Analyzing the Spatial Distribution Patterns of High Schools in Thanlyin Township

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Abstract

Education is one of the main indicators of the development area of others been healthcare, employment and unemployment rate and gender equality. This paper deal with the study on spatial distribution patterns of high schools in Thanlyin Township. There are 17 urban wards and 28 village tracts in study area. Information related to the high school was obtained from the Thanlyin Township Education Office. The obtaining data include descriptive analysis, nearest neighbor analysis and mean center. According to the results, there are 17 high schools in the study area, 14 of which are government schools and 3 private schools. The Nearest Neighbor Analysis of High Schools in Thanlyin Township is the individual R scores can therefore take on any value with 0.79 indicating the presence a nearly of random observed distribution.

Key Words: Education, High schools, Spatial distribution, Nearest Neighbor Analysis

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Introduction

Education plays a vital role in the development of a country. In addition, education is a process which human beings can easily acquire knowledge, skills, values, beliefs and habits. Therefore, the distribution patterns of high schools are the most basic and play an essential part of education. A spatial distribution in statistics is the arrangement of a phenomenon across the Earth's surface and a graphical display of such an arrangement is an important tool in geographical and environmental statistics. (Source: Wikipedia) This research paper is presented on spatial distribution of High Schools in Thanlyin Township. The analysis surveyed the close relationships between geographically factors and the distributed patterns of schools.

Background History of Thalyin Township

Thanlyin was founded and ruled by King Nga Thanlyin and ruled by 36 dynasties during the region of King Bawgathena. After the Second Anglo-Burmese War in 1852, Thanlyin became the Queen Victoria Empire (British colony). Thanlyin was designated as a town under Section (4) of the Cities Act 1907. The General Administration Department issued the proclamation No.(47) dated 18.4.1912.

Location of study area

Thanlyin Township is situated in the southern district in Yangon region. It lies between north latitudes 16° 40′ and 16° 59′ and east longitude 96° 13′ and 96° 25′. The total area of Thanlyin Township is 372.9 square kilometer or 143.56 square miles (31.5 miles). The including area of urban is (5.94) square miles and (134.62) in rural area. It is border with Bago river in the north, Thonegwa Township and Khayan Township in the east and Kyauktan Township in the south and Yangon river in the west. It is consisted of 17 wards and 28 village tracts.
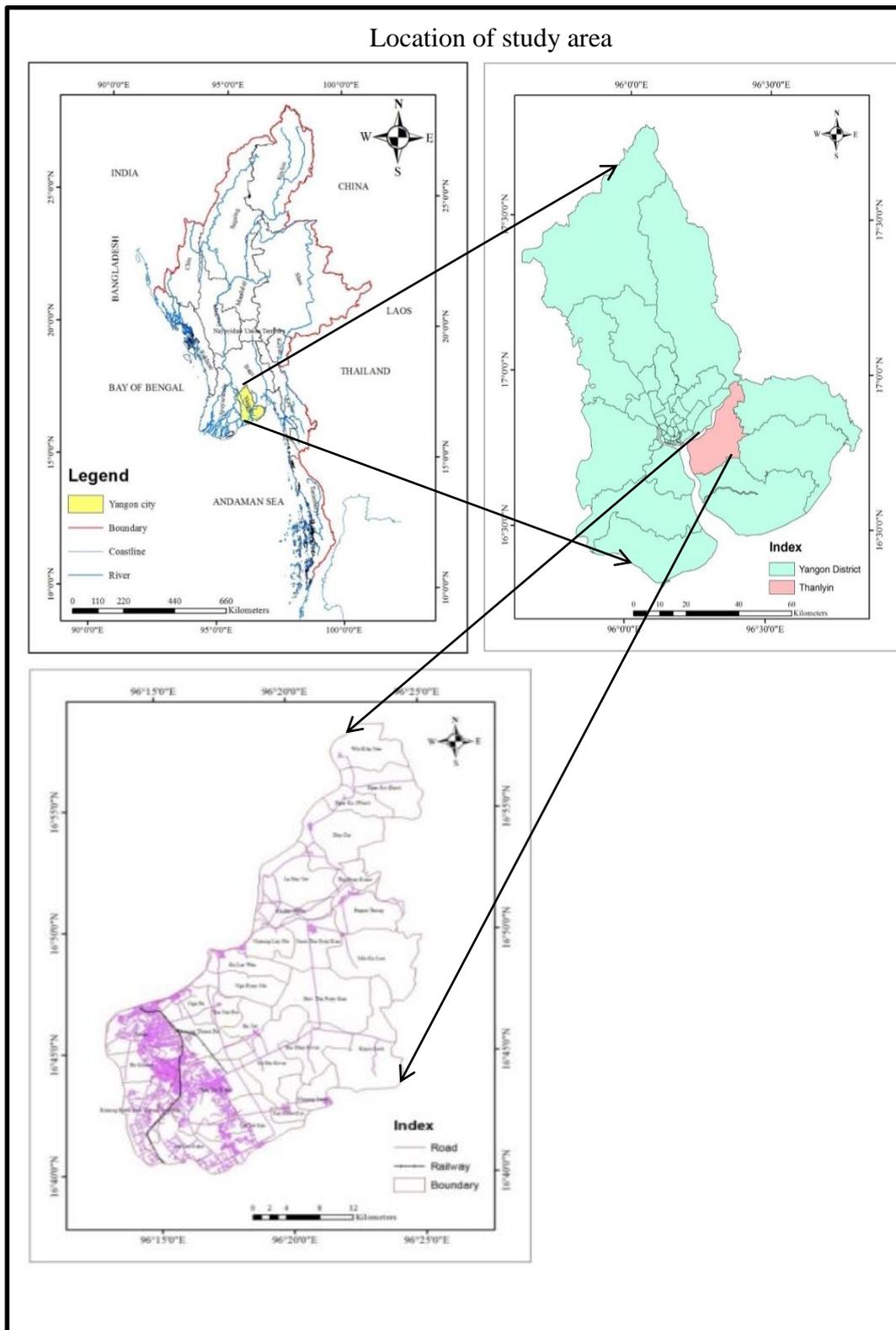
Figure (1) location of study area
Sources: MIMU and Open street map
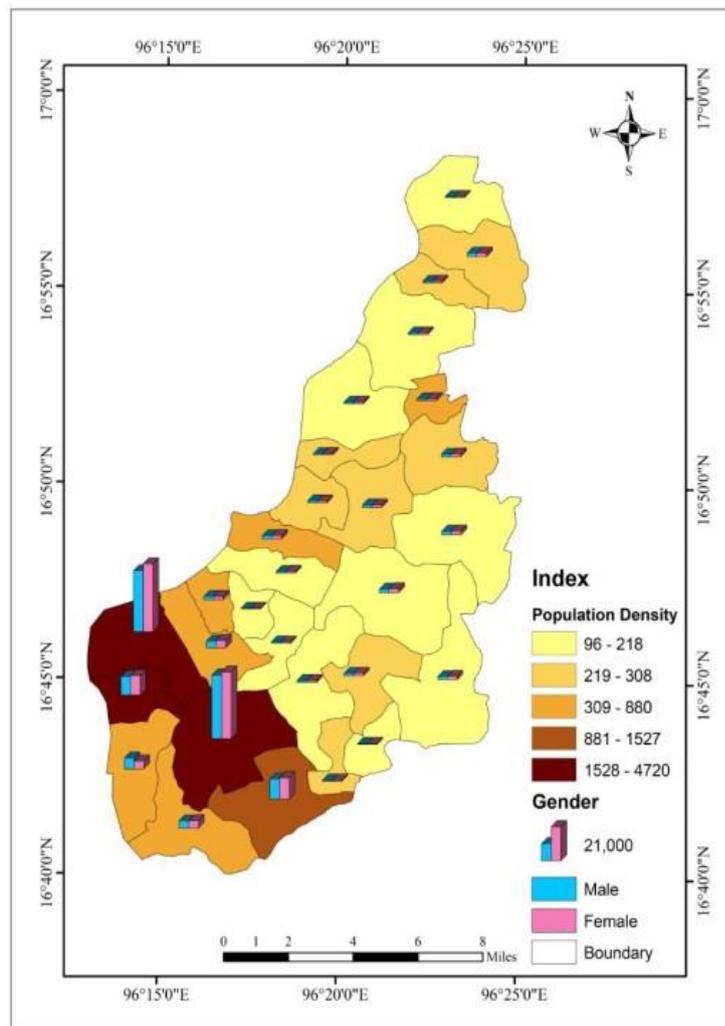**Population Distribution and Density**

