
No of students	156*	0	534*
Location area m ²	482**	0	3000**
Build up area m ²	325*	0	2800*
Location area m ² /student	3**	0	5.6**
Build up area m ² /student	2*	0	5*
No of class room	6*	0	13*
No of students in class room	26*	0	41*

* Relevant standard ** Not standard

A 9 Albalda Alqadema neighborhood schools match with The standards

Item	Primary school	Middle school	Secondary school
No of schools	2*	2*	4*
No of students	555*	964*	2291*
Location area m ²	3528**	6664*	9596*
Build up area m ²	742*	2566*	6587*
Location area m ² /student	6.4**	7**	4.2**
Build up area m ² /student	1.4**	2.6*	2.9*
No of class room	16*	25*	61*
No of students in class room	38**	39*	35*

* Relevant standard ** Not standard

A 10 Almanteqa Alsenaeaya neighborhood schools match with The standards

Item	Primary school	Middle school	Secondary school
No of schools	2*	2*	3*
No of students	731*	1073*	1922*
Location area m ²	3509**	5674**	59536*
Build up area m ²	3006*	4230*	8980*
Location area m ² /student	4.8**	5.2**	30.9*
Build up area m ² /student	4.1*	3.9*	4.6*
No of class room	21*	30*	50*
No of students in class room	35*	36*	39*

* Relevant standard ** Not standard

A 11 Adahya neighborhood schools match with The standards

Item	Primary school	Middle school	Secondary school
No of schools	4*	1*	0
No of students	486*	566*	0
Location area m ²	1570**	1140**	0
Build up area m ²	832*	1640**	0
Location area m ² /student	3.2*	2**	0
Build up area m ² /student	1.7*	2.9*	0
No of class room	23*	16*	0
No of students in class room	22*	36*	0

* Relevant standard ** Not standard

A 12 Aljabal Alshamali neighborhood schools match with The standards

Item	Primary school	Middle school	Secondary school
No of schools	10*	4*	5*
No of students	1591*	1543*	3105*
Location area m ²	14260**	20324*	16590**

Build up area m ²	6931*	5624*	13359*
Location area m ² /student	9**	13*	5.3**
Build up area m ² /student	4.4*	3.6*	4.3*
No of class room	81*	53*	86*
No of students in class room	20*	29*	36*

* Relevant standard ** Not standard

A 13 Almasakin neighborhood schools match withThe standards

Item	Primary school	Middle school	Secondary school
No of schools	1*	1*	1*
No of students	70**	695**	559*
Location area m ²	150**	5000**	5700*
Build up area m ²	100*	2400*	1730*
Location area m ² /student	2.1**	7.1**	10.1*
Build up area m ² /student	1.4*	3.4*	3.1*
No of class room	2*	20*	15*
No of students in class room	35*	35*	37*

* Relevant standard ** Not standard

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