When studying the population of Thanlyin Township, it had two parts which are urban and rural area. In this township, there are (17) wards in urban and (28)

village tracts in rural. The total population of the township is 298902 persons. It has one-third of total population (80242) persons in urban and remaining two-third of total population (21860) persons in rural area. The population density of the township is (2082) persons per square mile. The most using urban lands are for government departments, industrial lands, hospital, park and residential. Similarly, agricultural lands are mostly used in rural area. The population of the Thanlyin Township is the most populated in the southwest part of the area. So, the distribution of population is not equal between urban and rural area.
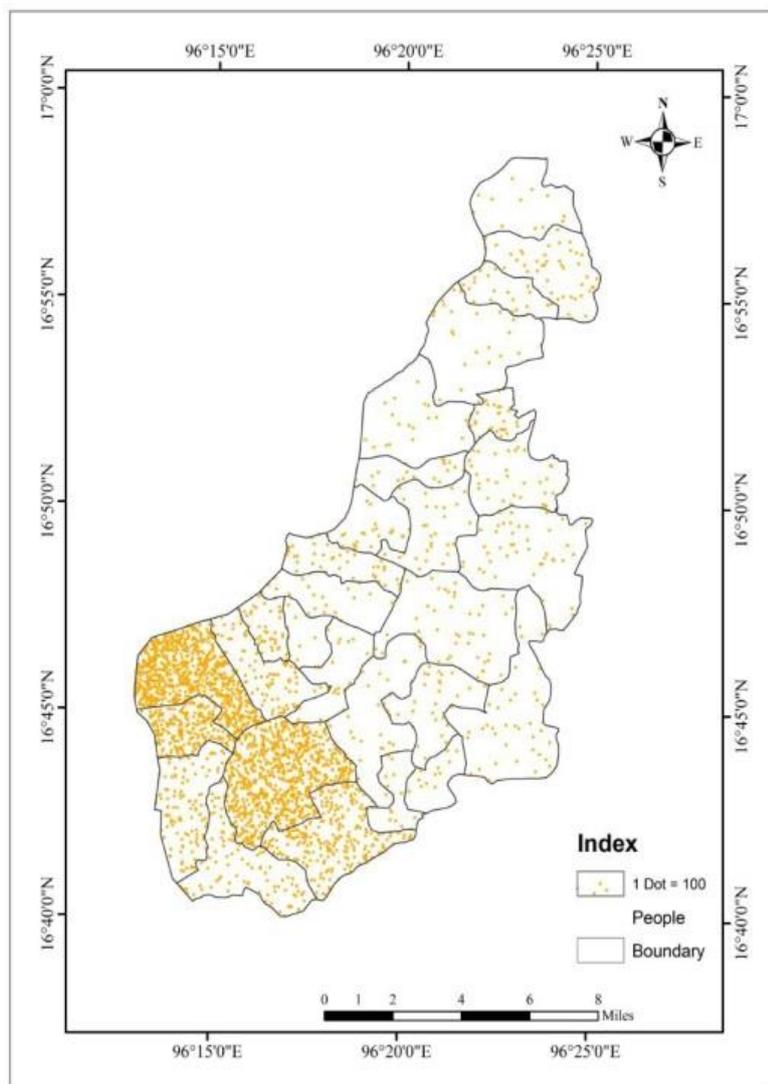
Figure (2) Population Distribution in Thanlyin Township
Sources: Office of the General Administrator

Figure (3) Population Density in Thanlyin Township
Sources: Office of the General Administrator

Aim and Objective

- To analyze the spatial distribution patterns of high schools in Thanlyin Township
- To describe the distribution patterns of high schools in rural and urban by using tables, graphs and pie chart.
- To calculate nearest neighbor analysis to measure the distributions according to whether they are cluster, random or disperse.
- To evaluate the mean center of the schools by using Arc GIS spatial statistical tools.

Data and Methodology

In this research the using data and population figure were to be obtained from township education office. This research used the following analysis-

Descriptive Statistical Analysis

The collecting data converted into simple statistical tables and pie charts, so as to aid visual.

Nearest Neighbor Analysis

The measurement of distribution whether they are cluster, random or disperse. The nearest neighbor formula produces a result between 0 and 2.15, where the following distribution pattern form a continuum

- Cluster   – 0
- Random   – 1.00
- Disperse   – 2.15

The nearest neighbor scale can be referred to as an "R" scale, and the individual R values can be calculated as follows:

Where,

$$R = \frac{\bar{r}A}{\bar{r}E}$$

$$\bar{r}A = \frac{\sum r}{N}$$

Or the mean of the series of distances to nearest neighbor, r being the distance from each point to its nearest neighbor ("A" meaning "actual") and

$$\bar{r}E = \frac{1}{2\sqrt{p}}$$

Or the expected mean distance to a nearest neighbor in an infinitely large random distribution of density P ("E" meaning "Expected", P being defined as)

$$P = \frac{\text{number of points (N)}}{\text{total area}}$$

The individual R Scores can therefore take on any value between zero signifying absolute clustering, to 2.15, signifying maximum dispersion, with unity indication the presence of a random observed distribution.
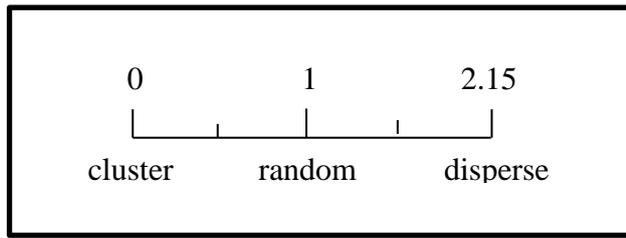
Source: Yeates: M.H: An introduction to Quantitative Analysis in Economic Geography

Statistical Analysis

Arc GIS spatial statistical tools is used to measure the mean center of the schools.

Research design
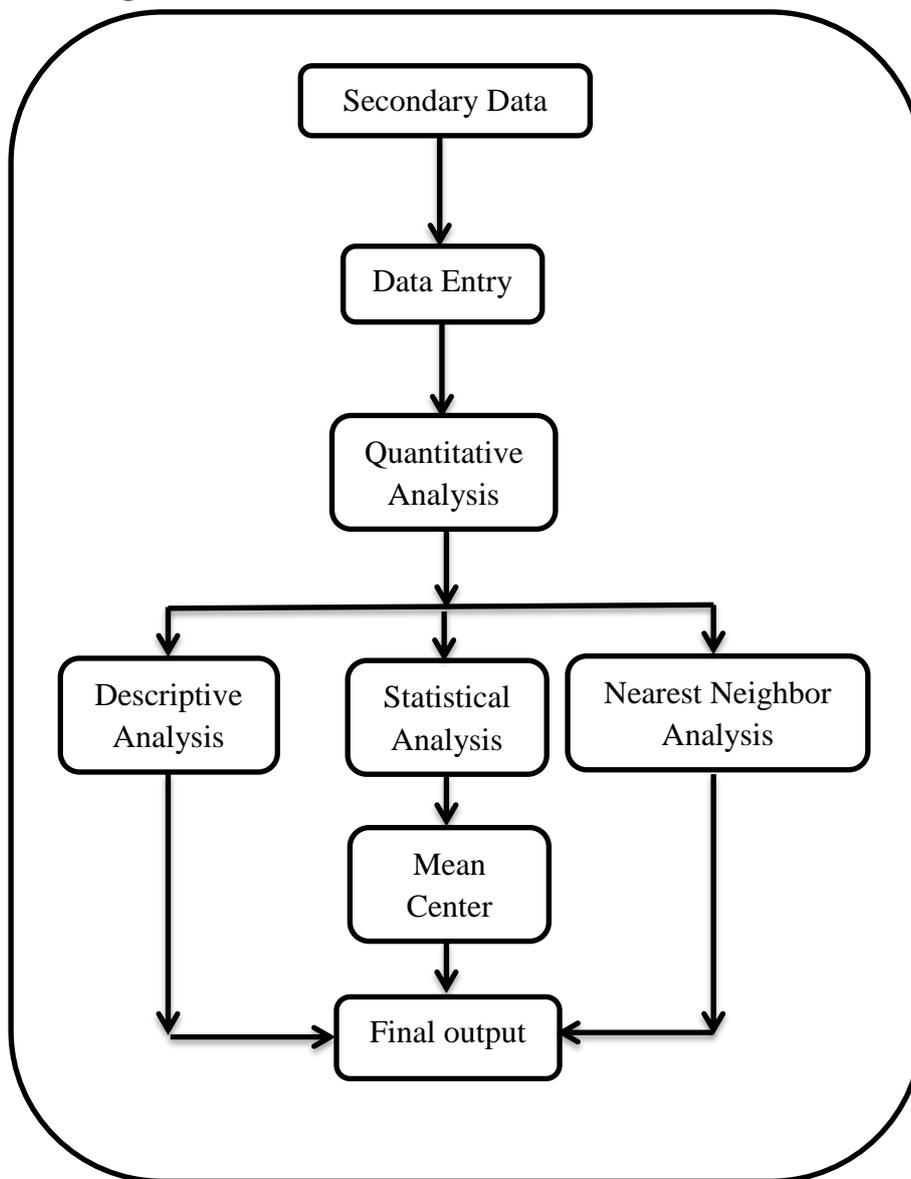
Figure (4) Research design

**Sources**: Survey Data, Thanlyin Township Education Office

Data Analysis

Ownership of High Schools

The table and pie chart show the number and percentage of high schools in Thanlyin Township area based on their ownership. The government owns 14 high schools representing 82.30%, while the private schools own 3 high schools representing 17.70%. They are below:

Table 1:   Ownership of High Schools in Thanlyin Town\ship.

Ownership	Number of schools	Percentage
Government	14	82.30%
Private	3	17.70
Total	17	100.00%

Source: Office Education Thanlyin Township
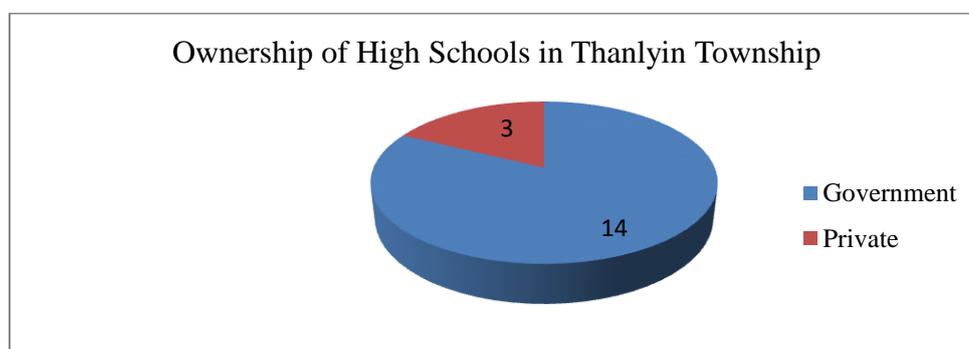
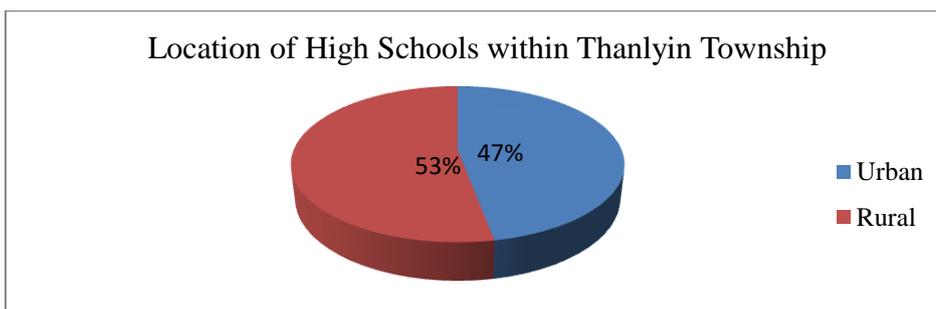**Figure (5) Pie Chart showing High schools Ownership**
Source: Author, 2022

Location of High schools

The table and pie chart show location of high schools in Thanlyin Township. According to the survey result, total number of schools in Thanlyin Township was 17 high schools , among them 8 high schools (47% of total schools) were found in urban area and the rest 9 high schools (53% of total schools) were found in rural area. They are below:

Table 2:   Location of High Schools in Thanlyin Township

Location	Number of schools	Percentage
Urban	8	47%
Rural	9	53%
Total	17	100%

Source: Office Education Thanlyin Township

Figure (6) Pie Chart Showing High Schools Location
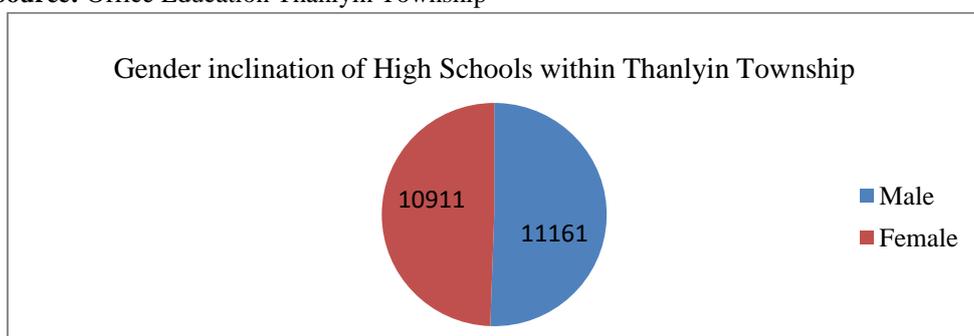**Source**: Author, 2022

Gender inclination

The table and pie chart indicate the gender inclination of high schools in Thanlyin Township. The male are having every high schools representing 51 %, the female are having every high schools representing 49 %.

Table 3:   **Gender inclination of High Schools within Thanlyin Township**

Gender	Number of schools	Percentage
Male	11161	51%
Female	10911	49%
Total	22072	100%

Source: Office Education Thanlyin Township

Figure (7) Pie Chart Showing High Schools Gender Inclination
Source: Author, 2022

Students –Teacher Ratio

The research shows that the availability of teachers in Thanlyin Township. There are three types of teachers and students in the research. They are government teachers and students in urban area, government teachers and students in rural area and private teachers and students in urban area.

The students-teacher ratio is a simple measurement of the number of students enrolled in a school compared to how many full-time equivalent teachers are employed there. This is a very high-level method to evaluate educational systems to determine teacher workload and get a general idea of the level of individual attention available to students.
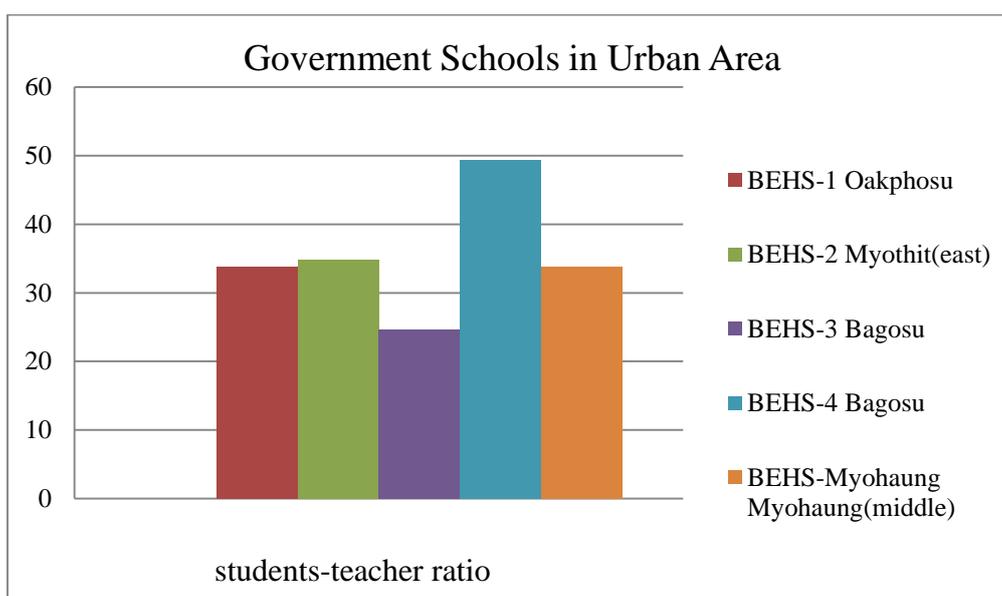
Calculation of Students- Teacher Ratio

Class size is calculated by dividing the number of students enrolled by the number of classes. The students-teachers ratio is obtained by dividing the number of full-time equivalent pupils at a given level of education by the number of full-time equivalent teachers at that level and in similar types of institutions.

Table 4:   Government High Schools in Urban Area

No	School categories	Students -Teacher Ratio
1	BEHS-1	34
2	BEHS-2	35
3	BEHS-3	25
4	BEHS-4	49
5	BEHS-Myohaung	34

Source: Office Education Thanlyin Township

According to the research data, the highest students- teacher ratio found with 49 students in a class in BEHS – 4. And also the lowest students– teacher ratio found with 25 students in a class in BEHS – 3 in urban area.

Figure (8) Government High Schools in Urban Area
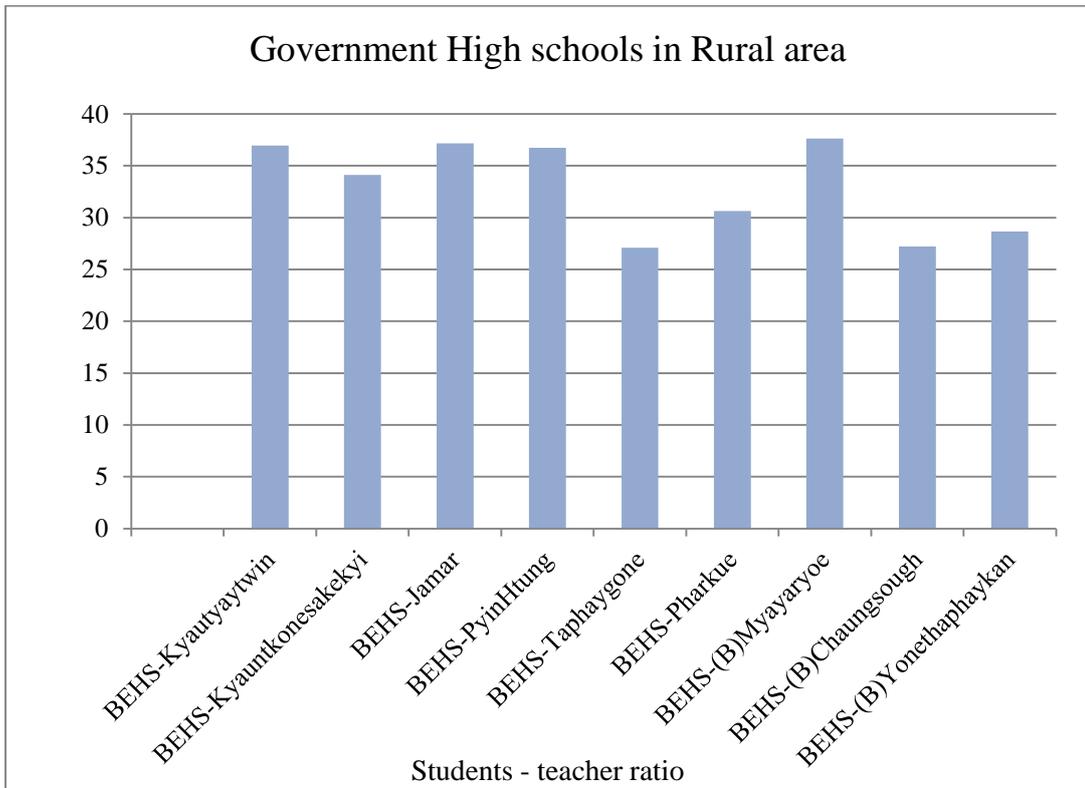 **Source**: Author, 2022

Table 5:   Government High Schools in Rural Area

No	School categories	Students-Teacher Ratio
1	BEHS-Kyautyaytwin	37
2	BEHS-Kyauntkonesakekyi	34
3	BEHS-Jamar	37
4	BEHS-PyinHtung	37
5	BEHS-Taphaygone	27

6	BEHS-Pharkue	31
7	BEHS-(B)Myayaryoe	38
8	BEHS-(B)Chaungsough	27
9	BEHS-(B)Yonethaphaykan	29

Source: Office Education Thanlyin Township

According to the research data, the highest students- teacher ratio found with 38 students in a class in BEHS-(B) Myayaryoe. And also the lowest students – teacher ratio found with 27 students in a class in BEHS-Taphaygone and BEHS-(B)Chaungsough .

**Figure (9) Government High Schools in Rural Area**
Source: Author, 2022

Table 6:   Private High Schools in Urban Area

No	School categories	Students -Teacher Ratio
1	TTEC	13
2	New Bridge	8
3	Nay Min Sandar	10

Source: Office Education Thanlyin Township

At Private High Schools in Urban Area, the highest students- teacher ratio found with 13 students in a class in TTEC. And also the lowest students – teacher ratio found with 10 students in a class in New Bridge.

Private Schools in Urban Area

TTEC ▪ New Bridge ▪ Nay Min Sanda
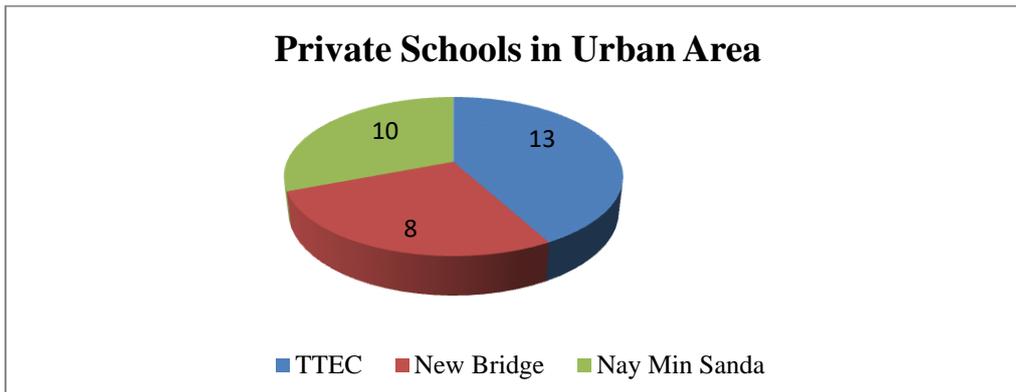
Figure (10) Private High School in Urban Area
Source: Author, 2022

Distribution of High Schools

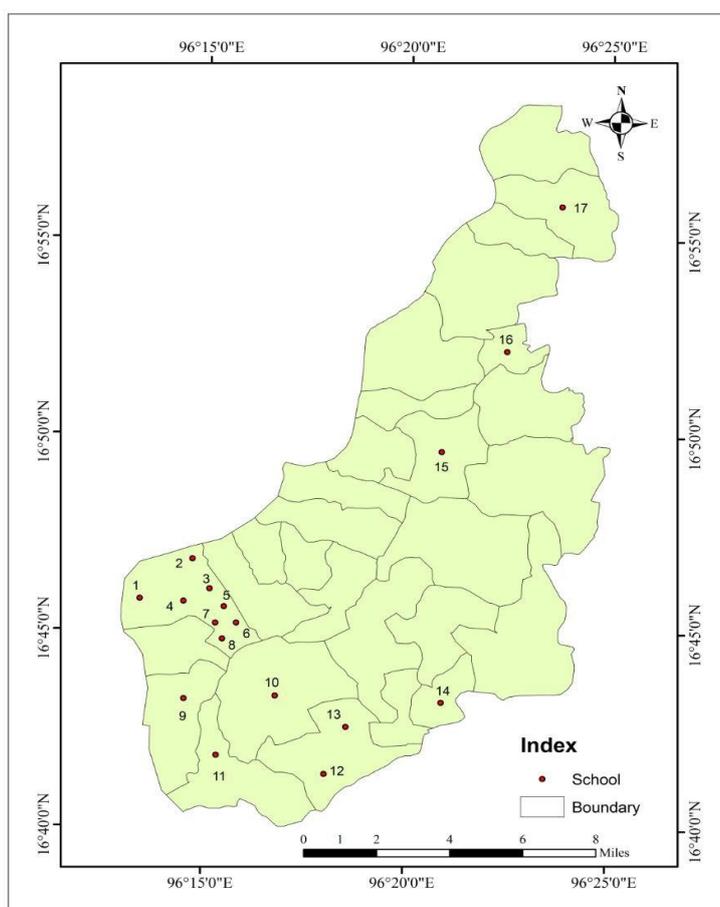The distribution of high schools in Thanlyin Township is shown with the following table.

Table 7:   Distribution of High schools in Thanlyin Township

No	High schools	Wards
1	BEHS-1	Oak Pho Su
2	BEHS-2	Myoe Thit (east)
3	BEHS-3	Ba Go Su
4	BEHS- 4	Ba Go Su
5	BEHS- Myoe Haung	Myoe Haung (middle)
6	BEHS- Kyauk Yae Twin	Hpa Yar Kone
7	BEHS-Kyaung Kone Seik Gyi	Ah Lun Soke
8	BEHS-Gya Mar	Kyaung Kone Seik Gyi
9	BEHS-Pyin Htaung	Let Yet San
10	BEHS-Tha Paya Kone	Tha Paya Kone
11	BEHS-Hpar Ku	Hpar Ku (east)
12	BEHS-(B) Mya Yar Yoe	Let Yet San
13	BEHS-(B)Chaung Sauk	Chaung Sauk
14	BEHS-(B)Yone Tha Phay Kan	Yone Tha Phay Kan
15	TTEC	Oak Pho Su
16	New Bridge	Yae Nan
17	Nay Min Sanda	Thauk Taw Twin

Source: Township Education office, Thanlyin Twonship

Nearest Neighbor Analysis of High Schools in Thanlyin Township

Nearest Neighbor Analysis measures the spread or distribution of something over a geographical space. It provides a numerical value that describes the extent to which a set of points are clustered or uniformly space. (Source: Wikipedia)

Figure (11) The nearest neighbor distance of high schools in Thanlyin Township
Source: Author, 2022

Table 8: **The Nearest Neighbor Distances of High Schools in Thanlyin Township**

Point	Name of High Schools	Nearest Point	Name of High Schools	Distance
1	New Bridge	4	BEHS-2	0.4″
2	BEHS- Myoe Haung	3	Nay Min Sanda	0.3″
3	Nay Min Sanda	5	TTEC	0.2″
4	BEHS-2	3	Nay Min Sanda	0.3″
5	TTEC	6	BEHS- 1	0.2″
6	BEHS- 1	5	TTEC	0.2″
7	BEHS- 4	8	BEHS-3	0.2″
8	BEHS-3	7	BEHS- 4	0.2″
9	BEHS-Gya Mar	11	BEHS- Kyaung Kone Seik Gyi	0.6″
10	BEHS- Kyauk Yae Twin	13	BEHS-Pyin Htaung	0.7″
11	BEHS-Kyaung Kone Seik Gyi	9	BEHS-Gya Mar	0.6″
12	BEHS-(B) Mya Yar Yoe	13	BEHS-Pyin Htaung	0.5″
13	BEHS-Pyin Htaung	12	BEHS-(B) Mya Yar Yoe	0.5″

14	BEHS-(B)Chaung Sauk	13	BEHS-Pyin Htaung	0.9″
15	BEHS-(B)Yone Tha Phay Kan	16	BEHS-Tha Paya Kone	1.2″
16	BEHS-Tha Paya Kone	15	BEHS-(B)Yone Tha Phay Kan	1.2″
17	BEHS-Hpar Ku	16	BEHS-Tha Paya Kone	1.6″
N=17				∑r = 9.8″

Source: Author, 2022

From the geographic point of view, the high schools are neither cluster nor disperse distributed. In order to know the spatial distribution of high schools, "Nearest Neighbor Analysis" is used. The calculated value by using the formula is 0.79 and thus the distribution of high schools within Thanlyin Township is random rather than cluster or disperse distributed.

Mean Center

The Mean Center tool uses to compare distributions of different type of feature (Point, Polygon). It computes the average X and Y coordinates of all feature (shape, Point) in the study area, and generate a new point indicate the center. The Mean Center tools used to determine the central point of population density and high schools. When calculating the mean center of high schools in the study area, the results were found to be centered in the Myoma (South) in urban area and in the Sit Pin Kwin in rural area.
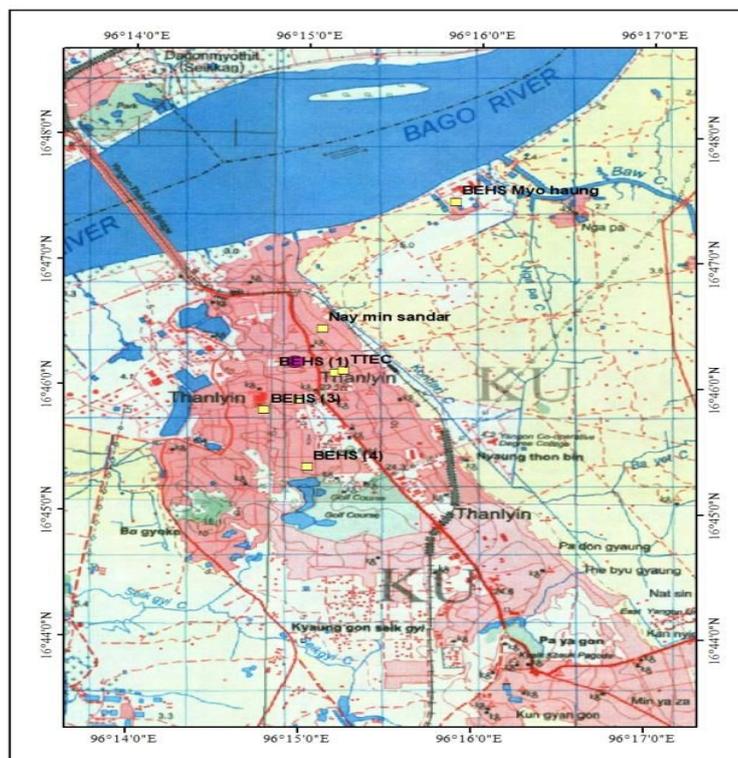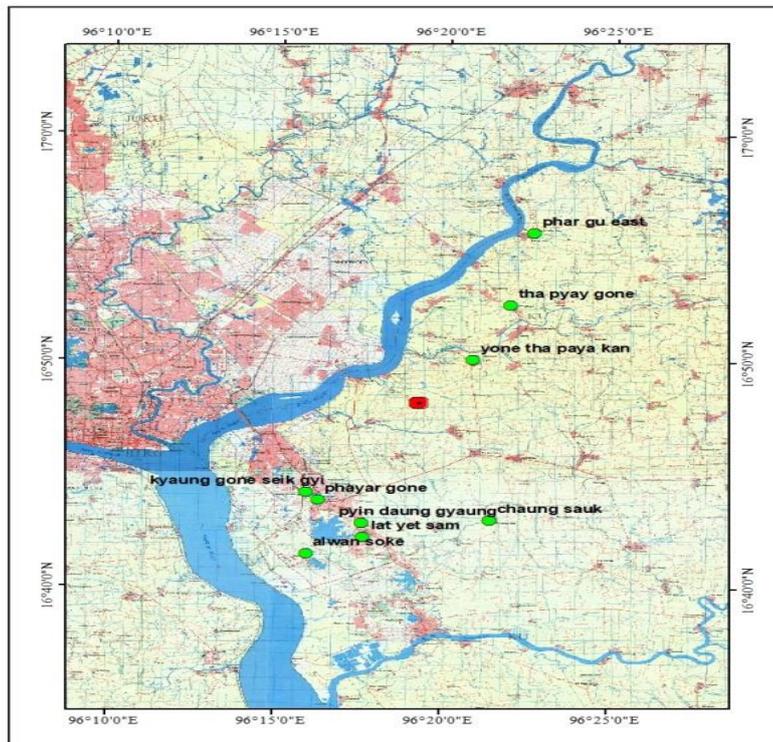

Figure (12) Mean center distribution of schools Thanlyin in Urban area

Figure (13) Mean center distribution of schools Thanlyin in Rural area
Source: Author 2022
Finding and Suggestion

The government owns 14 high schools representing 82.30%, while the private schools own 3 high schools representing 17.70%. According to the survey result, total number of schools in Thanlyin township was 17 schools , among them 8 high schools (47% of total schools)   were found in urban area and the rest 9 high schools (53% of total schools) were in rural area. The male are having every high schools representing 51 %, the female are having every high schools representing 49 %. At government high school in urban area, the highest students- teacher ratio found with 49 students in a class in BEHS – 4. And also the lowest students – teacher ratio was found with 25 students in a class in BEHS – 3. At government high school in rural area, the highest students- teacher ratio found with 38 students in a class in BEHS-(B) Myayaryoe. And also the lowest students– teacher ratio was found with 27 students in a class in BEHS-Taphaygone and BEHS-(B) Chaungsough. At private high school in urban Area, the highest student-teacher ratio found with 13 students in a class in TTEC. And also the lowest student – teacher ratio was found with 10 students in a class in New Bridge. The nearest neighbor analysis calculated value by using the formula is 0.79 and thus the distribution of high

schools within Thanlyin Township is random rather than cluster or disperse distributed. When calculating the mean center of high schools in the study area, the results were found to be centered in the Myoma (South) in urban area and in the Sit Pin Kwin in rural area.

Conclusion

This study attends to analyze the distribution pattern of high schools in Thanlyin Township from statistical and spatial approaches. In terms of relative number of schools between rural and urban areas, there seems to be balance in the number of schools between the two areas which is very commendable. Nearest Neighbor Analysis, according to the distribution pattern of high school in Thanlyin Township is random type. In general, the coverage of school is reasonably good. When calculating the mean center of high schools in the study area, the results were found to be centered in the Myoma (South) in urban area and in the Sit Pin Kwin in rural area. It can be supposed that the population factor is the significant factor for distribution of high schools. Therefore, it would be appropriate to build another high school in this area.

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